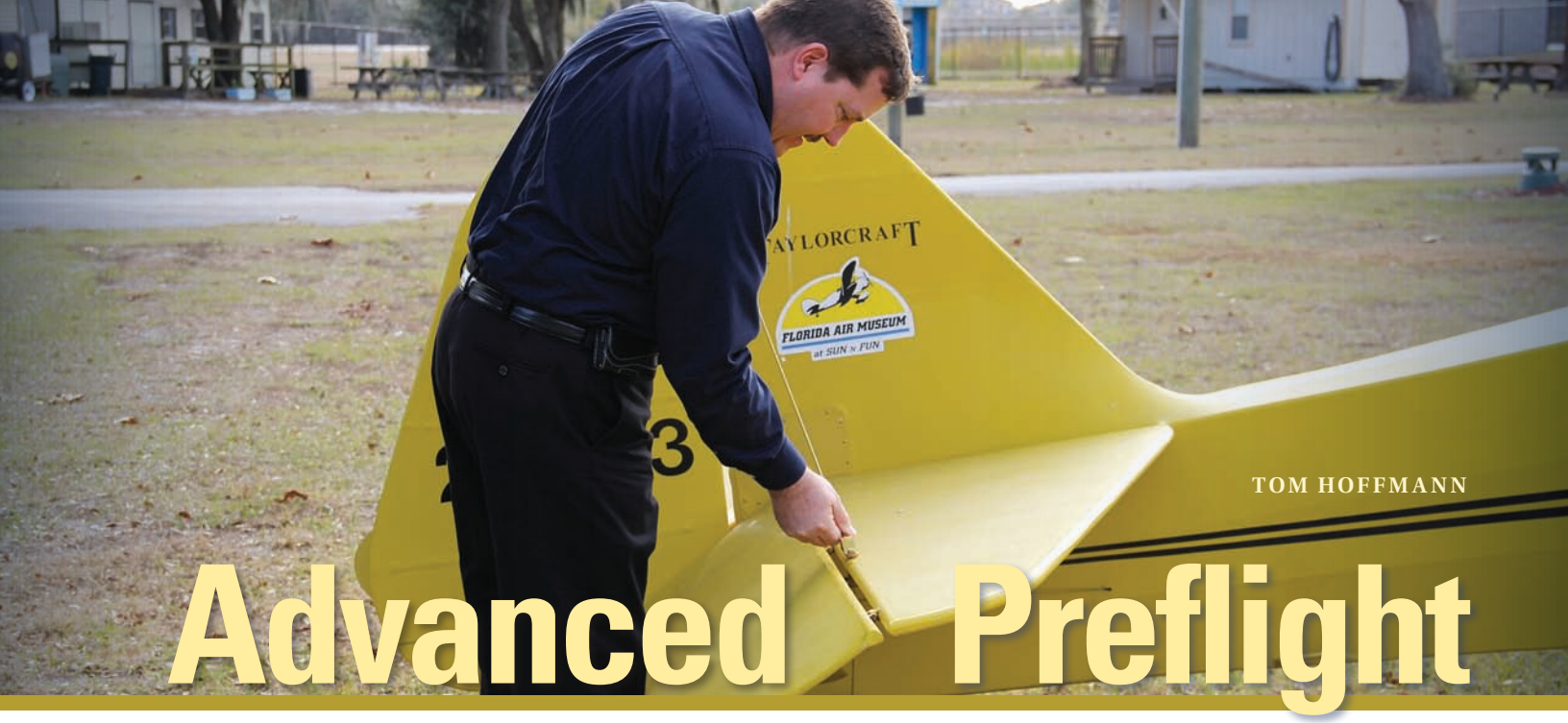


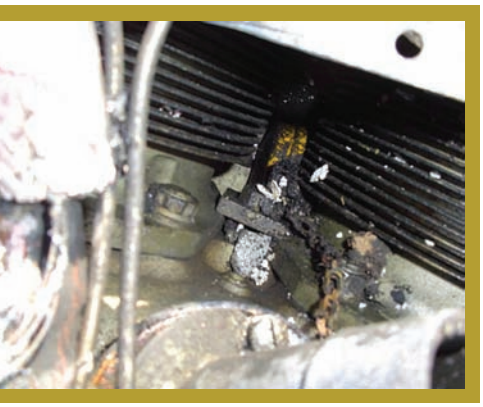
TOM HOFFMANN

Advanced Preflight

Take Your Preflight Inspection to the Next Level

At an airport near Tulsa, Okla., a pilot, his wife, and their infant grandchild climbed aboard a Cessna 210 *Centurion* one late August afternoon for what should have been a routine flight. The proud grandparents were flying their seven-month old granddaughter back to her home in Joplin, Miss. The scene was set for a safe flight with 10-mile visibility and light winds. But what started without incident ended quickly in tragedy.

On the day of departure the pilot was seen taxiing to the self-serve fuel pump, but no witnesses could say if the pilot had preflighted the aircraft. After topping off with fuel the pilot and his precious cargo departed for their destination. Shortly after take-off, the pilot requested an emergency landing after oil began splattering across his windshield. Another aircraft in the pattern reported seeing the aircraft in distress flying well below pattern altitude, and its pilot witnessed the plane crash and burst into flames after a one-and-a-half turn spin.



The Cessna 210's oil filler cap was found unsecured between cylinders 4 and 6.

On-scene accident investigators determined the engine was producing power at the time of impact and discovered traces of oil on the larger fragments of the windshield. Closer investigation also revealed the "smoking gun"— the oil cap hanging from its chain, wedged between two of the engine cylinders below the oil filler neck. Was this cap left unsecured by an AMT during a previous oil change? Or, did the pilot, perhaps after seeing that the level was low, add extra oil and forget to secure the filler cap? Those two questions remain unanswered.

During the engine teardown and records review of the *Centurion*, it was discovered the annual inspection had been completed five months before the accident. Also, the installed oil filter adapter was found to be out of compliance with a recurring Airworthiness Directive (AD). Further review of the records indicated that at one point the adapter had been replaced by one the AD did not affect. However, evidence suggested that following that installation, someone had replaced it with yet another adapter in which the AD was now applicable again, and then never documented its installation. For the next few years, this item was overlooked during subsequent annual inspections and oil changes by more than one AMT with Inspection Authorization (IA). Although this component was not determined to be the cause of the accident, it was believed to have contributed to an oil leak.

As you can see here, there are a few things that led up to this unfortunate loss of life. However, these red flags could have been easily discovered and mitigated with a more rigorous preflight inspection. The accident also illustrates a couple salient and yet often overlooked points for aircraft owners: Just how well do you know your aircraft, and who exactly is inspecting and maintaining it? Enhancing your relationship with both your aircraft's history and your mechanic are both critical components of an *advanced preflight*.

Advancing Towards Safety

Wait a minute! Advanced preflight? I already follow all the items on my preflight checklist. Do I have to check things differently now, or is this some new checklist I need? That's a typical reaction FAA Airworthiness Inspector Steve Keesey gets when describing the concept of an advanced preflight. While not advocating an outright replacement for your preflight checklist, Keesey does recommend stepping up your approach to a procedure that can quite possibly make the difference between a safe flight and your last flight.

"Advanced preflight is a program that helps aircraft owners and pilots become more aware of all the safety-related data pertaining to their aircraft," says Keesey. "In addition, it focuses on being more aware of who maintains your aircraft, and how to apply a detailed approach to your preflight inspection based on a review of the aircraft's maintenance history."

As evidence of its importance in helping reduce GA accidents, the FAA Safety Team (FAASTeam) has adopted "advanced preflight" as one of the three core topics of its annual Safety Standown, a nationwide event designed to raise safety awareness for pilots. While loss of control events lead the pack when it comes to GA fatalities, NTSB accident data from 2000-2009 shows poor preflight inspections caused or contributed to 156 GA accidents and 41 fatalities. No one knows how many other accidents may have been indirectly affected by an improper preflight inspection.

Referring to the *Centurion* accident, Keesey notes that an advanced preflight could have helped change the tragic outcome of that flight. "Had the pilot applied better aircraft maintenance history research techniques, he would have discovered the oil filter adapter was out of compliance and had it corrected or replaced well before the flight," he says. "A similar conclusion may have been reached if the pilot had probed a little more into the knowledge and expertise of the AMT working on his aircraft, perhaps prompting a discussion and discovery of the noncompliant part." Keesey also observes that a more thorough walk-around inspection immediately before flight could have made a big difference in this case by allowing the pilot an opportunity to realize the oil filler cap may not have been secured.

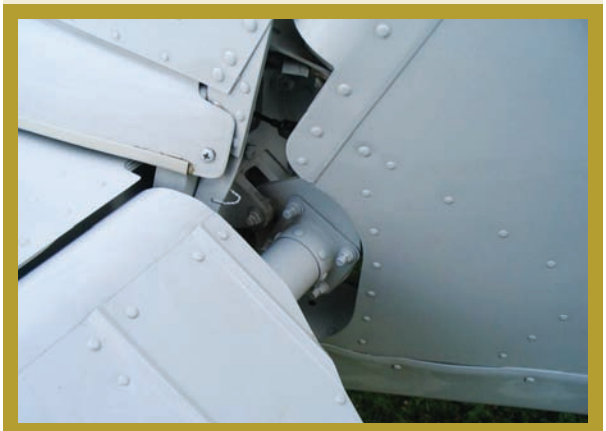
Know Your Aircraft

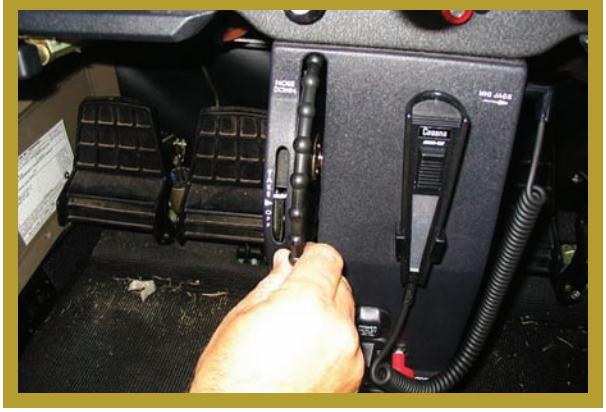
The backbone of any good preflight inspection begins with knowledge: knowledge of your aircraft's history, its systems and components, and its propensity for possible failures or weak spots—the sometimes inconspicuous items not always covered in an AD or Service Bulletin. A quality records review is the best way to acquire an intimate knowledge of an aircraft's maintenance history. You'll need to include all available resources: logbooks and records, maintenance manuals, ADs, manufac-

Opposite page top: During the empennage preflight, apply forward, aft, and lifting pressures to all surfaces. Inspect attaching hardware for proper installation and security.

Below: (top) Inspect the condition of the control surface structure and associated hardware. Hint: If you see a castellated nut, it should have a cotter pin securing it. If it's a self-locking nut, or one with a locking type washer, rule-of-thumb is to see at least one full thread protrude beyond the top of the securing nut.

(bottom) Checking proper operation and position of trim controls is especially important after maintenance or before each flight if you rent/borrow an aircraft. Does the trim move in the correct direction and is there any abnormal noise during operation?





Advanced Preflight Highlighted at Safety Standdown

For more information on Advanced Preflight, be sure to check out one of the many FAASTeam Safety Standdown seminars in your area this April. A list of events can be found at http://faasafety.gov/standdown/.

turer's service letters and bulletins as well as any repair and alteration history. This can take some detective work, so be sure to ask an AMT, a type club member, or even your local FAASTeam representative for help. Many of the tools to help you find what you need are conveniently available on www.FAA.gov. You can also request a complete copy of records for your aircraft by going to http://aircraft.faa.gov/e.gov/ND/.

If you're not the original owner, you'll also want to know how and where it has been stored (hangar or ramp) and what types of environments it has been exposed to (high humidity, salt-water, extreme heat, etc.). Also, ask how much and what type of flying was done (flight training, banner towing, etc.). All of these conditions affect aircraft in different ways, and many can accelerate the aging process.

Advanced preflight is a program that helps aircraft owners and pilots become more aware of all the safety-related data pertaining to their aircraft

Know Your AMT

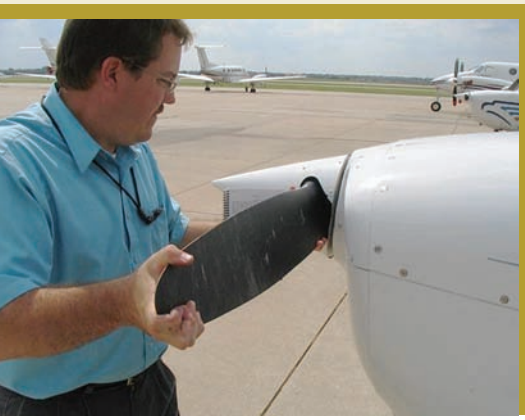
Do you know who's maintaining your aircraft? Part of an advanced preflight is getting to know your AMT. Ask questions before a procedure or repair is done to ensure that the AMT is qualified and has the proper experience with your type of aircraft or component. You can always get a second opinion if you're not comfortable with a specific suggestion or mechanical diagnosis. Building a relationship with an AMT will not only help you learn more about your aircraft, but it may also enable you to feel more comfortable with pointing out items that you're unsure of, or believe need corrective action. Type club members are another good source of information for helping you perform a more advanced preflight. Their expertise with your particular aircraft or flying environment could prove invaluable.

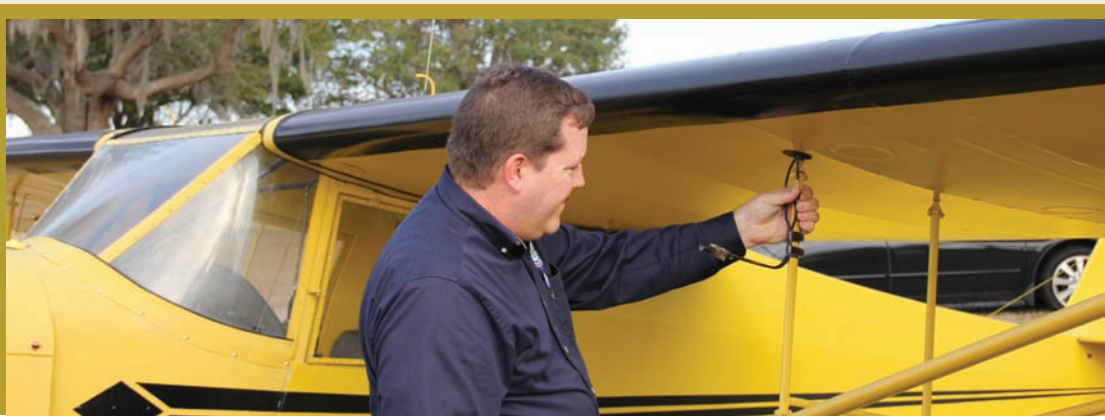
Putting it All Together

Armed with a greater knowledge of your aircraft and who is maintaining it, you are now ready for the practical application of an advanced preflight: the walk-around inspection. "This inspection is likely your last chance to determine the safe operational condition before a flight," says Keesey, who recommends starting with the manufacturer's checklist if one is available. While most checklists are thorough, they won't always cover everything you need to check. Keesey advises letting a checklist form the basis of your preflight inspection, but warns not to let it set the limits of what you check. "There's no one-size-fits-all when it comes to checklists," says Keesey. "Every aircraft is unique, and so it only follows its preflight be unique too."

For example, if an aircraft's history shows a repair was made (let's say a spar splice) ensure you check the area around that repair during every preflight. Even if the item or area is not easily visible or

Left to right: 1. During the prop inspection, look for signs of erosion, pitting, and leading or trailing edge damage (nicks). If any of these items are discovered, notify an AMT for assistance in corrective action. Refer to your prop manufacturer's service manual for damage allowable limits.
2. During pitot tube inspection, look for blockage, attaching hardware, and all visible wiring, fittings, and lines.





accessible, be on the lookout for signs like buckling or cracked paint, which may indicate a problem with the part's structural integrity. The repair could also be a one-time compliance procedure, so don't rely on an AMT's workmanship to act as a lifetime warranty. Instead, keep a constant eye out for anything out of the ordinary.

Also, be aware of how vague some checklists can be. The word "check" can indicate several things so learn what it means specifically for the item you're inspecting. For instance, when checking flight control surfaces, the act of checking involves integrating and interpreting visual, aural, and tactile cues. With control surfaces, you'll want to apply movement with pressure against hinge points while looking for cracks, feeling for looseness or binding, and listening for any abnormal sounds.

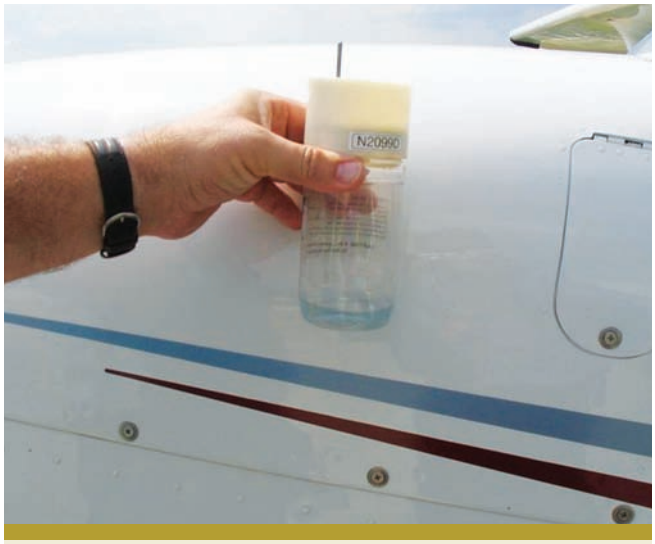
Your Preflight Toolkit

As with any job, having the right tools is always important, and that includes preflight inspections. For most aircraft, a checklist, a fuel tester and a stepladder are three of the more common tools to aid in your inspection. You may also want to grab a rag and that flashlight at the bottom of your flight bag. Besides helping your hands stay clean, a rag can also help buffer the heat of a scorching-hot oil filler cap and provide some extra leverage with a tricky latch or fastener. The flashlight provides visual access to the inner recesses of control surface assemblies and cables, not to mention the critter hideout spots under the cowling.

Another good resource to use when perfecting your preflight skills is an AMT, CFI, or another owner who knows your aircraft well. Ask them to follow you around on a preflight. They can point out things you never knew or bothered to check as well as highlight areas that are prone to aging or corrosion. One deceptive type of corrosion, called fretting, is often regarded as "that black streaky stuff" found on certain surfaces and components. Keesey points out that it is sometimes mistaken for dirt, then wiped away and disregarded—even by AMTs. For more detailed photos on this and other corrosion types, have a look at AC 43-4A, *Corrosion Control for Aircraft*.

Summing It Up

Although advanced preflight is a new concept, it is designed to enhance what you've already been doing. Given the lack of attention preflight inspections are sometimes given, as well as how many subtle factors are at play when it comes to forming a picture of complete airworthiness and flight safety, consider it a way of kick-starting a good habit and challenging yourself to look at things differently before each flight.



When checking fuel for contamination, always hold up against a contrasting object.

The advanced preflight concept also doesn't apply to just aircraft owners. "It is a valuable tool whether you own, rent or borrow an aircraft," says Keesey. "It takes some discipline and dedication, but done properly, an advanced preflight can significantly increase your chances of a safe flight."

Steve Keesey contributed to this article and is serving as a subject matter expert during the 2012 FAA Safety Standdown. He is an FAA Airworthiness Inspector and FAASTeam Program Manager in Oklahoma City, OK.

Tom Hoffmann is an editor of FAA Safety Briefing. He is a commercial pilot and holds an A&P certificate.

Learn More

Link to FAASTeam M (Maintenance) Pamphlet
www.faasafety.gov/gslac/ALC/lib_categoryview.aspx?categoryId=3

"Going Beyond Preflight," March/April 2011 FAA Safety Briefing
www.faa.gov/news/safety_briefing/2011/media/MarApr2011.pdf

Best Practices Guide to Aging GA Aircraft
www.faa.gov/aircraft/air_cert/design_approvals/small_airplanes/cos/aging_aircraft/media/aging_aircraft_best_practices.pdf