

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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(202) 426-8787

ISSUED: April 4, 1976

Forwarded to:

Honorable John L. McLucas
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-76-51 through 55

On March 16, 1975, a Piper aircraft, Aztec PA-23-250, N54212, caught fire in flight and crashed near Grandville, Indiana; the pilot and a passenger were killed. As a result of its continuing investigation of the accident, the National Transportation Safety Board is concerned about the design of the capacitance discharge strobe light system used on this and other general aviation aircraft. High energy potentials exist in this system which generate peak electrical currents of 300 amperes and temperatures of 6350 F.

The Safety Board's investigation has revealed that the fire began in two separate areas on the aircraft--one in the fuselage and the other in the left wingtip. Components of the anticollision strobe light system were located in these two areas. Recent maintenance had been performed on the strobe system's power supply, which is located within the fuselage and on the left wingtip strobe lamp.

The Board's records reveal several aircraft explosions that resulted from ignition of vapor by a flashing strobe lamp. In reviewing the history of the strobe light system, the Board learned that no Technical Standard Order (TSO) exists on the subject although one has been planned for several years. All general aviation aircraft strobe system installations have been approved through the supplemental type certificate process.

Three Cessna aircraft were damaged when wingtip tanks exploded after fuel vapor was ignited by the strobe lamp that was mounted in the tip tank structure. Two Beech aircraft were similarly damaged by an explosion in the wingtip-tank and strobe-lamp assembly. In one case, the left wing was destroyed. These explosions took place on the ground, and no one was injured or killed.

Inquiries made of manufacturers and of FAA personnel indicate that no consensus exists as to why the flashing strobe lamp ignites fuel vapors. One source believes that the problem is caused by improper electrical grounding; another believes that the generation of radio frequency energy by the system is the fault; and still another believes that the mechanical and electrical construction details of the lamp may be the cause.

Ignition of fuel vapors by strobe lamps continues on general aviation aircraft despite current prevention efforts. For example, on October 7, 1975, a tiptank of a Cessna aircraft, N5013Q, exploded at Des Moines, Iowa, even though Airworthiness Directive 75-05-08 CESSNA, issued in February 1975 to deal with these explosions, had been complied with. Three other AD's exist on this subject--AD 74-20-11 BEECH, AD 74-24-03 BEECH, and AD 75-05-04 WHELEN.

The Board's recent examinations of several business jet aircraft revealed another problem with strobe installations that could also result in catastrophic fires. These examinations revealed that electrical conduits, which house strobe light wiring within wingtip fuel tanks of the Learjet 23, 24, and 25 models, are being damaged by fuel hose nozzles during refueling operations. A punctured conduit would allow the fuel to be in direct contact with the strobe light wiring.

Since the strobe light system increases the aircraft conspicuity and therefore can help prevent midair collisions, and its use is increasing in general aviation, greater exposure will be given to any hazards within the system.

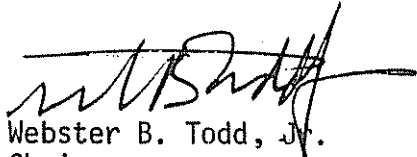
In view of the above, the National Transportation Safety Board recommends that the Federal Aviation Administration:

1. Conduct a special study into the ignition/explosion mechanism involved with strobe lamp systems to find and to correct any fault(s) which may exist in current designs. (Class II--Priority Followup.)
2. Issue a TSO on strobe light systems as soon as possible. (Class II--Priority Followup.)
3. Review the design of fuel-tank and strobe-lamp assembly combinations to insure that they are vented properly, that vapors are isolated, and that they are not susceptible to electrical or mechanical damage during refueling. (Class II--Priority Followup.)
4. Alert general aviation industries and aircraft operators to the potential danger that exists in the high levels of

energy within the strobe light system. Maintenance personnel should be cautioned especially about the dangers inherent in abrasions and faulty connections in the strobe system wiring. (Class II--Priority Followup.)

5. Review current Airworthiness Directives on strobe light systems to insure that they are adequate. (Class II--Priority Followup.)

TODD, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.


By: Webster B. Todd, Jr.
Chairman

THESE RECOMMENDATIONS WILL BE RELEASED TO THE PUBLIC ON THE ISSUE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THE CONTENTS OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.