Log 1713

# NATIONAL TRANSPORTATION SAFETY BOARD
## WASHINGTON, D.C.

ISSUED: August 15, 1984

Forwarded to:
Honorable Donald D. Engen
Administrator
Federal Aviation Administration
Washington, D.C. 20594

SAFETY RECOMMENDATION(S)

A-84-93 through -95

About 0514 eastern standard time, on March 30, 1983, Central Airlines Flight 27, a Gates Learjet model 25, crashed during a landing attempt on runway 4 right at Newark International Airport, Newark, New Jersey. Flight 27 was operating as a nonscheduled cancelled bank check courier under 14 CFR Part 135. The airplane was destroyed on impact and the two pilots died as a result of the accident. The National Transportation Safety Board determined that the probable cause of the accident was: a) loss of control following ground contact; b) an unstabilized approach; and c) likely impairment of the flightcrew's judgment, decisionmaking, and flying abilities by a combination of physiological and psychological factors. 1/

Because of the implications of marijuana usage by the pilot(s) in this accident and other drug-related aviation accidents or incidents, the Safety Board is concerned about this potential safety issue in the pilot population. This concern includes both commercial and general aviation pilots who, before or during flight operations, may be taking licit or illicit drugs. In the Newark accident, the toxicological finding of phenylpropanolamine 2/ further illustrates the potential adverse effects of licit drugs, including those purchased over-the-counter. The Safety Board believes that toxicological tests for any drugs, in both therapeutic and abnormal quantities, should be performed routinely after an aviation accident or incident. The Safety Board traditionally has used the Federal Aviation Administration's (FAA) Civil Aeromedical Institute (CAMI) toxicology laboratory at Oklahoma City for tests of samples obtained from fatally injured pilots. The Board is aware that the Federal Railroad Administration also plans to use the CAMI laboratory in the near future to perform toxicology tests on samples from railroad crewmen involved in accidents and incidents for evidence of possible drug or alcohol use. Many toxicological laboratories, including the CAMI laboratory, do not test routinely for therapeutic levels of licit drugs, including over-the-counter drugs, unless a specific request is made based on the finding of a prescription bottle or other indication of use by a pilot. Drug screens generally are designed only to detect abnormal (lethal or incapacitating) levels of licit drugs, and only the presence of illicit drugs.

1/ For more information read "Aircraft Accident Report: Central Airlines Flight 27, Hughes Charter Air, Gates Learjet Model 25 (N51CA), Newark International Airport, Newark, New Jersey, March 30, 1983" (NTSB/AAR-84/11).

2/ Phenylpropanolamine is found in over-the-counter drugs as diet control and cold or allergy pills. The contraindications for use by pilots, or any operator of a vehicle, include nervousness, wakefulness, and errors in judgment.

Following the Newark accident, the New Jersey State Medical Examiner's office toxicology tests reported the finding of phenylpropanolamine in the copilot's specimens, while CAMI's drug tests were negative. The Safety Board is aware of other cases in which local laboratories have found the presence of certain drugs when CAMI reported negative findings. In some cases, especially involving marijuana testing, the Safety Board has had to rely on laboratories other than CAMI to detect and quantify drug findings. Because of the limited quantity available and other logistical problems involving toxicology samples, and because of the need for definitive and accurate testing of specimens from pilots involved in accidents, the Safety Board believes that the CAMI's toxicology laboratory should be equipped and staffed adequately to perform tests for therapeutic levels of all licit drugs and for the detection and quantification of illicit drugs.

A recent National Transportation Safety Board Safety Study provided a statistical review of alcohol-involved aviation accidents. This study determined that at least 10 percent of fatal general aviation accidents involve alcohol use. However, there currently are no statistics relating to alcohol or drug use in nonfatal accidents. Therefore, the Safety Board recommended that a regulation providing for implied consent to toxicological testing be issued. Such a regulation would make it possible to determine the extent of alcohol and drug use in aviation. This determination of the parameters of the problem would aid the FAA in developing appropriate countermeasures. In addition, this rule would also provide a general deterrent to piloting during or after drug or alcohol ingestion. The Safety Board believes that the circumstances of this investigation reinforce the concerns which generated Safety Recommendation A-84-46, which was issued to the Federal Aviation Administration (FAA) on May 1, 1984:

A-84-46

Issue a rule which establishes implied consent to toxicological testing as a condition of issuance of an airman certificate. (Class II, Priority Action)

During its investigation of the Newark accident, Safety Board staff found that blood levels of marijuana have not been correlated with physiological and psychological changes. In addition, there may be long-term behaviorial changes due to the use of marijuana that have not been defined or established. Although some research has been conducted in the area, the need exists to collate available data and to institute additional research in drug involvement in aircraft accidents and the potential effects of drugs on pilot performance. The Safety Board's difficulty in obtaining definitive data, both quantitative and qualitative, regarding toxicological analyses and behavioral effects of marijuana during this investigation, indicates a lack of scientific data regarding the potential drug problem in aviation.

Additionally, the potential synergistic effects of various drugs used in combination and of such environmental stressors as hypoxia are not well established. Because this is a safety issue which encompasses all operator performance and the Secretary of Transportation has issued a related safety initiative, the Safety Board is recommending a multi-modal approach to the research. 3/ However, because of the nature of pilot performance requirements, the task complexity and the constraints upon the margin of safety mandated by the aviation environment, the Safety Board believes that the Administrator, FAA, should work in coordination with the Secretary, Department of Transportation, to resolve this issue.

3/ See Safety Recommendation A-84-96, to the Secretary, Department of Transportation.

The Safety Board is further concerned that information or literature regarding pilot performance and use of licit and illicit drugs, including over-the-counter drugs, is incomplete and not as directive or well disseminated to the pilot population as is necessary. The FAA's current "Guide to Drug Hazards in Aviation Medicine" (AC 91.11-1) was published in 1962. Other material, including the Airman's Information Manual, contains sparse information on this subject. The information that is obtained both from literature review and further research should be used to update and to develop positive, usable guidelines and cautionary material on the use of such drugs by pilots before and/or during flight operations. These guidelines should include acceptable time intervals between the ingestion of various drugs and the initiation of operations.

The investigation of the Newark accident also illustrated the importance of the cockpit voice recorder (CVR). A CVR on the Central Airlines Flight 27 could have provided more information and data with which to understand the accident factors. The Safety Board made several recommendations regarding the importance of installing CVRs on aircraft in which they currently are not required. The CVR can provide vital additional data to help in understanding the factors surrounding an accident. Certainly, CVR information is never used in isolation to determine the cause of an accident. However, in the human performance area, CVRs can provide critical insight into the circumstances surrounding an accident, including the judgmental and decisionmaking procedures used by a flightcrew. A better understanding of these would not only have helped investigators understand the Newark accident, but would also have provided guidance on developing principles for enhancing aviation safety. The Safety Board's investigation indicates that the Newark accident was precipitated by a bounce from which the pilot failed to recover. Several airworthiness factors were examined which could have led to the pilot's subsequent loss of control including lateral center of gravity imbalance, stall characteristics, and improperly polished static ports. However, the absence of definitive airplane performance information during the latter portions of the flight precluded a conclusive determination. The presence of a flight data recorder would have provided such data. This accident demonstrates, again, the significance of the installation of the cockpit voice and flight data recorders. The Safety Board strongly reiterates Safety Recommendations A-82-106 through A-82-111, which were issued to the FAA on August 31, 1982: Safety Recommendations A-82-106 and -108 are being held in an Open—Acceptable Action status, and Recommendations A-82-107 and A-82-109 through -111 are being held in an Open—Unacceptable Action status.

A-82-106

Encourage timely adoption of the Society of Automotive Engineers (SAE) standard for "general aviation" flight recorders (intended for installation in multiengine, turbine-power fixed-wing aircraft and rotorcraft in any type of operation not currently required by 14 CFR 121.343, 121.359, 135.151, and 127.127 to have a cockpit voice recorder and/or a flight data recorder), and issue a Technical Standard Order (TSO) covering such recorders immediately after the SAE document is approved. Include in the TSO requirements that:

a) specify a cockpit voice recorder (CVR) of high enough audio quality to render intelligible recorded data on each of two channels which reserves on channel for voice communications transmitted from or received in the aircraft by radio, and one channel for audio signals from a cockpit area microphone;

b) specify all flight data recorder (FDR) parameters, ranges, accuracies, and sampling intervals cited in Tables I and II (attached);

c) specify crash and fire survivability standards for CVRs and FDRs which are at least as stringent as those of TSO-C51a for Type I (nonejectable) and Type III (ejectable) recorders as appropriate.

(Class I, Urgent Action)

A-82-107

Require that all multiengine, turbine-powered, fixed-wing aircraft certificated to carry six or more passengers manufactured on or after a specified date, in any type of operation not currently required by 14 CFR 121.343, 121.359, and 135.151 to have a cockpit voice recorder and/or a flight data recorder, be prewired to accept a "general aviation" cockpit voice recorder (if also certificated for two-pilot operation) with at least one channel for voice communications transmitted from or received in the aircraft by radio, and one channel for audio signals from a cockpit area microphone, and a "general aviation" flight data recorder to record sufficient data parameters to determine the information in Table I (attached) as a function of time. (Class II, Priority Action)

A-82-108

Require that all multiengine, turbine-powered rotorcraft certificated to carry six or more passengers manufactured on or after a specified date, in any type of operation not currently required by 14 CFR 127.127 to have a cockpit voice recorder and/or a flight data recorder, be prewired to accept a "general aviation" cockpit voice recorder (if also certificated for two-pilot operation) with at least one channel for voice communications transmitted from or received in the aircraft by radio and one channel for audio signals from a cockpit area microphone, and a "general aviation" flight data recorder to record sufficient data parameters to determine the information in Table II (attached) as a function of time. (Class II, Priority Action)

A-82-109

Require that "general aviation" cockpit voice recorders (on aircraft certificated for two-pilot operation) and flight data recorders be installed when they become commercially available as standard equipment in all multiengine, turbine-powered fixed-wing aircraft and rotorcraft certificated to carry six or more passengers manufactured on or after a specified date, in any type of operation not currently required by 14 CFR 121.343, 121.359, 135.151, and 127.127 to have a cockpit voice recorder and/or a flight data recorder. (Class III, Longer-Term Action)

A-82-110

Require that "general aviation" cockpit voice recorders be installed as soon as they are commercially available in all multiengine turbine-powered aircraft (both airplanes and rotorcraft), which are currently in service, which are certificated to carry six or more passengers and which are required by their certificate to have two pilots, in any type of operation not currently required by 14 CFR 121.359, 135.151, and 127.127 to have a cockpit voice recorder. The cockpit voice recorders should have at least one channel reserved for voice communications transmitted from or received in the aircraft by radio, and one channel reserved for audio signals from a cockpit area microphone. (Class II, Priority Action)

A-82-111

Require that "general aviation" flight data recorders be installed as soon as they are commercially available in all multiengine, turbojet airplanes which are currently in service, which are certificated to carry six or more passengers in any type of operation not currently required by 14 CFR 121.343 to have a flight data recorder. Require recording of sufficient parameters to determine the following information as a function of time (see Table I (attached) for ranges, accuracies, etc):

altitude
indicated airspeed
magnetic heading
radio transmitter keying
pitch attitude
roll attitude
vertical acceleration
longitudinal acceleration
stabilizer trim position
or pitch control position.

(Class III, Longer-Term Action)

In summary, the Safety Board believes that there are several safety problems illustrated by the Newark accident which require positive action by the FAA. Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Establish at the Civil Aeromedical Institute the capability to perform state-of-the-art toxicological tests on the blood, urine, and tissue of pilots involved in fatal accidents to determine the levels of both licit and illicit drugs at both therapeutic and abnormal levels. (Class II, Priority Action) (A-84-93)

Review the research and literature on the potential effects on pilot performance of both licit and illicit drugs, in both therapeutic and abnormal levels, and use that to develop and actively disseminate to pilots usable guidelines on potential drug interactions with piloting ability. (Class II, Priority Action) (A-84-94).

In coordination with the Office of the Secretary, U.S. Department of Transportation, institute appropriate research to further the understanding of potential effects on pilot performance of both licit and illicit drugs, in both therapeutic and abnormal levels, and actively disseminate those findings. (Class II, Longer Term Action) (A-84-95)

BURNETT, Chairman, GOLDMAN, Vice Chairman, BURSLEY and GROSE, Members, concurred in these recommendations.

By: Jim Burnett
Chairman