NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

FAA STATUS REPORT ON LEARJET SPECIAL CERTIFICATION REVIEW RECOMMENDATIONS 1-8

(8 pages)

DCA00MA005

U.S. Department
of Transportation
Federal Aviation Administration

Memorandum

Subject: **INFORMATION:** NTSB Accident/Incident Request #00-109

Date: DEC 1 2000

From: Director, Flight Standards Service, AFS-1

Reply to Attn. of:

To: Director of Accident Investigation, AAI-1
ATTN: Manager, Recommendation and Analysis Division, AAI-200

The Board has requested a status on the recommendations from the FAA's Special Certification Review Team Report, entitled "Learjet Model 35/36 Pressurization and Oxygen Systems." Specifically, Flight Standards has action on Recommendation 8, which states that we should distribute information to the pilot community, including FAA operations inspectors and examiners, that emphasizes the importance of pressurization and oxygen systems operations and procedures to avoid hypoxia.

Flight Standards will be distributing this information by placing an article in the next issue of the "Designee Update" newsletter, which is scheduled for completion in January 2001. We will provide the Board with a copy as soon as it is issued.

If we can be of further assistance, please let us know.

[redacted]

L. Nicholas Lacey

(1)

U.S. Department
of Transportation

Federal Aviation Administration

Memorandum

Subject: ACTION: Recommendations 1, 2, 3, 5, and 7 of the Special Certification Review Team Report on Learjet Model 35/36 Pressurization and Oxygen Systems

Date: NOV 16 2000

From: Manager, Propulsion/Mechanical Systems Branch, ANM-112

Reply to Attn. of: 00-112-21

To: Manager, Program Management Branch, ANM-114

This memorandum is being written in response to National Transportation Safety Board (NTSB) request #00-109. The NTSB has asked for an update on the recommendations contained in the Special Certification Review (SCR) Team Report on Learjet Model 35/36 Pressurization and Oxygen Systems, dated February 25, 2000.

There are eight recommendations with the primary responsibility divided among three organizations:

ANM-100	Recommendations 1, 2, 3, 5, and 7
ACE-100	Recommendations 4 and 6
AFS	Recommendation 8

This memorandum provides an update on recommendations 1, 2, 3, 5, and 7.

Recommendation 1

"Revise the Learjet Model 35/36 AFM to include an emergency procedure associated with the cabin altitude warning. The team recommends that the first crew actions are to don the oxygen masks. Mandate the revision through the Airworthiness Directive (AD) process."

Update

A Notice of Proposed Rulemaking (NPRM) was issued on June 2, 2000, proposing the Learjet 35, 35A, 36, and 36A Airplane Flight Manual be revised to have donning of the oxygen masks as the first crew action following a cabin altitude warning. The FAA anticipates issuing the final rule by the middle of December 2000.

Recommendation 2

"Bombardier Aerospace (Learjet Inc.) should develop a kit to provide an annunciator light or equivalent to advise the crew if the cabin air switch is in the off position (conditioned air supply off) for those Learjet airplanes not having an automatic emergency pressurization system."

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Update
Learjet Inc. informed the Federal Aviation Administration (FAA) in August 2000 that they intend to comply with the SCR recommendation. Learjet's goal is to have the service bulletins available by September 2001.

Recommendation 3
"The Transport Airplane Directorate should request all Aircraft Certification Offices (ACO) review the Airplane Flight Manual's (AFM) of all transport category pressurized airplanes certificated for flight above 25,000 feet and ensure there is an emergency procedure (or equivalent) when the cabin altitude warning is activated. The team recommends that the first crew action after a cabin altitude warning should be to don the oxygen mask. Mandate any necessary revisions through the AD process."

Update
With the assistance of the airplane manufacturers and the foreign civil airworthiness authorities the FAA has reviewed the AFM's. Based on this review NPRM's were issued to modify certain Lockheed and Learjet AFM's. The NPRM applicable to the Lockheed L-199A and L-188C was issued on August 24, 2000. It proposed an AFM revision to add an emergency procedure to don the oxygen masks after a cabin altitude warning. The final rule was issued on November 6, 2000.

The Learjet NPRM is discussed in the update to recommendation 1.

Since issuance of the Lockheed final rule the FAA has determined that an AD is not necessary if a manufacturer chooses to voluntarily modify the AFM with the recommended changes. This decision was based on the changes not being AFM Limitations and the FAA's efforts to improve the handling of AFM revisions and aircraft manufacturer operations bulletins. The FAA issued Airworthiness Handbook Bulletin HBAT 99-07, dated May 28, 1999, which encourages operators to incorporate AFM revisions and have a method in place for handling aircraft manufacturer operations bulletins.

A review of Cessna AFM's found that revisions are necessary for certain models. In August 2000, Cessna agreed to voluntarily make those changes. To date the Cessna Citation Model 650 AFM has been revised with additional changes to follow.

A review of the Raytheon airplanes found the Hawker Series AFM's should be revised. Raytheon expects to revise the AFM's by the fourth quarter of 2001.

Learjet has not responded formally to the recommendation for models other than the 35, 35A, 36, and 36A. However, the FAA and Learjet have a verbal agreement that the affected aircraft models will be identified and schedules for modifiying the AFM's will be established. We expect to receive a formal response from Learjet by the middle of December.

A review of the Dassault Aviation Falcon aircraft AFM's found that the MF50 and MF900 do not have an emergency procedure for rapid decompression. The Direction Général de l'Aviation Civile (DGAC) of France has informed the FAA that they intend to issue an AD to mandate the emergency procedure and that the first step will be to don the oxygen masks. The review also found that the AFM abnormal procedures for the MF50/F50EX, MF900/F900C, and the F900EX do not have donning the mask as the first step if the cabin altitude is high. Dassault is voluntarily revising the AFM procedures for high cabin altitude to have donning of the oxygen masks as the first crew action. The FAA is awaiting an update from the DGAC on the status of the AD's and AFM changes.

Mandatory action is being initiated by the Civil Aviation Administration of Israel (CAAI). They intend to issue AD's for the Astra SPX, Astra 1125, and Westwind 1124 to comply with the SCR recommendation. The FAA is awaiting an update from CAAI on the status of the AD's.

A review of the Boeing AFM's found emergency or non-normal procedures to don the oxygen mask either as the first action or after silencing the aural warning in the event of rapid depressurization. With regard to loss of cabin pressure, the operations manuals specify that the oxygen masks and goggles are donned when their use is required. The FAA found that the instructions provided in the AFM and operations manuals in total specify that during rapid depressurization or loss of cabin pressure situations, the pilots should don their oxygen masks but allows some judgement during loss of cabin pressure. The differences in wording between the manuals and the FAA recommendation are not significant enough to constitute an unsafe condition. Therefore mandatory corrective action via the AD process cannot be justified.

A review of the McDonnell Douglas (Boeing) AFM's and Flight Crew Operations Manuals (FCOM) found inconsistencies in the procedures associated with cabin altitude warning. Boeing has agreed to revise the AFM and FCOM procedures to ensure the oxygen masks are donned, as the first step, during a rapid decompression/emergency descent. The FAA will work with Boeing to devise appropriate procedures for cabin altitude warning which are similar to those in other Boeing operations manuals.

A preliminary review of the Airbus Industrie AFM's by the DGAC did not find any concerns or non-compliance with the recommendation. However, the DGAC is performing a more detailed review and is expected to respond by the middle of December.

Recommendation 5

"The Transport Airplane Directorate should request all ACO's forward the following recommendation to all manufacturers of transport category pressurized airplanes certificated for operation above 25,000 feet:

Determine if there is a means to annunciate to the flight crew that the pressurization system (conditioned air supply) is selected off. If annunciation is not available, the airplane manufacturer should develop a modification to provide an annunciation to advise the crew if the conditioned air supply is selected off. This recommendation does not apply to airplanes that have an automatic emergency pressurization system. Further, this automatic emergency pressurization system must not be deactivated by the switch that turns off the conditioned air supply."

Update

The ACO's notified all affected manufacturers of this recommendation. Several manufacturers have responded that their systems already incorporate the recommended annunciation. Others do not provide an active means to indicate if the conditioned air supply is selected off. Two of these manufacturers, Sabreliner and Raytheon, have indicated that they concur with the recommendation and plan to issue service bulletins to make the modifications available. Others are considering whether a modification kit will be offered while some have decided against a modification.

The SCR team found that recommended modification would be a design improvement. However, the team did not find that the absence of the annunciation results in an unsafe condition. Therefore, the FAA has only encouraged manufacturers to provide the modification and we do not intend to pursue mandatory action through the AD process.

The FAA plans to follow-up with Sabreliner and Raytheon on the progress of their modifications and with other manufacturers that are still considering the recommendation.

Recommendation 7

"The Wichita ACO should review and investigate Learjet Service Bulletin, SB 35/36-21-7, dated October 28, 1980, "Inspection of Cabin Pressurization Outflow Valve and Safety Valve," for action if necessary. This service bulletin addresses the possibility of cabin over-pressurization."

Update

The Wichita ACO has reviewed the service bulletin and determined that no action is required. For the Outflow/Safety valve in question to become a hazard to an airplane, two failures would be required. First the Safety valve would need to suffer a latent failure. Then a subsequent failure of the Outflow valve could result in dangerous over-pressurization if prompt crew action were not taken. These suspect valves were manufactured during a six-month period in 1980. Because there is a mandatory functional check of the Safety valve every 300 hours, it is reasonable to assume that any faulty valves have been discovered in normal operation during the past 20 years, and the faulty valve replaced. Therefore, there is

no reason to suspect that an unsafe condition exists on the Learjet Model 35/36 related to the Outflow/Safety valve service bulletin. The FAA considers this recommendation to be closed.

[redacted]

Neil D. Schalekamp

Recommendation 4
The Small Airplane Directorate should request all ACO's review the AFM's of all normal and commuter category pressurized airplanes certificated for flight above 25,000 feet and ensure there is an emergency procedure (or equivalent) when the cabin altitude warning is activated. The team recommends that the first crew action after a cabin altitude warning should be to don the oxygen mask. Mandate any necessary revisions through the AD process.

Discussion
Pressurized normal category and commuter category airplanes are type certificated to the requirements of either Civil Air Regulation 3 (CAR 3) or Federal Aviation Regulation (FAR). Unlike the FAR Part 25 requirement for an 8,000-foot cabin at the maximum operating altitude of the airplane (FAR 25.841), CAR 3 and FAR Part 23 do not have a requirement for a maximum allowable normal cabin altitude. FAR Part 25 also has a requirement for a cabin altitude warning (either aural or visual) at 10,000 feet. FAR Part 23 starting at amendment 17 has a similar 10,000-foot cabin altitude warning requirement, but no requirement for a maximum allowable normal cabin altitude. Prior to FAR Part 23 amendment 17, the altitude for a cabin altitude warning was not even specified in the regulations. Consequently, most CAR 3 and a large number of Part 23 pressurized airplanes can legally fly during normal operations at altitudes with the cabin altitude light illuminated.

Since this light may be on during normal operations, it is obvious that an emergency procedure that requires donning the oxygen mask when the light comes on is just not compatible with the certification requirements of CAR 3 or FAR Part 23. Additionally, FAR Part 91 operating regulations do not require oxygen for pilots or passengers until the cabin reaches an altitude above 12,500 feet.

Update
The ACO's were asked to review the AFM's for all of the pressurized airplane certificated for flight above 25,000 feet. Only two airplanes, the Piper PA- 31 and the Aerostar Model 601P, were identified as not having a requirement for the crew to don oxygen masks after a pressurization failure. Based on these results and the above discussion, no AD's will be issued at this time.

We agree that the insidious nature of hypoxia requires a warning means of cabin pressurization failures in pressurized airplanes. The warning means should illuminate the Master Warning Light or a dedicated warning annunciation in the pilot's primary field of view, and the warning should be automatic without a means of disarming it. FAR Part 23 needs to be amended to require a warning system that will warn the pilot of a pressurization problem. Any change to FAR Part 23 will not affect the present normal category fleet so we believe an operational rule amendment is also appropriate. We plan to begin working with Flight Standards to see if it will be possible to make changes to the operational requirements for use of oxygen in pressurized airplanes. No discussions have occurred yet.

We consider this recommendation to be open pending discussions with Flight Standards regarding changes to the operational requirements for use of oxygen in pressurized airplanes.

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Recommendation 6

The Small Airplane Directorate should request all ACO's forward the following recommendation to all manufacturers of normal and commuter category pressurized airplanes certificated for operation above 25,000 feet:

Determine if there is a means to annunciate to the flight crew that the pressurization system (conditioned air supply) is selected off. If annunciation is not available, the airplane manufacturer should develop a modification to provide an annunciation to advise the crew if the conditioned air supply is selected off. This recommendation does not apply to airplanes that have an automatic emergency pressurization system. Further, this automatic emergency pressurization system must not be deactivated by the switch that turns off the conditioned air supply.

Update

The Wichita, Atlanta, Denver, Los Angeles, and Seattle ACO's indicated that they either sent letters to their respective manufacturers and modifiers or had discussions with them. Most of the manufacturers do not have annunciation to indicate that the system has been turned off. However, we do not consider this to be an unsafe condition and will not mandate changes to the pressurization systems.

We consider this recommendation to be closed.