

# AGING TRANSPORT SYSTEMS RULEMAKING ADVISORY COMMITTEE

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**OFFICE OF THE CHAIRMAN  
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January 30, 2004

SAE International  
400 Commonwealth Drive  
Warrendale, PA 15096-0001  
Attention: Chairman SAE AE-8

Dear Chairman:

The Aging Transport Systems Rulemaking Advisory Committee (ATSRAC) has recently reviewed the results of DOT/FAA/AR-01/118 *Aircraft Age-Related Degradation Study on Single- and Three-Phase Circuit Breakers*. The results of this study lead ATSRAC to make the following recommendations to SAE:

1. Revise ARP 1199, paragraph 5.8.1 b4 to recommend circuit breaker termination securing parts be replaced with identical or other approved parts, and permit no substitutions unless there is a process that provides clearly defined alternatives until direct replacement can be accomplished.
2. Revise ARP 1199 to include a "Date Code Marking" requirement for circuit breakers in accordance with EIA-476-B, which specifies a four digit code, the first two digits are the calendar week and the second two digits are the calendar year in which the component was produced.
3. Revise ARP 1199 and ARP 4404 to include more definitive guidelines on when multiple circuits can be used with one circuit breaker.

The recommendation is necessary because 14 CFR 25.1357 (e) states "Each circuit for essential loads must have individual circuit protection." However, the essential loads data on an aircraft are not readily available to applicants who might perform electrical modifications.

The Aircraft Age-Related Degradation Study states "data indicate that a significant number of breakers may be protecting multiple circuits". During the course of the Study it was discovered that these breakers were found to be protecting fire, engine and flight systems. In the engine system alone one breaker was found protecting six possible circuits. A single breaker on the flight systems possibly protected four systems. In Conclusion 4.2.2.3 the Study recommended that "A detailed circuit analysis would need to be performed to verify multiple circuits are monitored and to determine the impact of multiple circuits on each breaker."

It is recommended that the revisions of ARP 1199 and ARP 4404 include the provision that before multiple circuits are connected to a single breaker, there must be analysis and, where appropriate, testing to determine the impact on continued safe aircraft operation in the event of failure of that particular circuit. The analysis/testing should consider possible modes of failure, malfunctions, probability of multiple failures and undetected failures, such as described in AC 25.1309 or other documents.

4. Revise AS 50881 and AS 5809 to ensure that the subject of multiple wires in one lug and multiple lugs on one circuit breaker terminal are covered in the documents.

ATSRAC appreciates your consideration of these important recommendations.

Sincerely,

Kent V. Hollinger  
ATSRAC Chairman

Cc: FAA AVR-1, AIR-1, AFS-1, ARM-1, ANM-117