Kansas City Flight Standards Office

Airworthiness Facts

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Service Bulletins

Yes, this can be an Awkward Conversation for all:

What is a Service Bulletin? Is it Mandatory? Who publishes Service Bulletins- the manufacturers or is it a FAA document? And, why a Service Bulletin?

Is a Service Bulletin Mandatory? The answer is no and sometime yes. The FAA can make an AD (Airworthiness Directive) from these publications and this makes them mandatory. Service Bulletins that do not become AD's are still highly recommended.
See FAA Order 8620.2A, National Policy, Applicability and Enforcement of Manufacturer's Data. This document states in part, "…unless any method, technique, or practice prescribed by an OEM in any of its documents is specifically mandated by a regulatory document, such as Airworthiness Directive (AD), or specific regulatory language such as that in Federal Aviation Regulation Part 43.15(b), those methods, techniques, or practices are not mandatory."

When manufacturers use the word **"Mandatory"** in big red letters, they are emphasizing a significant subject.

What drives a Service Bulletin?
The manufacturers are constantly researching accident reports, service difficulty reports (yes people do look at Service Difficulty Reports), and any other data they feel will give them the information they can use to improve their product and continue operating safely.

The manufacturers are trying to protect the customers (you and your customers) and themselves by discovering trends, weaknesses, and items that tend to wear without being noticed. They publish the Service Bulletins to make all of us aware of improvements we should make to enhance safety.

Data from accidents trends, failures, and sometimes-poor inspection habits drives the creation of Service Bulletins and this drives Airworthiness Directives.

I have included a couple of examples of how Service Bulletins come about.

On 07/23/2010, a Cessna U206F was crossing Lake Michigan at 10,000 feet above mean sea level when the engine lost power. They were near the mid-point of the lake (about 24 miles from the shoreline) with a 40-knot headwind, so the pilot turned to return to shore. He attempted to restart the engine but was unsuccessful. The pilot ditched the airplane about 5 miles from shore, and it quickly sank.

Background: CEN10FA465 (NTSB File Number)
Analysis:
The pilot reported that he was crossing Lake Michigan at 10,000 feet above mean sea level when the engine lost power. He was near the mid-point (about 24 miles from the shoreline) of the lake with a 40-knot headwind, so he turned around to return to shore. He attempted to restart the engine but was unsuccessful. The pilot ditched the airplane about 5 miles from shore and it quickly sank.

Post accident inspection of the airplane revealed that the firewall fuel strainer gasket did not provide a complete seal between the fuel screen and the fuel strainer's upper body. A portion of the gasket was positioned over the exit port, which created a gap. This allowed debris in the fuel to migrate to the engine's fuel inlet filter screen in the fuel metering assembly.

07/18/2018: A pilot stated that while maneuvering at 1,500ft., he heard a “deep knock” in the engine; the entire windshield became covered with oil (Made the pilot hard to see), and the engine lost power.

Background: ERA18LA195
Analysis:
The commercial pilot was conducting an aerial application flight. He stated that while maneuvering at 1,500ft, he heard a “deep knock” in the engine; the entire windshield became covered with oil, and the engine lost power. The pilot made a forced landing to a service road, during which the airplane struck a barbed-wire fence with the right wings before coming to rest in a field. Post-accident examination of the engine revealed the No. 2 cylinder had separated from the cylinder mounting deck. Two fractured sections of the left crankcase that included part of the No. 2 cylinder bore were found in the engine cowling. All but one of the No. 2 cylinder base studs and through-bolts remained in the cylinder bore and were fractured. The fractured surfaces exhibited signatures consistent with fatigue. The fatigue failure of the No. 2 cylinder studs and through bolts and the fracture of the crankcase led to the loss of engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

Fatigue failure of the No. 2 cylinder studs/through bolts and the fracture of the crankcase, which resulted in a total loss of engine power.

05/06/2019, Piper PA28: A flight instructor and student pilot, simulated engine-out emergency procedures in the airport traffic pattern. After takeoff, about 300-400ft. above ground level, witnesses reported that the flight instructor announced on the radio that the engine had quit. Witnesses said that the airplane then entered a nose-high, steep left turn before pitching down and impacting the ground. The engine examination revealed that excessive combustion deposits had jammed the No. 4 cylinder exhaust valve in the valve guide. The stuck exhaust valve likely resulted in a partial loss of engine power. Manufacturer service instructions suggested inspecting for valve sticking at regular intervals or sooner if operators suspected valve sticking. In this case, a flight instructor had reported the engine was running roughly the day before the accident. If a valve inspection had been completed, in accordance to engine manufacturer guidance the day before the accident following the engine roughness report, maintainers would have detected the heavy carbon deposits on the exhaust valve.

Background: ERA19FA164
Analysis:
The flight instructor and student pilot were conducting simulated engine-out emergency procedures in the airport traffic pattern. About 300-400ft. above ground level after takeoff, witnesses reported that the flight instructor announced on the radio that the engine had quit. Witnesses reported that the airplane then entered a nose-high, steep left turn before pitching down and impacting the ground. The day before the accident, the aircraft had experienced engine roughness. Following that flight, a mechanic cleaned the sparkplugs, performed an engine run-up, and returned the airplane to service; however, maintenance records did not show that the engine valves were inspected for sticking at that time. Manufacturer service instructions suggested inspecting for valve sticking at regular intervals or sooner if sticking was suspected. If a valve inspection had been completed in accordance with engine manufacturer guidance the day before the accident following the report of engine roughness, it is likely that the heavy carbon deposits on the exhaust valve would have been detected.

Post-accident examination of the airframe and flight controls revealed no mechanical anomalies that would have precluded normal operation. Examination of the engine revealed that the No. 4 cylinder exhaust valve was stuck in the valve guide due to excessive combustion deposits. It is likely that the stuck exhaust valve resulted in a partial loss of engine power.

Manufacturer service instructions suggested inspecting for valve sticking at regular intervals or sooner if sticking was suspected. If a valve inspection had been completed in accordance with engine manufacturer guidance the day before the accident following the report of engine roughness, it is likely that the heavy carbon deposits on the exhaust valve would have been detected.

Given that the flight instructor reportedly had students trim the airplane nose-up when landing, it is possible that the airplane was trimmed nose-high at the time of takeoff and the subsequent loss of engine power. Such a trim setting would have led to excessive pitch up, resulting in a rapid loss of airspeed, an exceedance of the airplane's critical angle of attack, and an aerodynamic stall at low altitude.

Probable Cause and Findings
The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A partial loss of engine power due to a stuck exhaust valve and the flight instructor's exceedance of the airplane's critical angle of attack following the loss of power, which resulted in an aerodynamic stall at low altitude.

Valve sticking in Lycoming reciprocating aircraft engines is addressed in Lycoming Service Instruction No. 1425A, dated January 19, 1988, Suggested Maintenance Procedures to Reduce the Possibility of Valve Sticking. The Service Instruction is applicable to all Lycoming direct-drive engines and states in part, that:

Investigations have shown that exhaust valve sticking occurs more frequently during hot ambient conditions. The lead salts that accumulate in the lubricating oil from the use of leaded fuels contribute to the deposit build up in the valve guides. This condition is eliminated each time the oil and filter are changed. Depending on the amount of deposits, sticking between the valve stem and guide can restrict the valve movement, which is often identified by an intermittent engine hesitation or miss.

The Service Instruction further states that, "exposing the engine to sudden cool down, as in a rapid descent with the power reduced, or shutting the engine down before it has sufficiently cooled down can also induce valve sticking." Textron Lycoming recommends 50-hour interval oil change and filter replacement for all engines using full-flow filtration system. A review of the accident airplane maintenance logs revealed that the engine had accrued 44.48 hours since the last oil change.

Valve sticking in Lycoming reciprocating aircraft engines is further addressed in Lycoming Mandatory Service Bulletin 388C and Lycoming Service Instruction 1485A. Mandatory Service Bulletin 388C, which, according to FAA regulations, is not mandatory for aircraft operated under 14 CFR Part 91, calls for all Lycoming reciprocating aircraft engines to be inspected at 400-hour intervals or earlier if valve sticking is suspected. If the valve and guide do not pass the inspection, then corrective action is to be taken as defined in Service Instruction 1485A. Once the guides are replaced with the newer Hi-Chrome guides, inspection is called for every 1,000 hours, half of the published time between overhauls (TBO), or when valve sticking is suspected, whichever occurs first.

Review of the accident airplane maintenance logs revealed that the No. 4 cylinder had accumulated a total of 591.85 hours since replacement with an Engine Component Inc. (ECI) Titan cylinder, part number TIST-04-1CA. ECI does not offer guidance regarding the frequency of inspection of the Hi-Chrome valve guides in order to detect valve sticking. A valve inspection was not performed after the flight instructor reported engine roughness the day before the accident flight.

Most Service Bulletins are available online. They are usually free, and aircraft owners can read them at their leisure. It is a great way to be informed of the safety issues the aircraft manufacturer has discovered over many years of supporting their aircraft. They may even decide on their own to comply with them.

Side note, yes SMS is coming, so we ask, what is SMS? It is a Safety Management Systems and consist of a set of policies and processes that can increase the safety and efficiency of any flight operation. The FAA is bringing SMS to General Aviation. You may have heard of SMS but thought it was only for large organizations but actually, SMS can be scaled to fit any operation large or small. There are 4 major components to a Safety Management System

Safety Policy – a documented commitment to safety that runs from the head of an organization to its newest member.

Safety Risk Management – a process that identifies hazards within an operation, determines to what extent an identified hazard may impact flight safety, and controls the risk of occurrence to an acceptable level.

Safety Assurance – By collecting and analyzing information derived from safety performance data Safety Assurance ensures the performance and effectiveness of Safety Risk Controls.

Safety Promotion is the communication of safety information and commitments throughout your organization.

To find out more information about Safety Management Systems contact your Principle Inspector. The SMS rule has not been published yet, watch the NPRM (Notice of Proposed Rulemaking) for a chance to comment on this rule and make a change.

On a Closing note:
Documentation of work performed in the maintenance records is the responsibility of the person performing the work. If it is not done correctly, it will make the job just that much harder for the person who follows.

Please note the URL for the following sites have changed with introduction of the Dynamic Regulatory System https://drs.faa.gov/browse/doctypeDetails

Notice of Proposed Rules Airworthiness Directives:
Notice of Proposed Rule Making is your chance to make a difference and stay informed on future changes. Yes, if you go through the process you can make a difference.

The URL for Proposed Rules Airworthiness Directives:
https://drs.faa.gov/browse/doctypeDetails

New Airworthiness Directives:
Airworthiness Directives, for all aircraft, can be found at:
https://drs.faa.gov/browse/doctypeDetails

Service Difficulty Program:
When a system, component or part of an aircraft (power plants, propellers, or appliances) functions badly or fails to operate in a normal or usual manner, it has malfunctioned and should be reported. In addition, if a system, component, or part has a flaw or imperfection, which impairs function or which may impair future function, it is defective and should be reported. While at first sight it appears this will generate numerous insignificant reports, the Service Difficulty Program design is to detect trends. Any report can be very constructive in evaluating design or maintenance reliability. These reports can be filed electronically or by paper. For electronic go to https://av-info.faa.gov/sdrx/. For paper submission, the form is available to download at http://www.faa.gov/documentLibrary/media/Form/FAA_8010-4_7-19.pdf, you may have to cut and paste this Link into your browser.

Service Airworthiness Information Bulletins (SAIB):
This is good information for issues that do not rise to level of an Airworthiness Directive.
https://drs.faa.gov/browse/doctypeDetails

Kansas City Flight Standards Office Information:
To include Designees, Airworthiness Representatives, Designated Mechanic Examiners, and Designated Parachute Rigger Examiners information.
Current Link:
https://www.faa.gov/about/office_org/field_offices/fsdo/mci/

The Kansas City FSDO Information Letters are published quarterly and available via email only to the Kansas City FSDO Mechanics and IAs. If you would like to receive Airworthiness Facts, create an account of FAASafety.Gov . You can also contact the Kansas City FSDO FAASTeam Program Managers for more information.

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