

Adapted 9/24/90

Log 2225



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: September 24, 1990
In reply refer to: A-90-121 through -123

Honorable James B. Busey
Administrator
Federal Aviation Administration
Washington, D.C. 20591

The National Transportation Safety Board is concerned about the potential for loss of pitch control of Nihon YS-11 airplanes as a result of tailplane icing.

On March 15, 1989, Mid Pacific Airlines flight 101, crashed while on approach to Purdue University Airport, West Lafayette, Indiana. The airplane was being positioned for a revenue flight and contained no cargo or passengers. Eyewitnesses noted that the airplane's nose suddenly pitched downward while on short final approach. The airplane struck an embankment 20 feet high, about 1/4 mile from the runway threshold. The landing gears were extended and the flaps were extended to 35° when the impact occurred. As a result of the accident, the two crewmembers were killed and the airplane was destroyed. A substantial quantity of ice was found on the leading edges of the horizontal stabilizer shortly after the crash. No evidence of ice was found on the vertical stabilizer or wings. The examination and testing of the pneumatic deicing system components revealed no anomalies.

The Safety Board determined that tailplane icing was a cause of the March 15, 1989 accident. An accident brief, containing the board's probable cause is attached.

On April 3, 1990, N112MP, another Nihon YS-11 operated by Mid Pacific Airlines, experienced a loss of pitch control while on final approach to Purdue University Airport. At 1,100 feet agl, with a speed of 130 to 135 KIAS, 35° of landing flap was selected. The airplane began to buffet and at 800 feet agl, the airplane pitched downward approximately 20°. The captain applied full power, and the first officer retracted the flaps to 15°. The airplane did not respond to elevator control, but with the application of full power and selection of 15° flaps, the airplane began to respond and accelerate on runway heading at 200 feet agl. The captain reported that the airplane continued to buffet and that there was no pitch response when the control yoke was initially moved about 12 inches fore and aft from the neutral position. Upon reaching approximately 180 KIAS, the buffeting subsided and pitch control was regained. The captain diverted to Indianapolis, Indiana, and made an uneventful landing, maintaining airspeed

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above 180 KIAS. An inspection of the airplane revealed a substantial amount of ice still adhering to the tail surfaces not covered by deicing boots. The investigation of the April 3 incident is continuing.

The Nihon YS-11 is a twin-engine airplane powered by Rolls Royce Dart engines. The airplane was manufactured in Japan by Nihon Industries in the 1960's. Mitsubishi Heavy Industries Ltd., now maintains the airworthiness certification responsibilities for the airplane. One hundred eighty-eight YS-11 airplanes were manufactured. Approximately 150 of them are still operating around the world. The FAA's January 1990 Air Carrier Aircraft Utilization and Propulsion Reliability Report listed 21 YS-11's in service in the United States. These aircraft are operated by three U.S. companies for passenger and cargo transport.

During the Safety Board's investigation into the 1989 accident, it was learned that at least one YS-11 operator, Airborne Express Inc., currently imposes a 20° limitation on landing flap extension during known icing conditions. The operator does not recall the source of the restriction, and the approved Nihon manual currently has no such restriction.

Discussions with Reeve Aleutian Airways Inc., a current YS-11 operator, indicate that the potential for adverse handling characteristics with tailplane icing may be aggravated by operating the airplane near the forward center of gravity limits. Therefore, it has restricted airplane loading to no further forward than 25 percent MAC at all times.

Mitsubishi customer support has notified the Safety Board that it agrees with the assessment that in the presence of excessive ice buildup on the horizontal stabilizer, control of the airplane may be adversely affected. To avoid a recurrence of similar incidents, it intends to propose flight manual changes to the Japan Civil Aviation Board. The proposed changes include using the minimum flap setting required for the landing condition, not increasing flap settings below 1,000 feet agl or, if full flaps are to be used, selecting full flaps above 1,000 feet agl.

The Safety Board believes that there is a potential for loss of pitch control when the YS-11 encounters tailplane icing with flaps greater than 20° selected. Operation of the airplane at or near the forward CG limit may aggravate the condition.

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

Conduct a directed safety review of the Nihon YS-11 icing certification to include the effects of flap extension and forward CG loading on pitch control with tailplane ice accumulation. (Class II, Priority action)(A-90-121)

As an interim measure to the completion of the directed safety review, issue an emergency airworthiness directive applicable to YS-11 airplanes that limits the use of flaps to 20° or less

for landing in the presence of known icing conditions. Require that a placard be installed, and that the Pilot's Operational Handbook be modified accordingly. (Class II, Priority Action)(A-90-122)

Issue an air carrier operation bulletin to principal operations inspectors to advise YS-11 operators of the potential for loss of pitch control of the airplane when using flaps greater than 20° for landing with ice on the tailplane. (Class II, Priority Action)(A-90-123)

KOLSTAD, Chairman, COUGHLIN, Vice Chairman, and LAUBER, BURNETT, and HART, Members, concurred in these recommendations.


By: James L. Kolstad
Chairman

Brief of Accident

File No. - 599 3/15/89 WEST LAFAYETTE, IN A/C Reg. No. N128MP Time (Lcl) - 0726 EST

---Basic Information---

Type Operating Certificate-AIR CARRIER - FLAG/DOMESTIC Aircraft Damage Fatal Serious Minor None
Name of Carrier -MID PACIFIC AIRLINES DESTROYED 2 0 0 0
Type of Operation -NON SCHED,DOMESTIC,CARGO Fire 0 0 0 0
Flight Conducted Under -14 CFR 121 ON GROUND Crew 0 0 0
Accident Occurred During -APPROACH Pass 0 0 0

---Aircraft Information---

Make/Model - NIHOH YS-11A-600 Eng Make/Model - ROLLS-ROYCE DART 542-10J ELT Installed/Activated - YES-UNK/NR
Landing Gear - TRICYCLE-RETRACTABLE Number Engines - 2 Stall Warning System - YES
Max Gross Wt - 55110 Engine Type - TURBOPROP
No. of Seats - 3 Rated Power - 2680 HP

---Environment/Operations Information---

Weather Data Itinerary Airport Proximity
Wx: Briefing - COMPANY Last Departure Point OFF AIRPORT/STRIP
Method - IN PERSON TERRE HAUTE, IN
Completeness - UNK/NR Destination WEST LAFAYETTE, IN
Basic Weather - VMC ATC/Airspace Airport Data
Wind Dir/Speed- 280/016 KTS Type of Flight Plan - IFR PURDUE UNIVERSITY AIRPORT
Visibility - 8.0 SM Type of Clearance - IFR Runway Ident - 28
Lowest Sky/Clouds - N/A Type Apch/Lnds Runway Lth/Mid - 6600/ 150
Lowest Ceiling - 2200 FT OVERCAST - VISUAL Runway Surface - ASPHALT
Obstructions to Vision- NONE TRAFFIC PATTERN Runway Status - DRY
Precipitation - NONE
Condition of Light - DAWN

---Personnel Information---

Pilot-In-Command Age - 36 Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT
Certificate(s)/Rating(s) Biennial Flight Review Flight Time (Hours)
ATP Current - YES Total 7294 Last 24 Hrs - 3
SE LAND,ME LAND Months Since - 8 Make/Model- 2097 Last 30 Days- 21
Aircraft Type - YS-11 Instrument- UNK/NR Last 90 Days- 61
Multi-End - 3794 Rotorcraft - 0

Instrument Rating(s) - AIRPLANE

---Narrative---

AN IFR FLIGHT WAS TERMINATED WITH A VISUAL APPROACH. CONDITIONS WERE CONDUCIVE TO AIRFRAME ICING. THE AIRCRAFT WAS BEING POSITIONED EMPTY, WITH A CG AT 22.12 MAC. ON SHORT FINAL, AT APPROXIMATELY 400 FT AGL, 35 DEGREES OF LANDING FLAP WAS SELECTED. THE AIRCRAFT WAS OBSERVED TO PITCH DOWNWARD TO AN UNUSUAL ATTITUDE AND TO ENTER A STEEP DESCENT. A PARTIAL RECOVERY WAS OBSERVED BEFORE THE AIRCRAFT IMPACTED A DIRT HILL 500 FT SHORT OF RWY 28. EXAMINATION OF THE AIRFRAME AFTER THE ACCIDENT REVEALED 1/2 TO 3/4 INCH OF RIME ICE ADHERING TO THE LEADING EDGE OF THE HORIZONTAL STABILIZER. NO ICE WAS FOUND ON ANY OTHER PORTION OF THE AIRFRAME. EVIDENCE IN THE COCKPIT INDICATED THAT ENGINE, PILOT, AND WINDSHIELD ANTI-ICE SYSTEMS WERE ON, BUT WING/EMPENNAGE DEICE WAS OFF. NO EVIDENCE OF A POWERPLANT OR SYSTEMS MALFUNCTION WAS FOUND.

Brief of Accident (Continued)

File No. - 599 3/15/89 WEST LAFAYETTE, IN A/C Reg, No. N128MF Time (Lcl) - 0726 EST

Occurrence #1 LOSS OF CONTROL - IN FLIGHT
Phase of Operation APPROACH - VFR PATTERN - FINAL APPROACH

Findings(s)

1. WEATHER CONDITION - ICING CONDITIONS
2. IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
3. HORIZONTAL STABILIZER SURFACE - ICE
4. ANTI-ICE/DE-ICE SYSTEM - NOT USED - COPILOT/SECOND PILOT
5. LOWERING OF FLAPS - EXCESSIVE -

Occurrence #2 IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation DESCENT - UNCONTROLLED

Findings(s)

6. TERRAIN CONDITION - DIRT BANK

-----Probable Cause-----

The National Transportation Safety Board determines that the Probable Cause(s) of this accident was:
A LOSS OF CONTROL DUE TO THE IMPROPER INFLIGHT DECISIONS BY THE CREW AND THE UNDETECTED ACCUMULATION OF ICE ON THE LEADING EDGE OF THE HORIZONTAL STABILIZER, DURING FLIGHT IN A FORWARD CENTER OF GRAVITY CONDITION AND EXACERBATED BY THE EXTENSION OF FULL LANDING FLAPS.