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HANDS ON / SAVVY AVIATOR



Owner-Produced Parts

Replacement parts you can make yourself for certificated aircraft

BY MIKE BUSCH

THE 1960s AND 1970s were the biggest years for production of piston GA airplanes. By the peak production year of 1979, manufacturers like Beech, Cessna, Mooney, Piper, and others were pushing new airplanes out the door as fast as they could, and owners were snapping up all they could produce. This came to a crashing halt in the early '80s, when the effects of a double-dip recession were magnified by passage of massive tax reforms that eliminated financial incentives to buy new airplanes. Piston GA manufacturing all but ceased, and it has never really recovered.

It's no surprise, then, that most of the piston GA aircraft flying today are between 30 and 50 years old. Keeping these aircraft flying is becoming more challenging every year, particularly with respect to finding replacement parts. Some manufacturers—notably Cessna—continue to do a far better job of keeping replacement parts available for these out-of-production aircraft than we have any right to expect. Other manufacturers don't support their legacy aircraft nearly as well. Many parts are becoming breathtakingly expensive, and some are simply unobtainable at any price.

For those parts that are available from the manufacturer, pricing seems to invert the normal laws of supply and demand. Parts that deteriorate or wear out quickly and need to be replaced frequently are often priced reasonably (at least by aircraft standards), but parts that need replacement only rarely can cost a king's ransom. The cost of parts is often a function of how many are produced. If a manufacturer sells only one or two of a particular part in a year, the cost of keeping that part in production can easily get out of hand.

ALTERNATIVES TO OEM PARTS

The cost of high-volume replacement parts is kept within reason by competition from third-party sources that manufacture replacement parts under an FAA parts manufacturer approval (PMA). A company other than the manufacturer that wants to make and sell replacement parts for installation on certificated aircraft must apply to the FAA for permission to do so, and convince the FAA that its parts are equivalent in form, fit, and function to the original equipment manufacturer (OEM) parts they replace. It must also show that its specifications and quality-control procedures will ensure that the parts it produces are of quality at least equal to the OEM parts. The FAA will then issue the company a PMA authorizing it to enter the replacement parts business. Such PMA parts are often less expensive than those from the factory, and generally they're every bit as good as—and sometimes better than—OEM parts.

Generally, companies will only go through the expense and hassle of applying for a PMA for parts that are in reasonably

high demand. If you need an often-replaced part like a seat track, flap roller, fuel bladder, or wheel fairing, you often have PMA alternatives to buying a part from Beech, Cessna, or Piper.

On the other hand, if you need a new wing rib, elevator trailing edge, or cowl flap, the OEM is likely the only source—if indeed the part you need is available at all. If it is, be prepared for serious sticker shock.

Sometimes your best bet may be to find a used serviceable part from a salvage yard. Generally, salvage yards will sell you parts in “as removed” condition for about 50 percent of what a new part costs from the OEM. When the part arrives, you and your mechanic should inspect it to ensure that it is airworthy. If you find the part unsatisfactory, any reputable salvage yard will allow you to return it for a full refund.

Without such a provision, an aircraft needing a replacement part not available from the manufacturer, a PMA supplier, or a salvage yard would be permanently grounded.

THE OWNER-PRODUCED ALTERNATIVE

But there may be yet another alternative: Fabricate the part yourself, or hire someone to fabricate it for you.

In light of the FAA's emphasis on ensuring that only fully documented approved parts be used, and its stepped-up enforcement actions against purveyors of unapproved aircraft parts, it might seem counter-intuitive that it would allow an aircraft owner to produce repair parts for his own aircraft. But that's indeed the case, and it's a lucky thing, too. Without such a provision, an aircraft needing a replacement part not available from the manufacturer, a PMA supplier, or a salvage yard would be permanently grounded. That's why the FAA made provisions for an owner to produce his own repair parts as “the source of last resort.”

The rules that govern owner-produced parts are a bit cryptic and often poorly understood. Before you try to take advantage of them, you'd better be sure that you and your mechanic understand them.

WHAT THE REGS SAY...

Part 21 of the FARs contains the rules for certification of products (aircraft, engines, propellers, and appliances) and parts. The key regulation concerning repair parts is Section 21.303:

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SECTION 21.303

REPLACEMENT AND MODIFICATION PARTS

- (a) Except as provided in paragraph (b) of this section, no person may produce a modification or replacement part for sale for installation on a type-certificated product unless it is produced pursuant to a Parts Manufacturer Approval issued under this subpart.
- (b) This section does not apply to the following:
 - (1) Parts produced under a type or production certificate.
 - (2) Parts produced by an owner or operator for maintaining or altering his own product.
 - (3) Parts produced under an FAA Technical Standard Order.
 - (4) Standard parts (such as bolts and nuts) conforming to established industry or U.S. specifications.

So parts sold for installation on a certificated aircraft, engine, propeller, or appliance must be either an OEM part produced under a type certificate or production certificate or a non-OEM part produced under a PMA or TSO. There are two exceptions: “standard parts” and “owner-produced parts.”

The FAA has traditionally interpreted “standard parts” to mean fasteners and other parts meeting National Aerospace Standards (NAS), Air Force-Navy Aeronautical Standard (AN), Society of Automotive Engineers (SAE), SAE Aerospace Standard (AS), and Military Standard (MS). On March 5, 1997, the FAA published a Notice of Interpretation in the *Federal Register* that broadened the definition of “standard parts” to include standard electronic parts such as resistors, capacitors, diodes, transistors, and non-programmable integrated circuits. Prior to 1997, it was technically illegal to replace a burned-out panel light rheostat or dimming transistor with one purchased at your local Radio Shack—now it’s officially kosher.

The meaning of “owner-produced parts” was rather murky until April 5, 1993, when Donald P. Byrne, the FAA’s assistant chief counsel for regulations, issued a memorandum defining the term “owner (or operator) produced part” as used in FAR 21.303(b)(2). Byrne’s memo clarifies the FAA’s interpretation of the owner-produced parts exception, and as you’ll see, that interpretation is surprisingly generous and liberal.

...AND WHAT THEY MEAN

Byrne explained that it is not necessary for the owner to actually manufacture the part himself for the part to be considered an “owner-produced part.” The owner may contract with a mechanic, a repair station, or even a non-certificated individual or firm (e.g., a machine shop) to manufacture the part for him, provided that the owner “participated in controlling the design, manufacture or quality of the part.” The FAA deems the part to be owner-produced if the owner does any of the following things:

- Provides the manufacturer with design or performance data from which to manufacture the part—this test would be met if the owner provides the manufacturer with the old part and asks that it be duplicated; or
- Provides materials to make the part; or
- Provides fabrication processes or assembly methods to be used in making the part; or
- Provides quality control procedures to be used in making the part; or
- Supervises the manufacture of the part.

In short, a part whose manufacture is contracted by the aircraft owner will qualify as “owner-produced” if the owner participates in the production of the part in any meaningful way at all.

THE MECHANIC’S ROLE

Interestingly, while FAR 21.303 authorizes an owner or operator to produce repair parts for his own aircraft, it does not

authorize an A&P mechanic to produce parts for use in a repair. Except for certain special situations involving STCs or major repairs or alterations made under an FAA field approval, an A&P is allowed to maintain, repair, and modify parts, but not to make a new replacement part.

But, an owner or operator may contract with a mechanic (or non-mechanic) to produce a repair part for the owner, and that part will be considered an “owner-produced part” under FAR 21.303 so long as the owner “participates in controlling the design, manufacture or quality of the part” by providing the specifications or materials or supervising the manufacture of the part.

While only the owner or operator is allowed to produce an “owner-produced part,” it typically requires an A&P mechanic or certified repair station to install the part on the aircraft, determine that the resulting repair is airworthy, and approve the aircraft for return to service.

The bottom line is that the use of the “owner-produced part” provision typically requires teamwork between the owner and mechanic. It makes no sense for an owner to produce a repair part for his aircraft unless he’s sure that his mechanic is willing to install it and sign off the repair as airworthy. The best way for the owner to ensure that his mechanic will consider the owner-produced part airworthy is to enlist his mechanic’s help in producing the part.

IS THE PART AIRWORTHY?

If the owner-produced part is to be used to effect a major repair—a wing spar or primary control surface or landing gear strut, for example—then the repair must be inspected and signed off by an A&P with inspection authorization (IA) and documented on FAA Form 337.

In completing the Form 337, the A&P/IA must certify that the owner-produced part conforms to FAA-approved data. As a general rule, this means either the owner-produced part was made from a manufacturer-approved drawing, or it was made by duplicating an existing approved part and therefore all materials and dimensions can be determined from the existing part. If the A&P/IA has any doubts about whether or not the part conforms to approved data, he may choose to ask the local flight standards district office for a field approval of the repair (which could delay return of the aircraft to service) or require that a designated engineering representative be hired to generate the necessary approved data.

If the owner-produced part is to be used for an ordinary “non-major” repair—replacing a damaged wing rib or fairing or interior trim part, for example—then the part can be approved and the repair signed



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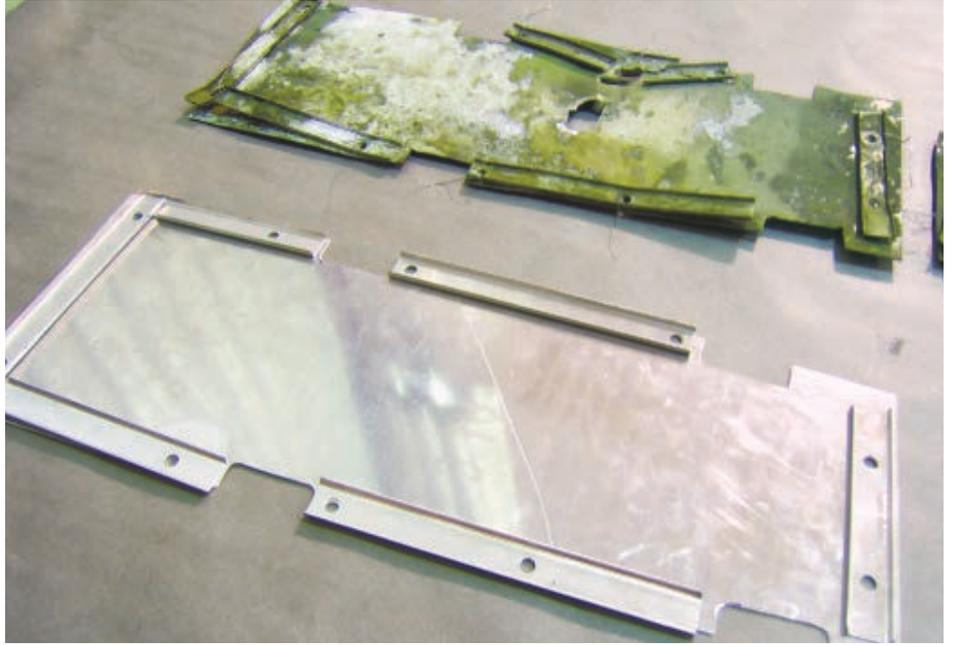
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The FAA has made provisions for an owner to produce his own repair parts if the parts are not otherwise available from the manufacturer, a PMA supplier, or salvage yard, but before you go ahead and start cranking out pieces, be sure you and your mechanic understand the regs.

off by any A&P (not necessarily an IA), and just an ordinary logbook entry is required. However, the mechanic still needs to ensure that the owner-produced part conforms to the aircraft type design, which may be easy or difficult depending on what kind of part is involved.

In all cases, the mechanic must also ensure that the repair is made (to quote FAR 43.13) “in such a manner and us[ing] materials of such a quality that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered condition (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness).”

Presumably if the owner works with the mechanic to produce the part, the mechanic will be satisfied that the part conforms to and the repair meets the “at least equal to the original” requirement of FAR 43.13.

SIGNING OFF THE REPAIR

Although it’s seldom done, the best and safest way to document a repair involving an owner-produced part (and ensure that the feds are happy) is to make two separate entries in the aircraft maintenance records—one by the owner who produced the part, and one by the mechanic who installed it and approved the aircraft for return to service.

The owner should make and sign a logbook entry that identifies the part as an owner-produced repair part under FAR 21.303(b)(2), describes the approved data used in manufacturing the part (generally either a manufacturer-supplied drawing or duplication of an existing approved part), and explains the owner’s participation in controlling the design, manufacture, or quality of the part (e.g., furnished materials or supervised the manufacture). The owner must sign and date the logbook entry.

The mechanic should then document the repair work and approve the aircraft for return to service with a normal logbook entry made in accordance with FAR 43.9. The mechanic’s entry can state that he helped manufacture the owner-produced part, but should clearly state that the owner supervised the manufacture, furnished the materials, or otherwise participated in controlling the design, manufacture, or quality of the part.

When the paperwork is complete, it should be obvious to anyone reading the logbook that the owner was responsible for producing the part and ensuring its conformity to the aircraft’s type design, and the mechanic was responsible for installing the part, making any other necessary repairs, and approving the aircraft for return to service.

With this sort of owner/mechanic teamwork, almost anything is possible. *EAA*

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