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THE SAVVY AVIATOR

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The Savvy Aviator #55: Is Repair A Lost Art?

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by **Mike Busch**

Columnist

The Savvy Aviator

When the co-owner of a 1976 Cessna 172M contacted me, she had just come from talking to her mechanic and was clearly in a state of sticker shock:

"Where can I locate a used battery box for my Skyhawk without having to rob a bank? Our Gill battery (that has constantly leaked from shortly after we bought it) has caused corrosion that cannot be repaired, so we are told. Our plane is down for its annual, and apparently will remain unairworthy until this issue is resolved to the FAA's standards.

"In the past, we've used acid-proof paint to protect the aluminum box, and pads to soak up any leakage, but the problem has now become severe enough that the A&P says we have to replace the whole box. I thought our current one could be repaired, but according to the mechanic, the bottom of the box has the stamp on it that makes it legal, and that area is damaged and needs to be replaced.

"New boxes from Cessna are $600, which we find totally ridiculous and unacceptable. What can we do? Are there any alternatives? I'm so upset about this that I'm ready to sell our lovely plane and eliminate the letters 'FAA' from my alphabet."

It infuriates me when mechanics give this sort of advice to owners. There is absolutely no reason on earth that the existing battery box can't be repaired. There's no FAA rule that says the box needs some magic stamp to be legal. (It might need a magic stamp to be legal to *sell*, but not to *use*. Big difference!)

Minor Repair

Repairing the battery box is a "minor repair" and can be done by any A&P mechanic using standard sheet-metal repair techniques. Those techniques are thoroughly documented in the A&P mechanic's bible, **FAA Advisory Circular AC 43.13-1B**, "Acceptable Methods, Techniques, and Practices -- Aircraft Inspection and Repair." The resulting repair requires nothing more than a simple logbook entry. In short, it's no big deal.

The FARs classify aircraft repairs as being either "major" or "minor." These terms are defined in **FAR §1.1** as follows:

Major repair *means a repair:*

About the Author ...

Mike Busch has been a pilot for more than 40 years and 7,000 hours, and an aircraft owner and CFI for more than 35 years. He became increasingly interested in the maintenance aspects of aircraft ownership about 20 years ago, and ultimately earned his A&P/IA.

Mike is also a prolific aviation writer, with hundreds of technical articles published in Air Facts, ABS Magazine, Aviation Safety, AVweb, CPA Magazine, Cirrus Pilot Magazine, IFR, Light Plane Maintenance, and The Aviation Consumer. He co-founded AVweb in 1995 and served as its editor-in-chief for more than seven years.

Mike conducts weekend **"Savvy Owner Seminars"** at which aircraft owners learn how to obtain better aircraft maintenance while spending a lot less money.

Mike was recently honored by the FAA as National Aviation Maintenance Technician of the Year for 2008.

1. *That, if improperly done, might appreciably affect weight, balance [limits], structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or*

2. *That is not done according to accepted practices or cannot be done by elementary operations.*

***Minor repair** means a repair other than a major repair.*

In addition, **FAR Part 43 Appendix A** lists numerous examples of repairs that the FAA considers to be major repairs. It is not an exhaustive list, but provides helpful guidance in understanding how the FAA interprets the aforementioned definitions.

A major repair is one that the FAA wants to know about. It must be done in accordance with "approved data" that has been officially blessed by an authorized representative of the Administrator (typically an FAA engineer, inspector, or designated engineering representative). It must be inspected and approved by an IA. And it must be documented on an FAA Form 337 (record of major repair or alteration) and filed with the FAA Records Branch in Oklahoma City, where it becomes a permanent part of the aircraft's official records.

In contrast, a minor repair is one that the FAA considers sufficiently inconsequential that it doesn't want to know about it. It does not require approved data, does not require an IA to inspect and approve it, and does not require a Form 337 to be prepared and filed. It may be performed by any A&P mechanic, and documented with a simple logbook entry.

A minor repair may be done in accordance with "acceptable data," which simply means materials, methods, and techniques that meet FAA certification standards and conforms with accepted industry practices. Acceptable data includes (but is not limited to) FAA Advisory Circulars; manufacturer's maintenance manuals, service bulletins and service kits; and military specifications (mil-specs) and technical manuals. Unlike approved data, acceptable data does *not* require FAA approval.

The determination of whether a particular repair is major or minor is made by the mechanic who is performing the repair, using FAR 1.1 and Part 43 Appendix A as guidance. In making this determination, the mechanic is essentially deciding whether the repair is "above his pay grade" and requires FAA and IA involvement. The overwhelming majority of aircraft repairs are minor repairs. Without question, repairing an aluminum battery box is a minor repair.

Repairing a battery box is a minor repair. If beyond repair, consider a PMA replacement (shown here) or a serviceable part from a salvage yard.

Of course, the Skyhawk owner may well have had other options as well. It's very likely that a PMA-approved battery box is available from a third-party source at a price substantially less than what Cessna charges. It's also quite likely that a used but serviceable battery box can be obtained from a salvage yard. All of these are legal alternatives to the high-priced spread.

Owner-Produced Part

Here's yet another option: Even if the Skyhawk's battery box was on the verge of crumbling into primeval aluminum-oxide dust and was totally unrepairable, it would still be perfectly legal for the aircraft owner to produce one from scratch (using the original as a template and using the same dimensions and materials), and document it in the logbooks as an "owner-produced part" in accordance with **FAR §21.303(b)(4)**. In doing this, the owner could enlist the aid of his A&P, a machine shop, or anyone else he likes and it would still qualify as an owner-produced part.

It's an oddity of the FARs that mechanics may repair broken parts, but they have no authority to produce new parts from scratch. However, the FARs grant precisely that authority to aircraft owners, so long as the parts they produce are for installation on their own aircraft and not for sale or for installation on an aircraft they do not own.

The owner need not actually make the part with his own two hands. The FAA will consider a part to be owner-produced (and therefore legal) if the owner is meaningfully involved in its production in any of the following ways:

1. Provides the specifications or the part to be duplicated;

2. Provides the materials to make the part;

3. Provides manufacturing techniques or assembly methods;

4. Provides quality assurance; or

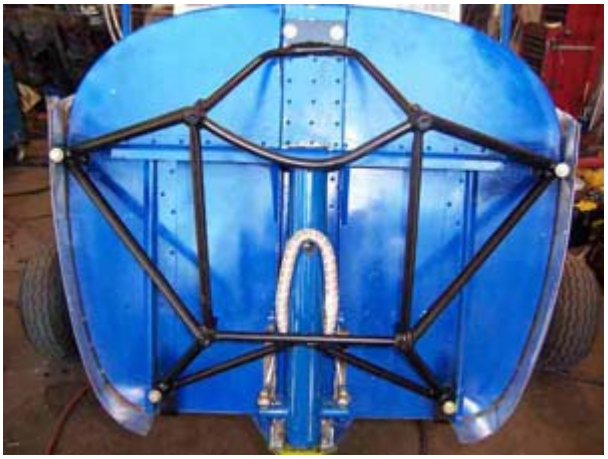
5. Supervises the manufacture of the part.

The only catch is that, to be legal, an owner-produced part must be airworthy. To be airworthy, it must conform to the aircraft's type design. Therefore, if you decide to fabricate a battery box for your Skyhawk, you must duplicate the original battery box as closely as possible, using the same dimensions, materials and construction methods used in the original.

You'll usually need help in fabricating an owner-produced part, and the most likely person to ask to help you is your A&P. That's because the owner-produced part won't do you much good unless your A&P is satisfied that it is airworthy and is willing to install it and approve your aircraft for return to service. The best way to ensure you A&P is satisfied that the part is airworthy is to get him involved in its production. In fact, your mechanic can legally manufacture the owner-produced part for you provided you supervise his work!

Major Repair

If the repair you need is a major repair, things get a bit more complicated ... but only a bit. Another story may be instructive here.



Repairing an engine mount is a major repair, but approved data for such a repair can be found in AC 43.13-1B.

Not long ago, I was contacted by the owner of a Cirrus SR22 that was undergoing its annual inspection at an authorized Cirrus Service Center. The inspecting mechanic discovered some light corrosion on the aircraft's welded-steel-tubing engine mount, caused by an exhaust leak.

The mechanic informed the owner that repair of an engine mount is a major repair that requires approved data. (He was correct. Engine-mount repair is listed as a major repair in Part 43 Appendix A.) He advised the owner that it would be necessary to obtain an Engineering Order (EO) from Cirrus for the repair, and that Cirrus had quoted an engineering fee of $2,000 to prepare the EO -- that was just for the paperwork, and did not include parts or labor for the repair itself!

Needless to say, the Cirrus owner was not amused, so he contacted me for advice. I counseled him that although an engine mount repair is a major repair, there was no need to pay Cirrus for an EO because the FAA has already provides data for performing such a repair in AC 43.13-1B. The signature page of that AC states, in pertinent part:

> *The repair data [in AC 43.13-1B] may also be used as approved data, and the AC chapter, page, and paragraph listed in block 8 of FAA Form 337 when:*
>
> *a. The user has determined that it is appropriate to the product being repaired;*
>
> *b. It is directly applicable to the repair being made; and*
>
> *c. It is not contrary to manufacturer's data.*

Furthermore, AC 43.13-1B indicates that if the corrosion is sufficiently minor and it can be removed mechanically without reducing the tubing wall thickness by more than 10 percent, no further repair is necessary other than priming and painting.

The owner approached his Service Center with this information, but they would not budge, and continued to insist that they could not repair the engine mount without an EO from Cirrus. I counseled the owner to find another A&P not associated with the Service Center and ask him to look at the corroded mount. He did so, and the independent mechanic confirmed my suspicion that the corrosion was so minor that it could simply be removed with a scouring pad and elbow grease, then primed and painted without requiring any structural reinforcement.

At my advice, the owner then instructed the Service Center to finish up the annual but without addressing the engine-mount corrosion, and to sign off the annual with a discrepancy. The owner then proceeded to taxi his aircraft to the other A&P's shop, where the corrosion was treated and the aircraft approved for return to service for just a couple hundred bucks.

Defensive Maintenance

If you read **my column about mechanic liability**, you understand why A&P mechanics are paranoid about being sued, and with good reason. Since the passage of the General Aviation Revitalization Act of 1994, there has been an explosion of lawsuits against aircraft maintenance shops and mechanics. It's a terrible problem.

Nevertheless, it really bugs me how much "defensive maintenance" is going on these days by mechanics who are more interested in

legal "CYA" than in doing what's right and reasonable for their aircraft-owner customers. There's no reason for aircraft owners to put up with stuff like that. The next time an A&P tells you that you have to do something expensive because FAA regulations require it, you might consider doing what the Skyhawk and Cirrus owners did: Contact your type club and ask for a second opinion.

See you next month.

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*Want to read more from Mike Busch? Check out the rest of his **Savvy Aviator columns**.*
*And use **this link** to send questions to Mike.*