



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation Report

### Unsafe Wiring Conditions in Piper Model PA-31T-Series Airplane Floor-Mounted Circuit Breaker Panels

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<b>Accident Number:</b>	WPR16FA153
<b>Operator/Flight Number:</b>	Cal-Ore Life Flight
<b>Aircraft and Registration:</b>	Piper PA-31T, N661TC
<b>Location:</b>	McKinleyville, CA
<b>Date:</b>	July 29, 2016
<b>Adopted:</b>	January 5, 2017

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The National Transportation Safety Board (NTSB) is providing the following information to urge the Federal Aviation Administration (FAA) to take urgent action on the safety recommendation in this report. This recommendation is intended to detect and correct unsafe wiring conditions that could lead to chafing, thermal stress, or arcing in the area directly below the floor-mounted circuit breaker panel in Piper Aircraft, Inc. model PA-31T-series airplanes. It is derived from an ongoing investigation of an accident in which a Piper PA-31T broke up in flight and crashed shortly after the pilot reported smoke in the cockpit. As a result of preliminary findings in this investigation, the NTSB is issuing one urgent safety recommendation to the FAA.

### Background and Analysis

On July 29, 2016, about 12:58 am Pacific daylight time, the pilot of a Piper PA-31T airplane, N661TC, reported the smell of smoke in the cockpit to air traffic control (ATC) and indicated that he wanted to return to the departure airport in Crescent City, California. ATC provided the clearance for the flight. About 1 minute later, the pilot reported that he had smoke in the cockpit and declared an emergency. There were no further communications from the pilot. According to the flight's primary radar returns, the airplane continued to fly for about 3 minutes before breaking up in flight. The wreckage was found in tree-covered terrain near Arcata/Eureka Airport, McKinleyville, California. The airplane was being operated by Cal-Ore Life Flight as an air transport medical flight under the provisions of 14 *Code of Federal Regulations* Part 135. The airline transport pilot, two medical personnel, and one patient died.<sup>1</sup>

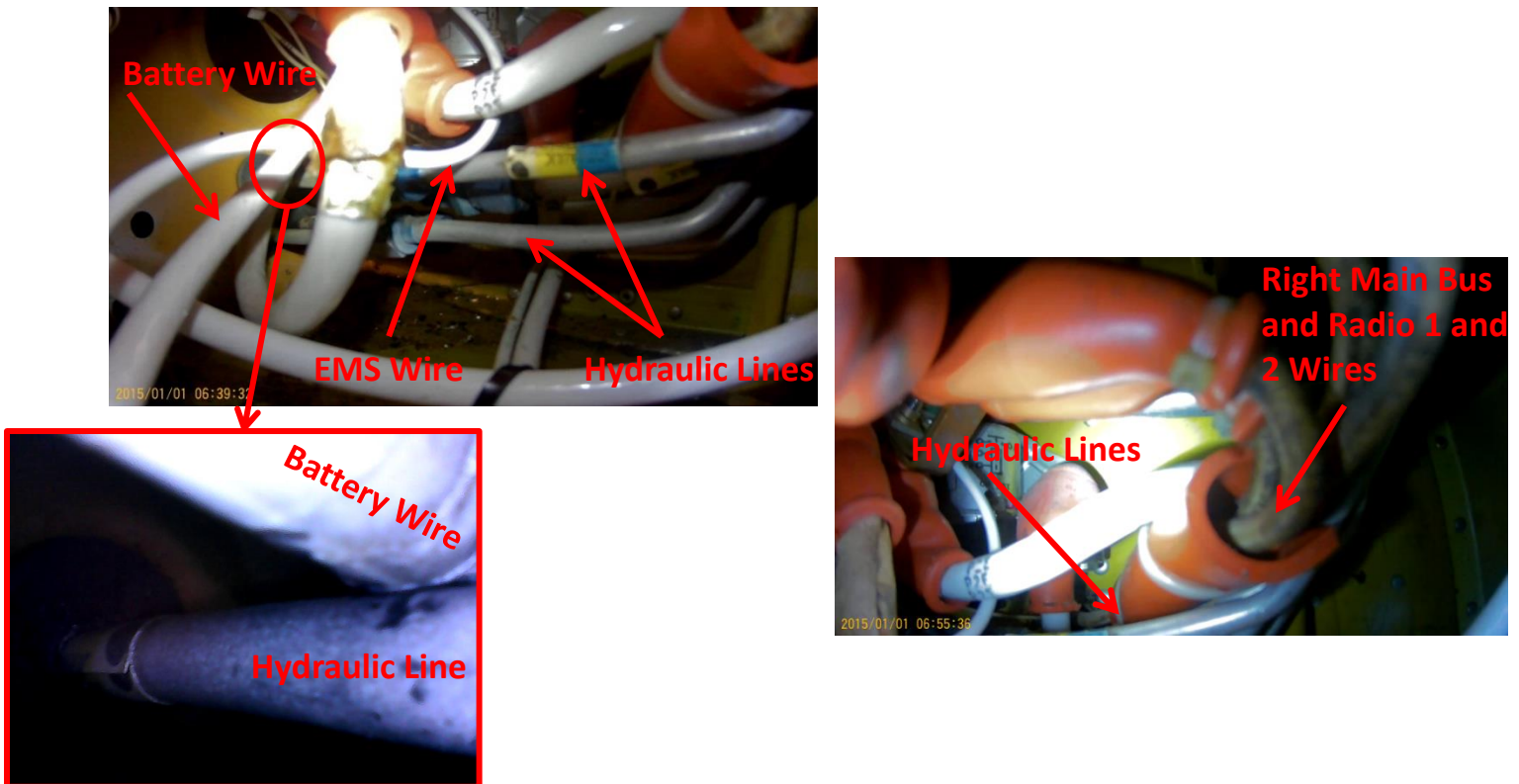
Examination of the wreckage found evidence of thermal damage near the main electrical bus circuit breaker panel. This enclosed space also includes hydraulic lines that run directly below

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<sup>1</sup> Additional preliminary information about this accident, NTSB case number WPR16FA153, can be accessed at the NTSB's Aviation Information Resources web page, [www.nts.gov/air](http://www.nts.gov/air).

the panel. Examination of the wiring in this area showed evidence of electrical arcing damage, and sections of the adjacent hydraulic lines were consumed by in-flight fire. The NTSB's investigation of this accident is ongoing; however, evidence thus far indicates that the in-flight fire occurred in the area where these electrical wires and adjacent hydraulic lines may have been in contact.

Advisory Circular (AC) 43.13-1B, "Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair," advises against wires and fluid lines being in contact due to the risk of chafing, which can lead to thermal stress and arcing in an area where flammable liquids are routed.<sup>2</sup> This guidance material specifies a minimum 1/2-inch clearance between the wires and the fluid-carrying lines. During this investigation, the NTSB and the FAA examined the same area in six exemplar Piper model PA-31T-series airplanes and found instances on all six exemplar aircraft of unsafe conditions in which electrical lines and hydraulic lines were in direct contact (see figure).<sup>3</sup> Some of the wires in the exemplar aircraft showed chafing between the hydraulic line and the electrical wires, which, if left uncorrected, could have led to electrical arcing and subsequent fire.



**Figure.** Photographs showing contact between wires and hydraulic lines in exemplar Piper PA-31T-series airplanes.

<sup>2</sup> AC 43.13-1B section 11-126 indicates that "An arcing fault between an electrical wire and a metallic flammable fluid line may puncture the line and result in a fire. Every effort must be made to avoid this hazard by physical separation of the wire from lines and equipment containing oxygen, fuel, hydraulic fluid, or alcohol."

<sup>3</sup> The NTSB examined two airplanes and the FAA examined four airplanes as of December 20, 2016.

The NTSB notes that, currently, about 317 Piper PA-31T-series airplanes are registered with the FAA. During annual inspections, the area below the circuit breaker panel is only accessible through a panel in the belly of the airplane. As shown in the figure, the number of electrical wires and hydraulic lines that are routed through the area further obscure an already confined space where visual sight lines are limited. Current maintenance procedures in AC 43.13-1B only specify a general visual inspection of the area to check “electrical wiring for security.” The difficulty of detecting this unsafe condition through visual means alone likely explains why it was not previously identified on all six of the exemplar airplanes examined during our investigation using a borescope and camera. We are concerned that current maintenance procedures do not provide adequate guidance for inspection in these areas, thereby allowing contact between electrical wires and hydraulic fluid lines to persist undetected.

On December 16, 2016, the FAA issued Special Airworthiness Information Bulletin (SAIB) CE-17-05 to alert owners and operators of these airplanes about this safety issue. The SAIB recommends that the condition of all wiring in the floor-mounted circuit breaker panel be inspected at the next scheduled maintenance visit using “a mirror, a suitable light source or other equipment (small cameras, borescopes, magnification, etc.) capable of providing equal or better resolution.” It also recommends that owners and operators repair or replace any damaged wires and ensure that proper clearance between wires and hydraulic lines is maintained.

The NTSB believes that the issuance of the SAIB was a good first step in alerting owners of this safety issue but that more urgent, mandatory action is needed to prevent future accidents. Given that this unsafe condition was observed on all six exemplar airplanes that were examined during this investigation, we are concerned about the potential for additional fires to occur, leading to similar accidents.<sup>4</sup> The SAIB contains clear guidance that we believe owners and operators of these airplanes should be required to follow as soon as possible. The NTSB concludes that an unsafe condition exists that requires owners and operators of Piper PA-31T-series airplanes to immediately take action to identify and repair (or replace) damaged wires in the floor below the main circuit breaker panel and to ensure proper clearance between wires and hydraulic lines. Therefore, the NTSB recommends that the FAA issue an emergency airworthiness directive (AD) that requires owners and operators of Piper PA-31T-series airplanes to take the actions recommended in SAIB CE-17-05 immediately after the AD is issued.

## Recommendation

### To the Federal Aviation Administration:

Issue an emergency airworthiness directive (AD) that requires owners and operators of Piper PA-31T-series airplanes to take the actions recommended in Special Airworthiness Information Bulletin CE-17-05 immediately after the AD is issued. (A-17-1) Urgent

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<sup>4</sup> The NTSB recently completed the investigation of an April 12, 2015, accident involving a Piper PA-31T1 in which the pilot and three passengers died. Before a collision with terrain on final approach, the pilot reported smoke in the cockpit to ATC. The NTSB determined the probable cause to be “a rapid onset of smoke and/or fire in flight for reasons that could not be determined due to the postimpact fire and the condition of the wreckage.” Additional information about this accident, NTSB case number ERA15FA181, can be accessed at the NTSB’s Aviation Information Resources web page, [www.nts.gov/air](http://www.nts.gov/air).