



NTSB

SAFETY ALERT

National Transportation Safety Board



Helicopter Safety Starts in the Hangar



Proper helicopter maintenance is critical to flight safety

The problem

- Appropriate maintenance procedures and postmaintenance inspections are particularly critical for helicopters because of their mechanical and operational complexity and the potentially adverse environments they operate in.
- A lack of vigilance in performing maintenance tasks or in verifying that the work was done correctly can lead to accidents. One improperly torqued or degraded piece of hardware may result in an uncontrollable helicopter.
- Fatigue and other human performance issues (such as stress, complacency, distraction, pressure to complete work, and not adhering to standard operating procedures) can increase the risk of errors, even when performing the simplest tasks.

Related accidents

The NTSB has investigated several accidents in which maintenance personnel installed worn hardware, performed inadequate installations, or omitted important maintenance steps.

- A pilot and four passengers died when a Eurocopter AS350B2 crashed in mountainous terrain after the fore/aft control servo of the helicopter disconnected during flight. Maintenance errors identified during the investigation included the improper reuse of hardware (degraded self-locking nuts), the improper or lack of installation of a split pin, and inadequate postmaintenance inspections. Contributing to the errors were the maintenance inspector's fatigue and the lack of clearly delineated inspection steps. ([DCA12MA020](#))
- A commercial pilot and two medical flight crewmembers died when a Eurocopter AS350B3 descended rapidly and collided with terrain following a loss of engine power. The engine lost power because a fuel line fitting was improperly installed during maintenance. Further, the postmaintenance inspection was inadequate, and the postmaintenance check flight was too brief to comply with the manufacturer's specified checks. If the appropriate checks had been completed, the loss of engine power would have likely occurred during the check flight. ([WPR10FA371](#))
- A student pilot sustained serious injuries during a solo cross-country flight when a Schweizer 296C-1 lost engine power and collided with a building. Postaccident examination found that the right magneto was installed incorrectly. Additionally, maintenance personnel failed to ensure the correct magneto hardware was installed, thus missing an important step. ([ERA09FA355](#))

What can mechanics do?

- Ensure that you receive adequate training so that you have the skills necessary to complete specific maintenance tasks.
- Use work cards, if available, to document completed maintenance steps. Doing so will help ensure the safety and security of items that have undergone maintenance and of any surrounding components that may have been disconnected. If work cards are not available, consider developing them from available maintenance manuals.
- Obtain independent inspections of critical items that have undergone maintenance.
- Verify that all work was performed in accordance with manufacturers' procedures and work with flight check pilots to ensure that all appropriate checks are completed.
- Review available guidance and training materials regarding human performance errors associated with aviation maintenance. These can include pressures to complete the work, missed steps due to fatigue, and company procedures that are contrary to the manufacturer's guidance. Even experienced aviation maintenance technicians can make mistakes.

Interested in more information?

The reports for the accidents referenced in this safety alert are accessible by NTSB accident number from the NTSB's [Aviation Accident Database & Synopses](http://www.ntsbt.gov/aviationquery/index.aspx) web page at www.ntsbt.gov/aviationquery/index.aspx. Each accident's public docket is accessible from the NTSB's [Docket Management System](http://dms.ntsbt.gov/pubdms/) web page at <http://dms.ntsbt.gov/pubdms/>.

The Federal Aviation Administration (FAA) Safety Team (FAASTeam) provides access to online training courses, seminars, and webinars. The courses [Aircraft Maintenance Documentation for AMTs](http://www.faasafety.gov), [Dirty Dozen—Human Error in Aircraft Maintenance](http://www.faasafety.gov), [Fatigue Countermeasure Training](http://www.faasafety.gov), and many others can be accessed from www.faasafety.gov.

The FAASTeam's "[GA Maintenance Alert: Safety and Security of Components](http://www.faasafety.gov)" provides an overview of helicopter maintenance errors and suggestions for preventing similar errors and can be accessed from www.faasafety.gov.

The International Helicopter Safety Team's "[Helicopter Maintenance Toolkit](http://www.ihst.org)" provides guidance for safely maintaining helicopters and can be accessed from www.ihst.org.

The FAA's [Human Factors in Aviation Maintenance](http://www.faa.gov/about/initiatives/maintenance_hf/) web page provides educational resources for preventing human performance-related maintenance errors at www.faa.gov/about/initiatives/maintenance_hf/.

This NTSB safety alert and others can be accessed from the NTSB's [Safety Alerts](http://www.ntsbt.gov/safety/safety-alerts/Pages/default.aspx) web page at <http://www.ntsbt.gov/safety/safety-alerts/Pages/default.aspx>.