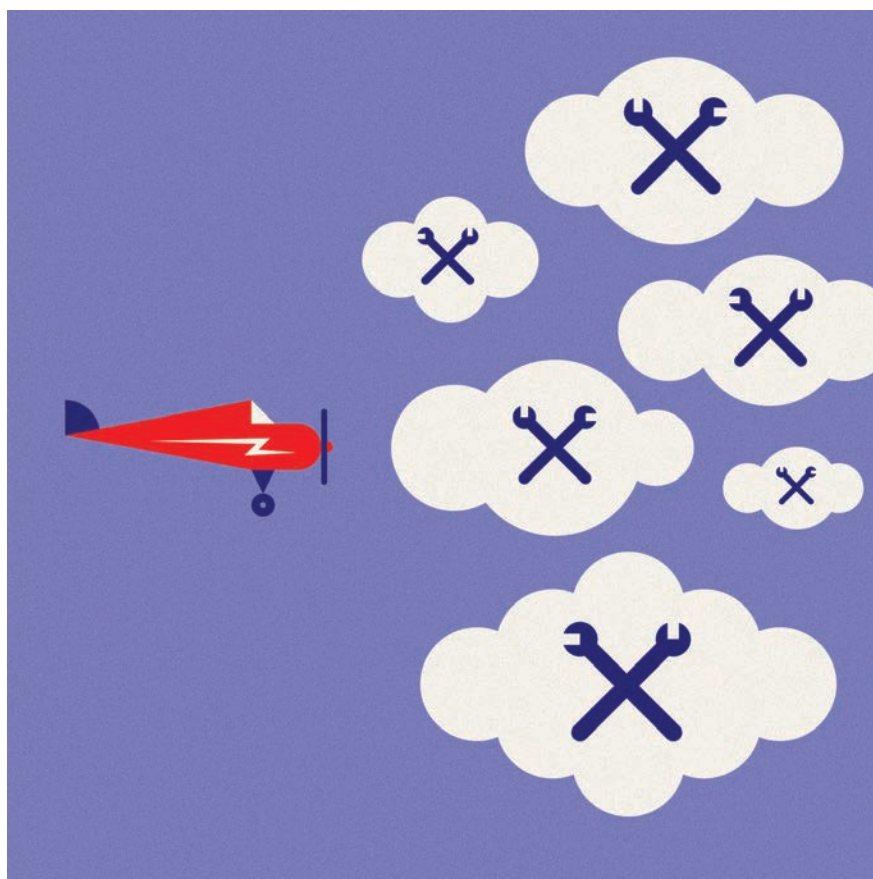


SAVVY MAINTENANCE / OPINION

Six big mistakes

Common blunders owners make in the maintenance of their aircraft

BY MIKE BUSCH



RECENTLY A COLLEAGUE asked me to identify the most common mistakes aircraft owners make when managing the maintenance of their aircraft, and to explain what they can do to avoid making them. After a bit of thought, I made a list of six errors I see owners make a lot. All these mistakes can result in increased expense, downtime, and frustration. Most are fairly easy to avoid with a little thought and effort. Here are my “savvy six.”

GREG MABLEY

1. Not saying no

The biggest mistake that owners make is failing to say no to unnecessary maintenance. Perhaps they don't know what work to say no to. Maybe they don't understand that they have the authority to say no to work that their A&P says is needed.

To make matters worse, most owners are profoundly uncomfortable saying no to their shops and mechanics. They shouldn't be. It's their job to say no. As my colleague Paul New, A&P/IA, is fond of saying, “It

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isn't your mechanic's job to make your maintenance affordable, it's yours." Paul is spot-on.

Most GA airplanes are grossly over-maintained. That's because most owners let their A&Ps decide what maintenance is necessary rather than making those decisions themselves. Mechanics make decisions based on very different motivations than owners do. Both owners and mechanics want the aircraft to be safe and legal. But owners also want to minimize expense, while mechanics want to minimize their liability in case something goes wrong.

To minimize their perceived liability, mechanics will usually do things strictly "by the book." The book in question is the manufacturer's maintenance manual. The maintenance that the manufacturer calls for in the maintenance manual is usually grossly excessive for most aircraft for reasons I'll get into shortly. If mechanics are allowed to decide what maintenance work to do, they will invariably do a lot more work than is necessary to make the aircraft safe, reliable, and legal. A lot of this excessive work is "defensive maintenance" done to minimize the mechanic's liability rather than to make the aircraft safer or more reliable.

Owners need to understand that maintenance is not an inherently good thing (like exercise) where the more we do, the better. Instead, maintenance should be thought of as a necessary evil (like surgery) that we sometimes have to do, but we sure don't want to do it any more than absolutely necessary. More maintenance is not better. Usually, it's worse.

A huge amount of scientific research proves this conclusively, ranging from the work of C.H. Waddington with the Royal Air Force in the 1940s to the development of reliability-centered maintenance (RCM) by United Airlines scientists Stanley Nowlan and Howard Heap in the late 1960s and early 1970s. (I discuss this in detail in my first book, *Manifesto*.)

So, whenever your mechanic tells you that he needs to perform some maintenance task on your aircraft that is going to be costly and/or invasive, determine whether or not that maintenance task is demonstrably necessary to make the aircraft safe, reliable, and legal. You need to ask yourself (or your mechanic), "What's

the worst that could happen if we don't do this?" Unless you are absolutely convinced that the work is necessary, it's your job to say "no thanks."

2. Not requiring authorization

You won't have the opportunity to say "no thanks" unless you establish and enforce a set of ground rules for how you and your shop or mechanic work together. The most important of these ground rules is that the shop will do no work on your aircraft without your authorization. If the shop believes that they have the discretion to perform whatever work they consider necessary or appropriate, you've effectively abdicated your maintenance management authority to your mechanic. The result is often unpleasant surprises at invoice time (i.e., sticker shock), which can lead to disputes, hard feelings, and occasionally lawyers getting involved.

To avoid this, you need to make it clear that they are not permitted to do any work on your aircraft without your explicit written authorization. Your authorization needs to be in writing so there can be no debate over exactly what you authorized the shop to do. Email or even text message works fine for this. Your authorization needs to be specific (e.g., "I approve removing the number 2 cylinder and sending it out to Tim's Aircraft for overhaul").

Take care never to give the shop a blank check. Never tell the shop, "Please troubleshoot and fix the problem with the electric trim." Instead, say, "I approve up to two hours of labor to troubleshoot the problem with the electric trim and report your findings to me."

Annual inspections are a special case. When you put your airplane in the shop for its annual ordeal, give the shop specific marching orders along the following lines: "You are authorized to perform the annual inspection on [insert aircraft] at the agreed-to flat-rate inspection fee of [insert dollar amount] and to report back to me your findings and repair recommendations. You are not authorized to do any repairs or order any parts until I have had the opportunity to review your inspection findings and to specifically approve or decline your repair recommendations."

3. Not requiring estimates

Of course, you can't make an informed decision about whether to approve work that the shop recommends without first knowing what it's going to cost. I find it astonishing how often owners allow their shops and mechanics to do work on their aircraft without requiring a written cost estimate.

Aircraft maintenance is a business transaction, and needs to be handled like a business transaction. Most people wouldn't make a purchase—whether having their house painted or buying a pair of shoes—without knowing exactly what it's going to cost. Why do so many aircraft owners give their mechanics the go-ahead to do work that might cost thousands of dollars with nothing more than a smile and a handshake? That's no way to do business.

In most states, an automotive repair shop is not permitted to work on your car without first giving you written work order containing a detailed description of each task they propose to perform and exactly what each will cost. You need to require the same from your aircraft repair shop or mechanic. If you give your shop a blank check—explicitly or implicitly—and then are shocked by the invoice, you really don't have a leg to stand on. Don't let it happen.

4. Not declining work that's due

One of the best ways to eliminate excessive maintenance (and associated expense) is to give serious consideration to saying no to work your shop or mechanic wants to do because the maintenance manual says it's due even though there's nothing demonstrably wrong with the component involved. The word "due" is a big red flag that makes me spring-loaded to say no.

Our maintenance manuals are chock full of maintenance tasks that are supposed to be done every so many hours, months, or years. Lycoming wants you to overhaul your engine every 2,000 hours or 12 years, whichever comes first. Hartzell wants you to overhaul your propeller every 1,500 hours or six years. Cirrus wants you to replace your battery every two years, your alternator every 500 hours, and a whole bunch of stuff every five years. The maintenance manual for my Cessna 310 contains more than 250 of these "due" maintenance items. (If I did all that stuff when Cessna

says it's "due" my airplane would never fly and I'd need to take out a second mortgage.)

Almost all this manufacturer's "when to" guidance is only a suggestion, not a requirement. The FAA doesn't require noncommercial (Part 91) operators to comply with TBOs or pay any attention to other manufacturer-prescribed inspection, maintenance, overhaul, or replacement intervals. With only two exceptions, it's up to the aircraft owner whether to comply with such "when to" guidance. In most cases, it makes sense to ignore such guidance and only perform maintenance when it's demonstrably necessary based on actual condition.

One huge problem with TBOs and other manufacturer's "when to" guidance is that it's a "one size fits all" guidance that ignores how regularly the aircraft is operated, whether it lives in a hangar or outdoors, whether it lives in an area of high or low corrosion risk, and other factors. Since the guidance has to work for the entire fleet, it's always calibrated for the worst-case aircraft. Since your airplane is probably not the worst-case, following the manufacturer's "when to" guidance is almost certainly excessive.

If your Cessna 182 flies 40 hours a year and spends most of its life tied down outdoors in South Florida, then it might make sense to overhaul your O-470 every 12 years and your prop every six years. On the other hand, if your Bonanza flies 140 hours a year and lives in a hangar in Denver or Boise or Missoula, it would be crazy to do that.

Generally, aircraft components should be maintained "on-condition" rather than on a fixed timetable. There are a handful of exceptions (like magnetos) whose condition cannot be determined without taking them apart, or whose TBOs are FAA-mandated by airworthiness directives or airworthiness limitations. Except for those few things, when your shop tells you "your xxx is due" your response should be, "No thanks, I'll pass."

5. Not running to failure

The purpose of preventive maintenance is to prevent failures. (Corrective maintenance is what we do after something has failed.) Preventing failures sounds like a good thing. But often it doesn't make sense.

We should only approve preventive maintenance that's worth doing. To do that, we need to think about the consequences of failure. If the failure of a component is an "acceptable failure"—one that doesn't compromise safety of flight and isn't likely to cause us to be stuck somewhere we don't want to be—then it doesn't make sense to spend money trying to prevent it. The optimal maintenance strategy for components whose failure is acceptable is to run the component to failure and then repair or replace it when it fails.

My Cessna 310 has two expensive 400-series vacuum pumps, one mounted on each engine. The pumps are required to operate my deice boots and used to drive my vacuum operated gyro instruments (before I got rid of them and installed a pair of Garmin GI 275s). Now, the manufacturer says these pricey vacuum pumps should be replaced every 500 hours. In my view, doing so would be ridiculous because the failure of a vacuum pump is a totally acceptable failure—the remaining pump is perfectly capable of operating the boots and spinning the gyros. Because the vacuum system is fully redundant, the only sensible strategy is to run each pump until it fails and then replace it. The same logic would apply to a single-engine airplane equipped with a standby vacuum system.

Similarly, the Cirrus SR22 has a fully redundant electrical system with dual alternators, dual batteries, and dual electrical buses. The manual calls for alternator replacement every 500 hours, which doesn't make much sense given that the failure of one alternator is an acceptable failure in this aircraft. If I owned an SR22, I would run the alternators to failure.

6. Accepting "shotgunning"

Picture this: You're on a cross-country flight when your engine suddenly hiccups. It really gets your attention. You instinctively push the mixture full-rich and switch tanks. The engine runs normally and the problem doesn't recur.

Upon returning home, you put your airplane in the shop and tell your A&P what happened. What does he do? In all probability, he cleans and gaps all your spark plugs, removes and cleans your fuel injector nozzles, checks your gascolator and

fuel control unit filters for contamination, and checks your mag timing. Maybe he installs new spark plugs or sends out your magnetos for overhaul. What did your A&P just do? Did he diagnose your engine problem and then fix it? No, what he did was to work on everything he could think of that might have been wrong, hoping to get lucky. In the industry, we call this "shotgunning" and it's a huge cause of costly and unnecessary maintenance.

Diagnosis needs to be based on data. For an engine hiccup, the best diagnostic approach would be to dump and analyze the digital engine monitor data for the incident flight. Other good tools for gathering data would be a borescope inspection of the cylinders and perhaps an oil filter inspection. All too often, however, mechanics skip the diagnosis phase and go straight to the therapy phase without really knowing what's wrong and instead relying on guesswork. Don't let this happen.

If your mechanic tells you something like "I think we should overhaul the magnetos" or "I think we should install new spark plugs," your response should be, "What evidence do we have that the mags (or plugs) caused the problem?" Unless your mechanic can answer this question in a clear, convincing, data-driven fashion, you should probably say no and try to refocus him on gathering diagnostic data.

Owner in command

These six common owner mistakes represent failures of the owner to stay in control of maintenance, and abdication of maintenance decision making to their mechanic or shop. An aircraft owner who has mastered the art of staying in control of their maintenance is one I like to call an "owner in command." If you own an aircraft, that what you should aspire to be. ■

mike.busch@savvyaviation.com

► savvyaviation.com

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