AC NO: 20-99

DAVE: 5/27/77

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

SUBJECT: ANTISKID AND ASSOCIATED SYSTEMS

1. PURPOSE. This circular sets forth an acceptable means but not the only means of complying with the requirement that antiskid and associated systems must be designed so that no probable malfunction will result in a hazardous loss of braking or directional control of airplane.

2. REGULATIONS AFFECTED. FAR 25.735(e).

3. BACKGROUND. There have been accidents wherein multiple loss of tires has resulted in loss of braking ability and directional control of the airplane. One such condition of braking loss cm occur on airplanes which have antiskid systems utilizing locked wheel protection circuits. The circuits compare one wheel's rotational speed with another one or more on the same and/or another gear to determine a locked wheel condition, The locked wheel protection feature is designed to prevent tire flat spotting and tire blowouts when braking on wet or icy runways. When the ratio of one wheel's speed compared to another as noted is less than a predetermined min/max value, brakeswill be released on the low speed wheel. If a wheel continues to roll after losing its tires and rim flanges, as during a momentary unbraked airplane roll condition, its rotational speed versus the speed of other wheels being compared could equal a ratio indicative of a locked wheel(s) elsewhere. This would result in the locked wheel protection circuits preventing application of brake pressure to the compared and still functionally satisfactory wheel/tire position, thus further reducing braking capability.

4. ACCEPTABLE MEANS OF COMPLIANCE.

a. A failure mode and effect analysis provide an acceptable method of complying with FAR 25.735(e). The analysis should provide for failures of the antiskid and associated systems (tires, wheels, brakes, etc.) and effects on airplane safety and braking performance.

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b. The analysis of antiskid systems utilizing locked wheel protection circuits should include a determination assuring that mechanical faults such as blown tires, broken wheel rims, etc., cannot significantly reduce the braking effectiveness of cross coupled wheels with intact tires.

Note: A tire or wheel failure that results in the loss of additional tires or wheels from overload, resulting from the initial failure, should be considered a single failure.

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