NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: February 6, 1975

Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-75-7

The National Transportation Safety Board has examined flight test data regarding the maneuvering stick force characteristics of the Aero Commander 500 series airplane. Our examination has disclosed unsatisfactory force gradients which require corrective action to avoid catastrophic accidents. The unsatisfactory characteristics exist in all Aero Commander twin engine, short fuselage models, including certain 600 and 700 series airplanes.

Extremely low stick forces can make these airplanes subject to dangerously high g loads or load factors in aft center of gravity configurations. In certain situations, these forces could easily be inadvertently applied. The test data also indicate that for the most critical conditions the stick force may reverse; i.e., a small push force may be required when the airplane is subjected to limit load factor in order to prevent the load factor from increasing further.

To correct these flight characteristics and to alleviate the potential danger of an inadvertent, pilot-induced structural failure, Aero Commander has issued Service Bulletin No. 128 on November 1, 1973, and Service Bulletins Nos. 129 and 136 on March 22, 1974. These bulletins provide for the installation of a bob-weight to increase elevator stick forces as g loads are applied. The purpose of increasing elevator stick forces, according to the bulletins, is to warn the pilot that he is applying high g loads and to deter him from doing so. Aero Commander considers the bob-weight mandatory and indicates that modification should be made at or before the next annual inspection.

From 1965 through 1973, there were nine fatal airframe failures involving Aero Commander twin engine airplanes. Seven of these failures were attributed to pilot causes, such as "exceeded design stress limits of aircraft," "loss of control for undetermined reason," or "continued VFR flight into adverse weather conditions." Although the contributing

effects of the stick force characteristics are unknown, the Safety Board believes that, because of the fundamental relationship between stick force gradient and load factor, the present force characteristics must be improved to minimize the potential for catastrophic failure under a variety of operating circumstances.

The National Transportation Safety Board recognizes that CAR 3, the basis for certification of the above airplanes, contains no specific requirements for maneuvering stick forces similar to those contained in FAR 23.155 "Elevator Control Force in Maneuvers." Nonetheless, related provisions for basic controllability under CAR 3.106 require that there be no danger of inadvertently exceeding limit load factor under all probable conditions of operation.

Because of the low stick force gradients and the ease with which certificated structural limits can be exceeded, the Safety Board recommends that the Federal Aviation Administration:

> Issue an Airworthiness Directive to require mandatory compliance with Aero Commander Service Bulletins Nos. 128, 129, and 136.

REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendation.

By: John H. Reed
Chairman

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