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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: April 13, 1978

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-78-23 through -26

On March 11, 1977, an Aerospatiale SA-318C Allouette II helicopter was involved in an accident near Coldfoot, Alaska. The National Transportation Safety Board's investigation of the accident revealed a design feature of the cyclic grip which may compromise a pilot's ability to handle certain emergency situations.

The helicopter, which was hovering out of ground effect, attempted to lift two fuel drums from a pinnacle in a sling operation. The pilot tried to climb with this external load, but had unknowingly exceeded the helicopter's capabilities; the helicopter began to descend seconds after the drums cleared the ground. The drums rolled off the pinnacle and dragged the helicopter along. The pilot did not actuate the electric release button which would have jettisoned the load and probably would have averted the accident. The button was located at the top right side of the cyclic grip. The pilot stated that the button was situated in an awkward position on the cyclic and that he tried but was unable to actuate the release.

The Safety Board found that the operator of the helicopter had modified the cyclic grip of most of the other helicopters in his fleet by moving the electric quick-release function to a more accessible switch location on the top of the cyclic grip; however, this particular aircraft had not been modified. Thus, the pilot was flying the same type of helicopter with which he was familiar, but which had a different cargo quick-release switch location.

The Safety Board has learned from Aerospatiale that three switches are located on the cyclic grip of the Allouette II helicopter, all with separate functions. We were informed that the cargo electric quick-release device can be wired to any of the three switch locations.

The different location of the quick-release switch could have created the problem encountered by this pilot. He instinctively would have relied on his past experience and training when he reacted to the emergency. He easily could have been confused as to the exact location of the electric quick-release switch on this particular helicopter. This problem is not unique to helicopters used in sling load operations; cyclic grip switch locations and functions differ on many helicopters and can be changed at the option of the operator.

Human error in the cockpit is a recognized safety problem in all types of aircraft. Safety Board statistics show that 74 percent of all fatal rotorcraft accidents during 1975 have been attributed in part to pilot-error. Our statistics revealed 19 accidents in the last 7 years in which "failure to jettison load" was cited as a factor or cause. Many general aviation accidents have been attributed to cockpit design features which provoke pilots into improperly using cockpit displays or controls. This problem also exists in helicopter crewstation design.

Design standardization on military helicopters is established by military specifications and standards. For instance, MIL-G-58087A (AV) details the design of the cyclic grip and component installations and the functions of switches on the cyclic grip. The Federal Aviation Administration (FAA), on the other hand, merely provides design minimums in order to provide manufacturers latitude in their designs. The regulations on sling load operations, specifically 14 CFR 133.43 and 14 CFR 27.865, only require that the quick-release switch "be designed and located so that it may be operated by the pilot without hazardously limiting his ability to control the rotorcraft during an emergency situation." Furthermore, while the regulations require the operator to demonstrate knowledge and skill in external load operations, 14 CFR 133.23(c) does not require a demonstration of pilot ability to actually use the quick-release switch in any mode of operation. In fact, if the operator can show previous experience with external load operations and has a good safety record, the

Administrator can waive the test of skill completely under 14 CFR 133.23(d). The Safety Board believes that, in the absence of definitive design standardization, additional pilot training and demonstration of skill are necessary to enhance pilot familiarization and proficiency in order to prevent confusion in high stress situations.

The Safety Board was encouraged to learn recently of the FAA's Office of Systems Engineering Management's plans for a program devoted to "Cockpit Human Factors Problems." The program is very ambitious and the FAA is commended for its efforts. However, the Board was disappointed to learn that the proposed investigations are directed only at the human factors problems in fixed-wing aircraft and not those encountered in helicopters.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

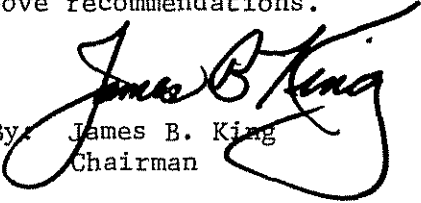
Expand its proposed research plans on "Cockpit Human Factors Problems," particularly in the area of Human Capabilities and Limitations and Displays and Controls, to include problems peculiar to helicopter controls and displays. (Class II - Priority Action) (A-78-23)

Amend 14 CFR 133.23(c)(6) to require the pilot to demonstrate his ability to actuate the quick-release switch in normal and simulated emergency operations. (Class II - Priority Action) (A-78-24)

Issue an Advisory Circular advising rotorcraft external load operators that, whenever the cargo quick-release switch location or function on the pilot's primary control (usually the cyclic grip) is modified, the operators again have their pilots demonstrate their ability to actuate the switch in normal and simulated emergency operation without having to assume an unusual finger or thumb position which may induce unwanted control inputs. (Class II - Priority Action) (A-78-25)

Delete 14 CFR 133.23(d) which permits the Administrator to waive pilot test of skill. (Class II - Priority Action) (A-78-26)

KING, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and DRIVER, Members, concurred in the above recommendations.

By:  James B. King
Chairman