FAASTeam Safety Tips

ST. LOUIS FSDO
St. Louis, Missouri

GRANT GILLIAN
FAASTeam Program Manager, Airworthiness

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SAFETY TIPS
I have created this Newsletter in hope of providing useful and valuable aircraft maintenance and safety information to both pilots and mechanics within the St. Louis District. In this issue, I will be discussing:

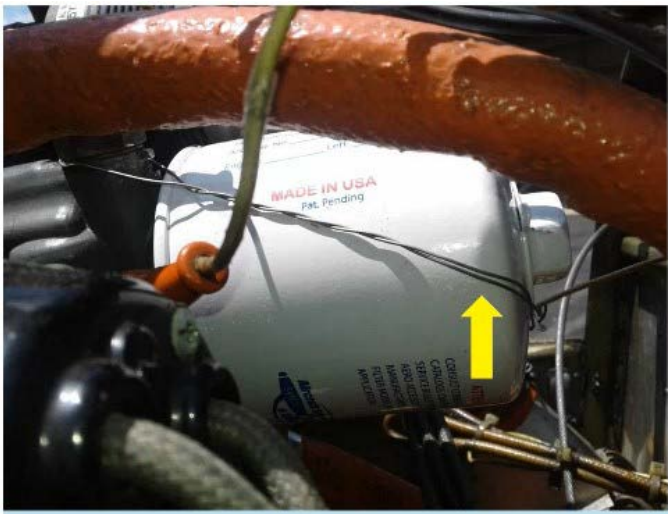
- Safety Wire
- Exhaust and V-Band Clamp Safety Maintenance
- Maintenance Records

Safety Wire … It Can Save Your Life

Loose hardware or components have led to accidents, many of them fatal. Safety wiring, or positive wire locking, is a type of locking device that is the most positive and satisfactory method of securing or safetying cap screws, studs, nuts, bolt heads, and turnbuckle barrels, which cannot be safetied by any other practical means. It is a method of wiring together two or more units in such a manner that any tendency of one to loosen is counteracted by the tightening of the wire.

Safety wire is necessary in areas where a bolt could loosen during vibration. Used properly, it will lock so that the wire remains taut and prevents further movement. Think of it as wearing a belt with your suspenders. If you notice a piece of hardware on your aircraft with loose or missing safety wire, be sure to ask about getting it replaced. Safety wire must be new upon each application. It is single use and disposable.

You don't want to lose functionality of an aileron actuation arm, a throttle cable, or an elevator flight control cable while you're in flight. Make sure any safety wire and/or hardware locking mechanisms are installed on your aircraft properly, and check that they are taut and ready for flight. Ensuring that hardware locking devices are properly installed can save your life!



This oil filter was not properly safety wired. The wire is routed in the right direction, but there are too few twists per inch. The arrow points to the section with no twist.

Fasteners, Wires, and Fast Facts

Safety wire is not intended to take the place of the proper installation of fasteners. Always make sure that the fasteners or components are tightened to the proper torque first, then install the safety wire.

Safety wire should always tend to tighten the bolt, nut, or fastener. When installing or inspecting safety wire, ask yourself, does it pass the "Righty- Tighty" test, i.e., does the installed safety wire cause the bolt to "Tighty." If you're doing owner-performed maintenance, make sure that you know what you're doing, and get a second set of eyes to look at your work after you're done.

Here's some more tips to keep things tight:

- Inspect your aircraft carefully before each flight to check that all fasteners and hardware locking devices are properly installed.
- Safety wire should be tight and maintain a light tension when secured. You should notice about 6 to 8 twists per inch with a good safety wire job.
- When inspecting fiber or nylon locknuts, make sure the bolt or stud extends at least the full round or chamfer through the nut. Turnbuckles should either have safety clips or safety wire.
- Castle nuts require a cotter pin to lock them down.

Keep it Locked

There are three basic methods to prevent the disengagement of hardware or components: 1) Safety wire, 2) cotter pins, and 3) self-locking nuts.

- **Wire**: usually stainless steel, used on cylinder studs, control cable turnbuckles, and engine accessory attaching bolts.
- **Cotter pins**: used on aircraft and engine controls, landing gear, and tailwheel assemblies,
- **Self-locking nuts**: used in applications where they will not be removed often; repeated removal and installation will cause the self-locking nut to lose its locking feature.

The safety wire is twisted properly but it's backwards. It's pulling the filter loose.

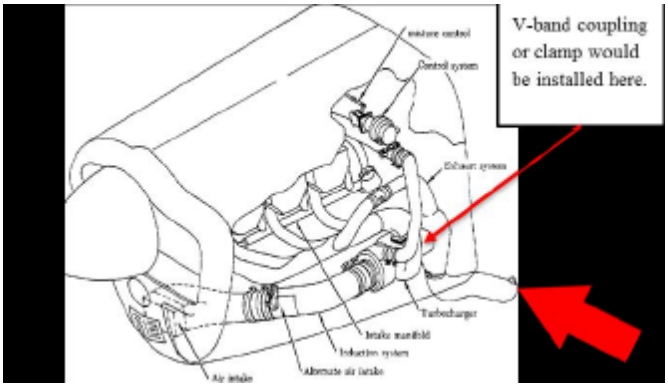
There are many other parts that require safety wire or other means of locking. FAA Advisory Circular AC 43.13-1B outlines the various locking methods and the proper safety wiring procedures.

Exhaust and V-band Safety

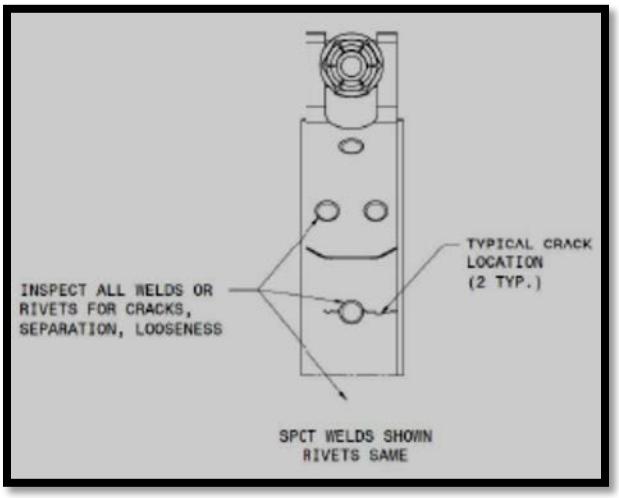
Nearly all maintenance and inspections address situations that have the potential to cause significant damage or harm if not performed properly. The objective of inspections is to identify

Exhaust and V-band Safety Cont.

deficiencies and to conform the airworthiness status in order to reduce the likelihood of mishaps.



Exhaust system components require special attention. Inadequate/ infrequent inspections or checks, and the lack of routine and preventive maintenance between inspections, cause most exhaust system failures. Engine operating temperatures and vibrations can cause exhaust system deterioration and metal fatigue in areas of stress concentration. This also wears at joints or connections.



V-band clamps are the preferred connection for many exhaust or intake systems; however, in order for the V-band clamp to work properly, the tubes and components of the coupling have to be connected before installation. Additionally, the flanges have to be aligned correctly prior to coupling installation to prevent failures. Ensure that the V-band does not bottom out on the flange before reaching the required torque. The installation process should include torqueing the latch to its proper torque value, then seating the coupling and re-torqueing the coupling until the torque value is stable. Tapping the coupling with a rubber mallet can help seating the coupling while re-torqueing. Use safety wire as needed.

Exhaust leaks are inherently more dangerous than induction leaks because of the very serious threat of in-flight fire. Fortunately, exhaust leaks are usually a lot easier to detect because they typically leave brightly colored exhaust stains (and sometimes, obvious heat damage) that can be detected during an engine-compartment inspection. Several V-band/exhaust system failures have involved accidents. As a result, these have prompted Airworthiness Directives as well as manufacturer's bulletins.

The operator of a turbocharged aircraft that experiences a sudden unexplained loss of manifold pressure in-flight should assume that an exhaust failure possibly occurred. It is vitally important to ground the airplane as soon as possible then contact the maintenance provider. If the aircraft is a twin, the operator should consider the possibility of shutting down and securing the engine to minimize the threat of in-flight fire, and then contact the maintenance provider as soon as possible. Follow the manufacturer's guidelines on the use of V-band gaskets and safety wire to secure the V-band.

Exhaust and V-band Safety Cont.

Knowledge and education are key to the maintenance of these advanced exhaust systems.

Make sure you:

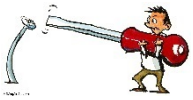
- Have the appropriate service information
- Inspect closely
- Get a second opinion when in doubt

Remember, the owner/pilot is relying on you!

***Reference**: Best Practices Guide for Maintaining Exhaust System Turbocharger to Tailpipe V-Band Couplings/Clamps*
https://www.faa.gov/aircraft/air_cert/design_approvals/small_airplanes/cos/aging_aircraft/media/maintaining_exhaust_system_best_practices.pdf

MAINTENANCE RECORD REQUIREMENTS

Excerpts from AC 43.9C



Responsibilities

CFR Part 91 states that an aircraft owner/operator shall keep and maintain aircraft maintenance records; however, *CFR Part 43* states that each person who maintains, performs preventative maintenance, rebuilds, or alters an aircraft, airframe, aircraft engine, propeller, appliance, or component part shall make an entry in the maintenance record of that equipment. In addition, the person approving or disapproving for return to service shall make an entry in the maintenance record of that equipment.

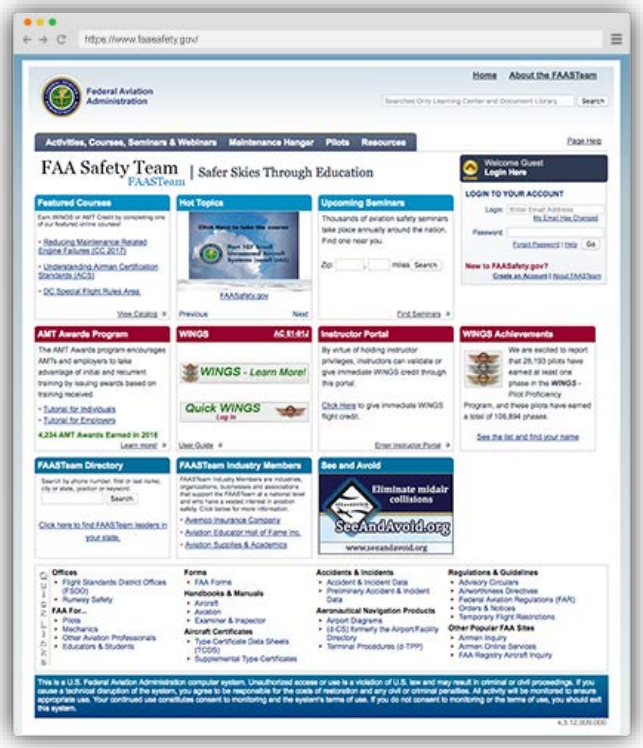
Maintenance Records

CFR Part 91 requires that each owner or operator ensures that maintenance personnel make appropriate entries in the maintenance records to show the aircraft has been approved to return to service. *Part 91* also outlines the content and retention requirements for maintenance records. Maintenance records can be kept in any format that provides record continuity, includes required contents, lends itself to the addition of new entries, provides for signature entry, and is intelligible. Records of maintenance, alterations, and required (or approved) inspections, must be kept until the work is repeated, superseded by other work, or for one year. It also requires specified records be retained and transferred with the aircraft at the time of sale.

Part 43 requires the maintenance record entry include "a description of the work performed". The description must enable a person unfamiliar with the work to understand not only it, but also the methods and procedures used. When the work is extensive, this results in a voluminous record. To provide for this contingency, the rule permits reference to technical data acceptable to the Administrator in lieu of making the detailed entry. Allowable references include: manufacturer's manuals, service letters, bulletins, work orders, FAA ACs, or any others that accurately describe what was done or how it was done.

You must indicate in the service record the type of certificate used when performing maintenance or preventive maintenance.

For more information on Maintenance Record Requirements see ***Advisory Circular 43.9C:***
https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/098a93c4bcbe5a098625806e00696ca7/$FILE/43-9C_CHG1_Incorporated.pdf



We all have heard of **"Replacement"** and **"Amendment"** of an airworthiness certificates, what is meant by **"Exchange"** of an airworthiness certificate as stated in FAA Order 8130.2J?

ANSWER: *To be included in Issue 2.*

Not Registered on FAASAFETY.GOV?

What are you waiting on? This site offers online safety training courses, notifications of upcoming safety seminars, information on obtaining AMT and Wings credits, etc. If you like this newsletter, register online at **FAASAFETY.GOV** and you will receive more in the future.

New Airworthiness Directives

This link is for Airworthiness Directives, for all aircraft: (Control-Click the below site)
http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAD.nsf/MainFrame?OpenFrameset

Additional Resources:

AC 43.13-1B *Acceptable Methods, Techniques-Aircraft Inspection and Repair*

FAA-H-8083-30A *Aviation Maintenance Technician Handbook-General*

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Grant.gillian@faa.gov