

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

Log 1531

ISSUED: September 27, 1982

Forwarded to:

Honorable J. Lynn Helms
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-82-123 through -129

About 1502 c.d.t., on October 1, 1981, a Sky Train Air, Inc., Learjet 24, N44CJ, crashed 2.5 miles southwest of Felt, Oklahoma. The flightcrew and one passenger, the only occupants on board, were killed.

At 1449:39, while in cruise flight at flight level (FL) 450, en route to McAllen, Texas, from Casper, Wyoming, the flightcrew made initial contact with the Albuquerque Air Route Traffic Control Center. About 1 minute later, the flightcrew failed to respond to a frequency change instruction and the airplane's transponder beacon code was lost. The controller made several unsuccessful attempts to contact the aircraft. Witnesses at Felt heard an airplane pass overhead at a very high speed; one witness, who saw the airplane momentarily, stated that it was in a descent angle of about 45° before it struck the ground. 1/ As a result of the accident, the Safety Board concluded that the pilots lost control of the airplane when they encountered turbulence, and they did not, and possibly could not, regain control of the airplane. Although the near total destruction of physical evidence and the absence of on-board flight recorders have inhibited the investigators' abilities to pinpoint the circumstances which led to the loss of control, the Safety Board is concerned that pilot factors were involved in either the initial loss of control or the inability to regain control, or both.

On May 6, 1982, in a similar accident a Learjet 23 crashed into the Atlantic Ocean near Savannah, Georgia. Shortly after clearance to descend from cruise FL 410, the airplane entered a steep dive from which the pilots did not recover. The Safety Board's investigation of the accident is continuing.

In addition, in recent years, the Safety Board has investigated a number of other accidents involving lack of flightcrew knowledge and proficiency in other 20-series Learjet airplanes which contributed to a loss of control in both high altitude and landing environments. 2/ The 20-series Learjet is one of the most readily available and most economical airplanes capable of high performance and high altitude operation used

1/ For more information, read Aircraft Accident Report—"Sky Train Air, Inc., Gates Learjet 24, N44CJ, Felt, Oklahoma, October 1, 1981" (NTSB-AAR-82-4).

2/ Thunderbird Airways, Inc., Gates Learjet 25B, Conlon, Texas, April 11, 1980 and Aircraft Accident Report—"Northeast Jet, Inc., Gates Learjet 25D, Gulf of Mexico, May 19, 1980" (NTSB-AAR-81-15). Aircraft Accident Report—"Inlet Marine, Inc., Gate Learjet 25C, Anchorage, Alaska, December 4, 1978" (NTSB-AAR-79-18). Aircraft Accident Report—"Massey-Ferguson, Inc., Gates Learjet 25D, Detroit, Michigan, January 19, 1979" (NTSB-AAR-80-1). Aircraft Accident Report—"Kennedy Flight Center, Gates Learjet 23, Richmond, Virginia, May 6, 1980" (NTSB-AAR-80-12).

in general and commercial aviation today. Consequently, the airplane is used frequently by persons or corporations upgrading to a turbojet fleet and is often flown by pilots who have had little or no previous turbojet experience. The Safety Board believes that the accident history demonstrates that pilots certificated to fly general aviation turbojet airplanes may fail to appreciate the flying qualities and performance limitations of these high performance airplanes because of inadequate training. Additionally, the number of pilots with little experience in general aviation turbojet airplanes will continue to increase as these airplanes are sold and resold. While these accidents have all involved the 20-series Learjet, the Safety Board believes that the problem is generic among turbojet airplanes.

While air carrier pilots and military pilots are required to undergo extensive classroom, simulator, and actual flight training, covering the aerodynamic, meteorological, and physiological aspects of high-performance, high-altitude flight, a private or business pilot is required to have little or no such training. In fact, in accordance with 14 CFR 61.63 requirements, a pilot holding only a private pilot's certificate with an appropriate class and instrument rating could apply for, and receive, a type-rating in a general aviation turbojet airplane if he passes a flight test demonstrating competence only in pilot operations and instrument proficiency. A pilot applicant is required only to demonstrate competency during the flight test consistent with the pilot certificate he holds. While such flight testing may demonstrate his ability to control the airplane under normal flying conditions, it does not assure that he is competent to cope with other demands consistent with the unique characteristics of the equipment he plans to operate. A pilot can progress from single engine and light twin reciprocating-engine airplanes to a high performance turbojet airplane without adequate training, or having demonstrated his knowledge regarding high altitude effects on airplane performance, hazards associated with operations near the low or high speed buffet boundaries, the effects of maneuvering load factors, the potential for loss of control when operating beyond M_{mo} , powerplant characteristics, potential effects of turbulence encounters, and recovery procedures.

Applicants for a type-rating are not required to attend structured training courses, such as those available at flight schools, or training programs approved in accordance with 14 CFR 121, 135, or 141. Yet, flying a general aviation turbojet airplane is just as complex a task as flying an air carrier airplane, and most of these airplanes are certificated under the same rules as transport category airplanes. While considerable guidance is given in the Flight Training Handbook, Advisory Circular 61-21, it focuses on single and light, reciprocating-engine airplane operations and does not address turbojet operations.

The Safety Board believes that a structured training syllabus for pilots applying for a type-rating in turbojet airplanes would be the best way to assure an acceptable level of knowledge regarding the performance characteristics and the effects of the operating environment unique to turbojet airplanes. The content of the syllabus should be based on current air carrier and military training programs and should include classroom instruction and simulator demonstration. Pilots who have had no comparable previous training or demonstrated experience in the operation of turbojet airplanes should be required to complete such a training program as a prerequisite for applying for a type-rating in these airplanes.

Furthermore, the Safety Board is concerned that present criteria for training and type-rating examinations for a given airplane allow too much subjectivity on the part of the certified flight instructors and pilot examiners. While training and examination are in accordance with the procedures and performance guidelines in the Type Rating Flight Test Guide, Advisory Circular (AC) 61-57A, this guidance material does not contain the

necessary information for use by pilot schools, pilot examiners, and flight instructors for evaluating a prospective pilot's abilities concerning specific flight characteristics peculiar to the airplane. Moreover, there is no such information available in 14 CFR 61.57, Airline Transport Pilots (ATP) Airplane Rating: Aeronautical Skill, Appendix A, and the ATP Flight Test Guide, AC 61-77, which requires testing in these areas. In its review of various Federal Aviation Administration (FAA) Operation Inspector Handbooks, the Safety Board did not find specific guidance on the procedures, maneuvers, and techniques that an inspector should use during review pilot training courses and during the conduct of flight checks in order to assure that pilot applicants demonstrate competency in handling characteristics unique to a particular airplane. Consequently, while the approved flight manuals are the primary source of information the Safety Board believes that they do not adequately emphasize the type and level of instruction required to assure pilot knowledge of flight characteristics, systems design, or emergency procedures unique to the airplane.

Currently, the FAA specialists assigned to the Flight Operations Evaluation Board (FOEB) and the Flight Standardization Board (FSB) are responsible for developing training standards, defining characteristics unique to a particular airplane and determining the appropriateness of the type-rating flight check. The FOEB evaluation prior to certification determines whether a type-rating is necessary, what the type-rating flight check should consist of, and what areas should be emphasized during training. These areas must include and must be consistent with the unique handling characteristics of the airplane. The evaluation also must take into account any anticipated problems that might be expected with the airplane in service.

The FSB reviews the recommendations from the FOEB and develops the minimum standards and qualifications for designated pilot examiners, flight instructors, and pilots and distributes this information in order to provide for standardization of pilot training and qualifications in a particular airplane. However, the Safety Board does not believe that the FOEB and FSB participation in the certification of those turbojet airplanes typically used today in initial turbojet training and flown most often by pilots with low experience has adequately identified required training criteria or achieved standardization of instruction and pilot examination. This shortcoming has been exemplified by the many *corrective actions* taken by the FAA following the Learjet Special Certification Review. The Safety Board believes that even the current activities of the FOEB and FSB do not assure preparation, dissemination, and implementation of an adequate standardized training program or pilot flight examination. Consequently, the Safety Board believes that the FAA should, as part of the FOEB and FSB activity and in conjunction with the airplane manufacturer, develop a Standardized Training Manual for each turbojet airplane model. The manuals should include specific flight maneuvers, simulated emergencies, and operational environments in which a pilot must demonstrate knowledge and the required level of competency. Pilot schools, flight instructors and pilot examiners should be required to use the manuals.

Moreover, during the operational life of a given model airplane, knowledge may be gained regarding that airplane's characteristics so that related operational procedures are modified. It is essential that such information be disseminated to pilots operating the airplane. The Safety Board believes that the issuance of changes to the airplane operators flight manual alone does not assure that the information is sufficiently emphasized and noted by the pilot. For example, as a result of the Special Certification Review of the airworthiness of the Learjet in June 1980, the emergency procedure regarding high speed recovery was changed when it was shown that the extension of wing spoilers could aggravate an impending high speed loss of control. Although the airplane flight manual instructions were changed, the Safety Board found in its investigation of two subsequent high altitude loss of control accidents that the pilots, apparently unaware of the correct

procedure, extended the spoilers. If these procedural changes were incorporated in a formal training manual used by flight schools, certified instructors, and pilot examiners, they would be emphasized during both initial and recurrent training, and type-rating and proficiency checks.

The Safety Board also believes that the criteria used by the FOEB and FSB to determine the requirement for a type-rating in successive models of airplanes built by the same manufacturer merit review. For example, a Learjet type-rating is applicable to all models of the Learjet ranging from the 20 series to the 50 series. However, while similarities may exist in the design and configuration of these airplanes, there are sufficient differences in performance, handling characteristics and operational procedures to justify a requirement that a pilot demonstrate proficiency in each of the various models. A pilot should be required to demonstrate proficiency and knowledge of the most complex model which can be flown under that type-rating. On the other hand, the Board believes that it is equally important that a pilot who is type-rated in the larger, more complex model be required to demonstrate proficiency in the lighter, less complex model; these models may be more demanding on pilot skills and more susceptible to flight envelope excursions and resultant loss of control because of their higher potential performance and unique handling characteristics. The 20 series Learjet is an example of such an airplane. A pilot who receives a type-rating in the larger model Learjets, can, without demonstration of knowledge about the systems or performance of the 20 series Learjet, fly the airplane. The Board believes that the FOEB type-rating evaluation should carefully consider differences in normal and emergency procedures, system design, cockpit layout, performance and handling characteristics, and operating envelope as criteria for a separate type-rating.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration in conjunction with the activities of the Flight Operations Evaluation and the Flight Standardization Boards:

Establish a requirement that manufacturers provide, as part of the initial certification of a new general aviation turbojet airplane, a training guide for pilot transition into the airplane. The training guide should encompass the entire flight envelope in which the airplane will be operating and any unique aspects of its systems design, handling characteristics, and performance including the hazards of exceeding the flight envelope. The training guide should be an approved manual for use by appropriate inspectors, pilot schools, flight instructors, and pilot examiners. (Class II, Priority Action) (A-82-123)

Establish a requirement that manufacturers provide a training guide for pilot transition into currently certificated general aviation turbojet airplanes. The training guide should encompass the entire flight envelope in which the airplane will be operating and any unique aspects of its systems design, handling characteristics, and performance. The training guide should be an approved manual for use by appropriate inspectors, pilot schools, flight instructors, and pilot examiners. (Class II, Priority Action) (A-82-124)

Review the criteria currently prescribed for evaluating the type-rating requirement for successive models of turbojet airplanes built by the same manufacturer evolving from an original design, to determine if they are sufficient to provide adequate consideration of performance differences, operating environments, unique operational normal and

emergency procedures, and systems design. If the criteria are found to be inadequate, revise them appropriately, and review existent type-rating requirements under the new criteria. (Class II, Priority Action) (A-82-125)

The Safety Board further recommends that the Federal Aviation Administration:

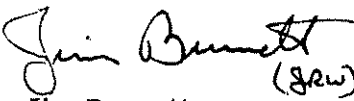
Upon approval of each specific training guide for general aviation turbojet airplanes require that the criteria used by inspectors and pilot examiners in conducting type-rating flight checks include full consideration of the material provided in the training guides. (Class II, Priority Action) (A-82-126)

Establish a minimum training curriculum to be used at pilot schools which covers special considerations involved in a pilot's initial transition into general aviation turbojet airplanes, including the aerodynamic, meteorological and physiological aspects of high performance, high altitude flight. (Class II, Priority Action) (A-82-127)

Require that pilot applicants for an initial type-rating in a general aviation turbojet airplane complete a minimum training curriculum at an approved pilot school or an equivalent military training program for turbojet airplanes. (Class II, Priority Action) (A-82-128)

Require that type-rating flight checks in general aviation turbojet airplanes include actual demonstration of pilot competency in handling characteristics in high altitude flight at speed ranges compatible with the specified flight envelope of the airplane. (Class II, Priority Action) (A-82-129)

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


(Jew)
By: Jim Burnett
Chairman