



# National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

2192060

Date: March 30, 1989

In reply refer to: A-89-14

Mr. Robert E. Whittington  
Acting Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

On November 15, 1987, at Akron, Colorado, a fuel-injected Piper model PA-24-260 "B" Comanche airplane, N9039P, sustained an engine stoppage while on an instrument flight rules (IFR) flight plan in instrument meteorological conditions (IMC) conducive to induction system icing. The airplane had been flying in clouds at below freezing temperature for approximately 45 minutes and was level at 9,000 feet mean sea level when the emergency occurred. Despite the use of appropriate emergency procedures, e.g., switching fuel tanks and turning the electric fuel boost pump on, the pilot was unable to restart the engine. An attempt was then made to glide to the Akron-Washington County Airport, but after breaking out of the clouds at 400 feet above ground level, the pilot landed in an open field with the landing gear retracted. The airplane was damaged substantially and the three occupants aboard the airplane sustained minor injuries.<sup>1</sup> A similar accident involving engine stoppage in a fuel-injected PA-24-250 Comanche,<sup>2</sup> N8185P, occurred on November 20, 1982, at Cascade Locks, Oregon. In this case, the airplane was also damaged substantially during the forced landing, but no one was injured.<sup>3</sup>

The National Transportation Safety Board's investigation of the accidents disclosed, in both cases, that the loss of engine power occurred after snow/ice blocked the induction air filters and prevented the flow of ram air to the engines. The engine air induction box assemblies on fuel-injected PA-24-260 airplanes produced from 1965 through 1968 and on fuel-injected PA-24-250 airplanes contain a spring-loaded alternate air door downstream of the air filter at the throat of the servo regulator. The door, which is acted upon by engine vacuum/suction, is intended to open automatically and provide an alternate source of heated air in the event of blockage of the induction air filter. However, the alternate air doors in N9039P and N8185P failed to operate, apparently because they had been frozen shut by moisture which had entered this portion of the air induction box before engine stoppage. The design of the alternate air systems in these airplanes differs from those installed in older

<sup>1</sup>For more detailed information, read Field Accident Brief No. 1523 (attached).

<sup>2</sup>Fuel-injected engines in Piper model PA-24-250 airplanes installed only under Supplemental Type Certificate (STC) No. SA811WE.

<sup>3</sup>For more detailed information, read Field Accident Brief No. 2549 (attached).

carbureted and post-1968 fuel-injected PA-24 models in two important aspects: (1) they contain no provision for manual operation of the alternate air doors, and (2) they use ambient engine compartment air rather than the much hotter air available from an exhaust heater muff typically used in connection with preventing fuel system icing.

On May 4, 1987, Piper issued Service Bulletin No. 861, *Heated Alternate Air Induction System Installation*. The bulletin, applicable to fuel-injected PA-24-260 airplanes with spring-loaded alternate air doors, reannounced the availability of a manually operated alternate air door installation kit. The availability of this kit had been announced previously in Piper Service Spares Letter No. SP-310, *Manual Alternate Air Induction System Installation*, which was issued on April 12, 1971. Piper considers compliance with the bulletin to be mandatory and recommends that it be accomplished at the next regularly scheduled maintenance event, but not to exceed 50 hours of operation. Piper explains the purpose of the bulletin as follows:

It has been determined that operation in icing conditions can cause ice to accumulate in the fuel injection system, resulting in a loss of engine power.

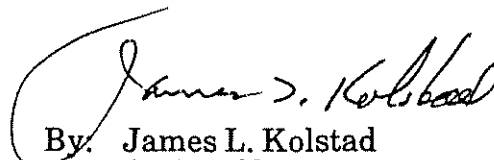
This service bulletin announces the continued availability of a manually operated heated alternate air induction system kit, Piper part number 760-516, which, when installed, will provide the ability to manually select heated alternate air when desired or when conditions dictate and help prevent the above described condition.

In view of the foregoing, the Safety Board believes that the Piper kits, or their equivalent, should be installed in all applicable fuel-injected PA-24 series airplanes to ensure a reliable source of heated alternate airflow to the engine during flight in IMC at altitudes at or above the freezing level.

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

Issue an airworthiness directive applicable to Piper fuel-injected PA-24-250 and PA-24-260 Comanche airplanes requiring a manually operated, heated alternate air induction system kit, Piper part No. 760-516, or its equivalent, to be installed in accordance with Piper Service Bulletin No. 861 or other appropriate service instructions. (Class II, Priority Action) (A-89-14)

KOLSTAD, Acting Chairman, and BURNETT, LAUBER, NALL, and DICKINSON, Members, concurred in this recommendation.

  
By: James L. Kolstad  
Acting Chairman

National Transporter on Safety Board  
Washington, D.C. 20594

Brief of Accident

File No. - 1523      11/15/87      AKRON,CO      A/C Reg. No. N9039F      Time (Lcl) - 1542 MST

---Basic Information---

Type Operating Certificate-NONE (GENERAL AVIATION)

Type of Operation - PERSONAL  
Flight Conducted Under -14 CFR 91  
Accident Occurred During -LANDING

Aircraft Damage  
SUBSTANTIAL  
Fire NONE  
Crew Pass

Fatal 0      Serious 0      Minor 1      None 0  
0      0      2      0

---Aircraft Information---

Make/Model - PIPER PA-24-260B      Eng Make/Model - LYCOMING IO-540-D4RS  
Landing Gear - TRICYCLE-RETRACTABLE      Number Engines - 1  
Max Gross Wt - 3100      Engine Type - RECIP-FUEL INJECTED  
No. of Seats - 6      Rated Power - 260 HP

ELT Installed/Activated - YES/YES  
Stall Warning System - YES

---Environment/Operations Information---

Weather Data  
Wx Briefing - FSS      Method - TELEPHONE  
Completeness - FULL  
Basic Weather - IMC  
Wind Dir/Speed- 330/016 KTS  
Visibility - 1.000 SM  
Lowest Sky/Clouds - N/A  
Lowest Ceiling - 400 FT OVERCAST  
Obstructions to Vision- BLOWING SNOW  
Precipitation - ICE PELLETS  
Condition of Light - DAYLIGHT

Airport Proximity  
OFF AIRPORT/STRIP

Itinerary  
Last Departure Point  
ENGLEWOOD,CO  
Destination  
DES MOINES,IA

Airport Data  
AKRON-WASHINGTON COUNTY  
Runway Ident - N/A  
Runway Lth/Wid - N/A  
Runway Surface - N/A  
Runway Status - N/A

---Personnel Information---

Pilot-In-Command  
Certificate(s)/Rating(s)  
COMMERCIAL  
SE LAND

Age - 42      Medical Certificate - VALID MEDICAL-WAIVERS/LIMIT  
Biennial Flight Review      Flight Time (Hours)  
Current - YES      Total 1091  
Months Since - 13      Make/Model- 249      Last 24 Hrs - 7  
Aircraft Type - PA-24      Instrument- 254      Last 30 Days- UNK/NR  
Last 90 Days- 37

Instrument Rating(s) - AIRPLANE

---Narrative---

BFR TKOF, SNOW WAS MELTED OFF THE ACFT IN A HEATED HANGAR. THE FLT WAS BGN IN BLOWING SNOW WITH A FORECAST OF OCNL MOD ICING TO 20,000'. THE FLT SAID THE SNOW LASTED ONLY 5 TO 10 MIN & ONLY A TRACE OF ICE (LESS 1/16 INCH) ACCUMULATED DRG THE 1ST 15 MIN OF FLT. NO FURTHER ACCUMULATION OF ICE WAS NOTED. APRX 45 MIN AFTER TKOF, WHILE CRUISING IN IMC CONDUCTIVE TO INDUCTION SYS ICING, THE ENG SUDDENLY LOST PWR & WOULD NOT RESTART. THE FLT DSCNDD TWD AN ARPT IN IMC TO APRX 400' AGL, BUT MADE A WHEELS-UP LNDG WHEN HE COULD NOT SEE THE ARPT. HE ATTRIBUTED THE LOSS OF PWR TO BLOCKAGE OF THE AIR INDUCTION FILTER. THE INDUCTION SYS WAS EQUIPPED WITH A SPRING LOADED DOOR WHICH WAS INTENDED TO OPEN AUTOMATICALLY & ALLOW HEATED ALTN AIR TO FLOW TO THE ENG IN THE EVENT THE FILTER BGN BLOCKED. NONETHELESS, PIFER INDCD THAT OFN IN ICING CONDS COULD CAUSE ICE TO ACCUMULATE IN THE FUEL INJECTION SYS & RESULT IN LOSS OF FWR. TO AVOID THIS, PIFER SVC BULLETIN NO: 861 WAS ISSUED ON 5/4/87 FOR INSTLN OF AN IMPROVED MANUALLY OPERATED ALTN AIR SYS ON FUEL INJECTED FA-24-260 ACFT.

File No. - 1523      11/15/87      AKRON, CO      Brief of Accident (Continued)  
A/C Reg. No. N9039P      Time (Lcl) - 1542 MST

Occurrence #1      LOSS OF ENGINE POWER(TOTAL) - NON-MECHANICAL  
Phase of Operation      CRUISE - NORMAL

Findings(s)

1. INDUCTION AIR CONTROL/SYSTEM -
2. MAINTENANCE, SERVICE BULLETINS - NOT PERFORMED - COMPANY/OPERATOR MGMT
3. WEATHER CONDITION - ICING CONDITIONS
4. WEATHER CONDITION - SNOW
5. INDUCTION AIR CONTROL/SYSTEM - ICE
6. INDUCTION AIR CONTROL, AIR FILTER/SCREEN - BLOCKED(TOTAL)

Occurrence #2      FORCED LANDING  
Phase of Operation      DESCENT - EMERGENCY

Occurrence #3      IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation      LANDING - FLARE/TOUCHDOWN

Findings(s)

7. WEATHER CONDITION - LOW CEILING
8. WHEELS UP LANDING

Probable Cause

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are findings(s) 5,6  
Factor(s) relating to this accident is/are findings(s) 2,3,4,7

National Transportation Safety Board  
Washington, D.C. 20594

Brief of Accident

File No. - 2549      11/20/82      CASCADE LOCKS,OR      A/C Res. No. N8185P      Time (Lcl) - 1430 PST

Basic Information-----  
Type Operating Certificate-NONE (GENERAL AVIATION)

Type of Operation -PERSONAL  
Flight Conducted Under -14 CFR 91  
Accident Occurred During -LANDING

Aircraft Damage  
SUBSTANTIAL  
Fire  
NONE

Fatal      Serious      Injuries      Minor      None  
0      0      0      0      1  
0      0      0      0      2

---Aircraft Information---  
Make/Model - PIPER PA-24-250

Landing Gear - TRICYCLE-RETRACTABLE  
Max Gross Wt - 2900  
No. of Seats - 4

Eng Make/Model - LYCOMING IO-540-C1BS  
Number Engines - 1  
Engine Type - RECIP - FUEL INJECTED  
Rated Power - 250 HP

ELT Installed/Activated - YES/YES  
Stall Warning System - YES  
Weather Radar - NO

---Environment/Operations Information---  
Weather Data

Wx Briefing - FSS  
Method - TELEPHONE  
Completeness - FULL  
Basic Weather - VMC  
Wind Dir/Speed - 220/005 KTS  
Visibility - 3.000 SM  
Cloud Conditions(1st) - 4000 FT BROKEN  
Cloud Conditions(2nd) - 7000 FT OVERCAST  
Obstructions to Vision- FOG  
Precipitation - RAIN  
Condition of Light - DAYLIGHT

Itinerary  
Last Departure Point  
HERMISTON,OR  
Destination  
NORTH BEND,OR

ATC/Airspace  
Type of Flight Plan - IFR  
Type of Clearance - UNK/NR  
Type Apch/Lndg - VISUAL STRAIGHT-IN

Airport Proximity  
ON AIRPORT  
Airport Data  
CASCADE LOCKS ST. STATE  
Runway Ident - 24  
Runway Lth/Wid - 1800/ 30  
Runway Surface - ASPHALT  
Runway Status - SNOW - WET

---Personnel Information---  
Pilot-In-Command

Certificate(s)/Rating(s)  
PRIVATE  
SE LAND

Age - 45  
Biennial Flight Review  
Current - YES  
Months Since - 0  
Aircraft Type - UNK/NR

Medical Certificate - VALID MEDICAL-NO WAIVERS/LIMIT  
Flight Time (Hours)  
Total 309      Last 24 Hrs - 3  
Make/Model- 224      Last 30 Days- 12  
Instrument- 63      Last 90 Days- 51

Instrument Rating(s) - AIRPLANE

---Narrative---  
WHILE CRUISING AT 10000 FEET MSL, IN IMC CONDITIONS, THE PILOT REPORTED THAT POWER HAD BEEN LOST, DURING DESCENT TO 2000 FEET THE ENGINE RESTARTED AND FAILED SEVERAL TIMES BUT EVENTUALLY MAINTAINED IDLE THROUGHOUT THE REMAINDER OF THE DESCENT. PORTLAND APPROACH CONTROL PROVIDED VECTORS TO THE PILOT DURING DESCENT AND THE AIRCRAFT BROKE OUT INTO LIGHT RAIN/SNOW AT 300 FEET AGL, AND 1000 FEET FROM THE APPROACH END OF RUNWAY 06. DURING LANDING THE PILOT INTENTIONALLY SKIDDED THE AIRCRAFT, COLLAPSING THE GEAR, TO PREVENT THE AIRCRAFT FROM OVER RUNNING. THE PILOT STATED THAT FREEZING WATER IN THE ALTERNATE AIR SYSTEM PREVENTED THE ALTERNATE AIR GATE FROM OPERATING AND PREVENTED SUFFICIENT AIR TO THE ENGINE.

Brief of Accident (Continued)

File No. - 2549      11/20/82      CASCADE LOCKS, OR      A/C Reg. No. NB185P      Time (Lcl) - 1430 PST

Occurrence #1      FORCED LANDING  
Phase of Operation      CRUISE - NORMAL

- Findings(s)
- 1. FUEL SYSTEM, RAH AIR - BLOCKED(PARTIAL)
  - 2. FUEL SYSTEM, RAH AIR - ICE
  - 3. WEATHER CONDITION - ICING CONDITIONS

Occurrence #2      ABRUPT HANEUVER  
Phase of Operation      LANDING - ROLL

- Findings(s)
- 4. GROUND LOOP/SWERVE - INTENTIONAL - PILOT IN COMMAND

Occurrence #3      GEAR COLLAPSED  
Phase of Operation      LANDING - ROLL

- Findings(s)
- 5. LANDING GEAR - OVERLOAD
  - 6. WEATHER CONDITION - RAIN
  - 7. WEATHER CONDITION - SNOW

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

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 1,2,4  
Factor(s) relating to this accident is/are finding(s) 3,5,6,7