NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT/INCIDENT SUMMARY REPORTS

DENVER, COLORADO -- AUGUST 19, 1983
BLountVILLE, TENNESSEE -- JULY 15, 1983
TUCSON, ARIZONA -- FEBRUARY 6, 1983
SIOUX FALLS, SOUTH DAKOTA -- DECEMBER 20, 1983
COCKEYSVILLE, MARYLAND -- APRIL 26, 1984
AKRON, OHIO -- SEPTEMBER 20, 1984
SEATTLE, WASHINGTON -- OCTOBER 16, 1984
MIAMI, FLORIDA -- NOVEMBER 11, 1983

NTSB/AAR-85/01/SUM

UNITED STATES GOVERNMENT
Aircraft Accident/Incident Summary Reports

(U.S.) National Transportation Safety Board
Washington, DC

30 Sep 85
### Abstract
This publication is a compilation of the reports of eight separate aircraft accidents investigated by the National Transportation Safety Board. The accident locations and their dates are as follows: Denver, Colorado, August 19, 1983; Bloomville, Tennessee, July 16, 1983; Tucson, Arizona, February 6, 1983; Sioux Falls, South Dakota, December 20, 1983; Cockeysville, Maryland, April 28, 1984; Akron, Ohio, September 30, 1984; Seattle, Washington, October 18, 1984; and Miami, Florida, November 11, 1983. A Brief of Accident containing the probable cause is included for each case.
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The incident occurred during a descent from flight level (FL) 410 to FL 240 in preparation for a landing at the Stapleton International Airport, Denver, near FL 295. When the captain advanced the engine thrust levers from the flight idle position, the left engine surged and exceeded its maximum exhaust gas temperature (EGT) limitation. About 18 seconds later, the right engine surged and exceeded its EGT limitation. The flight crew shut down both engines in order to prevent damage, declared an emergency, initiated the in-flight engine restart procedures, and successfully restarted the engines near 15,000 feet. Air traffic control had cleared the airspace below the flight and provided the flight crew with a direct route to the airport during the emergency. The flight subsequently landed at Stapleton without further incident. There were no injuries to passengers or crew as a result of the incident.

Preliminary investigation into the incident indicated that the reasons for the malfunction of the Pratt & Whitney JT9D-7F4 engines were probably the result of engine design and maintenance. Although the formation of ice within the engine was also considered a possibility during the early stages of the investigation, further investigation showed that icing would not have caused the problem based on simulated tests in severe icing conditions.

A few previous malfunctions which resulted in shutdowns of the JT9D-7F4 engines, including shutdowns subsequent to the incident involving United Flight 310, prompted a lengthy investigation by Pratt & Whitney, into the malfunctions condition termed "sub-idle stall." In cooperation with the National Transportation Safety Board and the Federal Aviation Administration (FAA) and...
with aircraft manufacturers and air carriers which use the JT9D-7R4. Several manufacturer service bulletins and an airworthiness directive were issued to operators apprising them of the problem, setting forth interim corrective measures and eliciting specific operational information to assist the investigation. Following extensive tests by Pratt & Whitney from August to November of 1983, it was determined that the sub-idle stall condition occurred because of contaminated fuel nozzles which significantly reduced engine combustor efficiencies. This condition prevented the flightcrew of United Flight 310 from obtaining additional thrust from the engines. Corrective actions taken to prevent recurrence of the problem as a result of the investigation were as follows:

1. Operator bulletins issued to require a higher minimum flight idle engine speed.

2. Technical directives issued requiring an increase in the minimum fuel flow scheduling and retrofit of a new flight idle cam for the fuel control units.

3. Tighter manufacturer limits for rework and overhaul of Hamilton Standard fuel control units to control fuel schedule "shifts."


5. An in-service fuel nozzle cleaning or replacement program established and were mandatory by an airworthiness directive.

The attached Brief of Aviation Accident contains the Safety Board's conclusions and findings of probable cause and related factors.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G.H. PATRICK BURSLEY
Member

January 7, 1985
National Transportation Safety Board
Washington, D.C. 20591

Brief of Incident

File No. - 5119                                                                 A/C Reg. No. N809YA
4/19/83 DENVERCO                                                                 Time (LZ) - 1920 AST

--- Basic Information ---
Type Operating Certificate - AIR CARRIER - FLAG/DOMESTIC                                Aircraft Damage
Name of Carrier - UNITED AIRLINES                                                    Faint
Type of Operation - SCHEDULED-DOMESTIC-PISTONANGER                                   Minor
Flight Conducted Under - 14 CFR 121                                                 None
Incident Occurred During - DESCENT

--- Aircraft Information ---
Make/Model - 767                                                                      ENTR Maker/Model - FW J9F4-7R6
Landing Gear - TRICYCLE-RETRACTABLE                                                   ELT Installed/Activated - N/A - N/A
Max Gross Wt - 30,000                                                               Engine Type - TURBOFAN
No. of Seats - 197                                                                      Stall Warning System - YES

--- Environment/Operations Information ---
Weather Data
WX Reporting - COMPANY
Method - TELETYPYE
Completeness - FULL
Basic Weather - VMC
Wind Dir/Speed - 160/009 KTS
Visibility - 40 SM
Lowest Sky/Clouds - 7000 FT SCATTERED
Type of Flight Plan - IFR
Lowest Ceiling - 25000 FT BROWNED
Type of Clearance - SPECIAL IFR
Obstructions to Vision - NONE
Precipitation - NONE
Condition of Light* - DAYLIGHT

--- Narrative ---
The ACFT was descending from FL 410, with the throttles at idle. As power was added at FL 275 the left engine surged &
exceeded NAX est. 15 secs later the right engine surged & exceeded NAX est. 12 secs later. The left & right engines were shut down at
FL 200 & 177 respectively. The engine was successfully restarted about FL 150. The inability of the engine to accelerate
after the manually induced surge was due to contaminated fuel nozzles which significantly reduced combustion chamber
efficiencies & which resulted in a smoke stall.

--- Personnel Information ---
Age - 55
Medical Certificate - VALID MEDICAL-WAIVERS/LIMIT
Commercial License Current - YES
Total Flight Time (Hours) - UNK/HR
Last 24 Hrs - UNK/HR

--- Instrument Ratification ---
AIRCRAFTE
Brief of Incident (Continued)

File No. - 5117  8/19/83  DENVER, CO  A/C Res. No. H6084A  Time (LCL) - 1820 ADT

Occurrence - LOS OF POWER(TOTAL) - MECH FAILURE/MALFUNCTION
Phase of Operation - DESCENT - NORMAL

Findings:
- 1. FUEL SYSTEM-NOZZLE - CONTAMINATION

--- Probable Cause ---

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/are finding(s) 1.
**AIRCRAFT ACCIDENT/INCIDENT SUMMARY**

<table>
<thead>
<tr>
<th>File No.</th>
<th>2312</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft Operator</td>
<td>Orion, Inc.</td>
</tr>
<tr>
<td>Airplane Type and Registration</td>
<td>Gulfstream G-159. N681G</td>
</tr>
<tr>
<td>Location</td>
<td>Tri-Cities Regional Airport, Blountville, Tennessee</td>
</tr>
<tr>
<td>Date and Time</td>
<td>July 15, 1983. 2108 eastern daylight time</td>
</tr>
<tr>
<td>Persons on Board</td>
<td>2</td>
</tr>
<tr>
<td>Injuries</td>
<td>None</td>
</tr>
<tr>
<td>Aircraft Damage</td>
<td>Destroyed by Post Crash Fire</td>
</tr>
<tr>
<td>Other Damage or Injury</td>
<td>None</td>
</tr>
<tr>
<td>Type of Occurrence</td>
<td>Overrun</td>
</tr>
<tr>
<td>Phase of Operation</td>
<td>Landing roll</td>
</tr>
</tbody>
</table>

The airplane departed Knoxville, Tennessee, at 2040, operating as TAG 409. The cargo consisted of 4,434 pounds of hazardous material, in two shipments: four milllicuries of Yttrium 90 radioactive material, UN2982 H.O.S. Type A, and two packages of 3942 and 3703 curies of Iridium-192 radioactive material, Type B. The Yttrium 90 container conformed to the DOT Spec. 7A requirements. The type B containers were approved by the Department of Energy (DOE). The flightcrew was aware of the nature of the cargo on board. In addition to the cargo, there was 6,000 pounds of fuel aboard. The takeoff gross weight was 32,411 pounds, and the estimated landing weight was 31,511 pounds.

The surface weather taken at 2045 by the National Weather Service observer was, in part: 25,000 feet scattered; visibility—7 miles; temperature—80°F; dewpoint—64°F; wind 300° at 6 knots; alimeter—30.04 inch Hg. The special observation taken after the accident was essentially the same except that the wind was recorded as 180° at 3 knots. Official sunset was 2048 with a period of twilight to 2128.

The flight, conducted under instrument flight rules (IFR), was uneventful until the airplane arrived in the terminal area and was cleared for the visual approach to runway 4. The weather was VFR. At 2104:17, the airplane was at 5,200 feet (airport elevation 1,500 feet) and the flightcrew reported an indicated airspeed of 250 knot. At 2106:35, the arrival controller told the flight to switch to tower, and asked if the flightcrew "will be able to get down for [runway] four." The pilot responded, "No problem."
At 2106:51, the local controller cleared TAG 409 to land "in the blind," since the flight had not contacted the tower. Conversations between the arrival and local controller followed as they tried to determine if TAG 409 had changed to tower frequency. At 2107:22, TAG 409 transmitted "Tower, TAG 409 on final for four," and the tower controller cleared the flight to land.

At 2107:52, the tower controller said "(Unintelligible) had better get on down." This comment was not transmitted but was recorded on the interphone. At 2108:12, one of the pilots made a series of comments on an open microphone about "getting on the brakes," and then an emergency locator transmitter (ELT) signal was heard.

The airplane ran off the runway, over an embankment, and collided with a chain link fence. The airplane exploded and burned. The flight crew escaped with no injuries.

The flight crew said that the flight was uneventful until the airplane was within 3 miles of the airport; the first officer was flying. The captain said that he knew they were high. "He (the first officer) misjudged on coming into Tri-Cities Airport. I let him sit there long enough so that he could see what was happening, and then I said at this particular point, 'I will take the aircraft, it's my judgment and I would rather continue this approach and I'll explain to you on the ground exactly why.'"

The first officer said the visibility was reduced by haze and that he did not descend until he saw the airport. When he did see it, "...I got jammed in a little bit tight...By the time I saw the runway, I was, in my opinion, too close for me with 60 hours in the aircraft to try and make an approach to the field. So I said to the captain, 'I'd like to make a 360 to the right and at that point he said, 'I have the aircraft.'"

The performance study of the flightpath was conducted from the altitudes of 7,700 feet to 2,200 feet mean sea level (about 700 feet above ground level (AGL)). At 2.3 miles from the airport, the airplane made a slight right turn and then a sharp left turn (27.50 angle of bank) and increased the rate of descent to 2,600 feet per minute. The last radar return was 1.45 miles from the runway threshold at 700 feet AGL. None of the calculations indicated airspeeds below 200 knots.

The airplane was configured properly for the landing; and landed on runway 4. The flight crew believed that the approach speed was V_{ref} plus 5. According to witnesses, the airplane touched down about 3,500 feet beyond the threshold of the 6,099-foot runway. The required landing distance for the airplane was calculated to have been 2,600 feet. The captain reported that after he got no response from normal braking, he used the emergency brakes. There was evidence of wheel bricking on the runway, beginning about 3,723 feet beyond the runway threshold, which consisted of four distinct black marks—these marks continued beyond the departure end of the runway. An examination of the wheel brakes showed no irregularities. Further, there was evidence of heavy braking as indicated by the imprints of three, pucks on each brake disc and the discoloration of the discs. Consequently, it is apparent that the wheel brake system functioned properly throughout the landing roll.

Further examination disclosed that the parking and emergency brake selector was selected to the normal position, and the parking and emergency brake selector valves were not in position to port fluid pressure to the
emergency brake pressure side of the valve. Also, the emergency brake "T" handle was not extended. This evidence verifies that the captain did not use the emergency brake for stopping.

The three containers of radioactive material were in a fuel fire for about 45 minutes after the accident. The containers were not damaged and no radioactive material was released.

The National Transportation Safety Board determined that the cause of the accident was the misjudgment of airspeed and distance by the pilot-in-command, and the failure of the pilot-in-command to perform a go-around. Factors relating to the accident were: light condition - dusk; weather condition - hazy; airport facilities - visual approach slope indicator not operating; the fence and the dirt bank the airplane struck.

See the attached accident brief.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G.H. PATRICK BURSLEY
Member

January 7, 1985
National Transportation Safety Board
Washington, D.C. 20254

Brief of Accident

File No. = 2312
7/17/93
BLAUPILLVILLE, IN
A/C Reg. No. N619G
Time (LST) - 2108 CDT

--- Basic Information ---
Type Operating Certificate - AIR CARRIER - SUPPLEMENTAL
Name of Carrier - ORION AIR, INC.
Type of Operation - SCHEDULED, DOMESTIC, CARGO
Flight Conducted Under - 14 CFR 135
Accident Occurred During - LANDING

--- Aircraft Information ---
Make/Model - GRUMAN 0-159
Landing Gear - UKH/UKH
Max Gross Wt. - 36,000
No. of Seats - UKH/UKH
Engine Make/Model - ROLLS ROYCE RD37/529-3E
Engine Type - TURBOPROP
Number Engines - 2
Rated Power - 1910 HP

--- Environmental/Operational Information ---
Weather Data
Wx: BRIEFING - SEYS
Method - IN PERSON
Completeness - FULL
Basic Weather - VMC
Wind Dir/Speed - 180/03 KTS
Visibility - 7/10 SM
L/vest Sky/Clouds - 25000 FT SCATTERED
Highest Ceiling - NONE
Obstructions to Vision - none
Precipitation - NONE
Condition of Light - DUSK

--- Personal Information ---
Pilot-In-Command
Certificate(s)/Rating(s) - COMMERCIAL, ATP, CFI
SE LAND/HY LAND

--- Instrument Rating(s) - AIRPLANE

--- Narrative ---
The report stated that when he began the approach to the destination airport, the weather condition was hazy and he delayed his descent slightly until he located the airport. When he saw the runway, he believed that they were a little too close, so he indicated to the captain that he would like to make a 360 degree turn. At that point, the captain assumed control of the aircraft and continued the approach to runway 4. According to witnesses, the aircraft touched down low. According to the captain, he tried several applications of the normal braking system, but no response. He then tried the emergency brake, which the co-pilot got on the brakes, but reported there was no braking. Subsequently, the aircraft went off the end of the runway, went over an embankment, and hit a fence, it came to rest on a 2nd embankment, where it exploded and burned. Tire marks with evidence of braking action were found starting 2378 ft beyond the runway threshold, a required field length of 2400 ft was calculated for the aircraft. No preimpact fire failure/malfunction was found, vacillating lights were not observed.

--- End ---
Occurrence #1: Overrun
Phase of Operation: Landing - Roll
Findings:
1. Light Condition: Dark
2. Weather Condition: Haze
3. Airport Facilities: VFR, A/C Slope Indicated - Not Operating
4. Misjudged - Misjudged - Pilot in Command
5. Distance - Misjudged - Pilot in Command
6. Go-Around - Not Performed - Pilot in Command

Occurrence #2: On-Ground Collision with Object
Phase of Operation: Landing - Roll
Findings:
1. Object - Fence

Occurrence #3: On-Ground Collision with Terrain
Phase of Operation: Landing - Roll
Findings:
1. Terrain Condition - Hill Bank

--- Probable Cause ---
The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are Findings 1 & 8.

Factors relating to this accident is/are Findings 1, 3, 7, 8.
The Bonanza pilot reported he was unable to power the engine.

2300, the Bonanza pilot reported he was unable to power the engine. The Bonanza was reported to turn to the right. The Bonanza pilot reported he had to land at the airport at a point where a 400-foot mean sea level for a landing at a vertical distance of 2000 feet. The Bonanza was observed to enter the traffic pattern at 1700. As the Bonanza approached, a Boeing 727, a pitch...

Washington
Safety Board
Transportation
National
AIRCRAFT ACCIDENT/INCIDENT SUMMARY
At 1745:38, after changing to the tower frequency, the Bonanza pilot was advised that the PSA aircraft was at 12 o'clock and 3 miles, on a base turn to runway 29L. The Bonanza pilot acknowledged and said he had the traffic. The Bonanza pilot again was cautioned about possible wake turbulence and was cleared to land.

At 1747:00, the Bonanza pilot called the tower in an excited voice. He reported that "something blew up here in the rlr and this thing is about to take apart. Oh, like to come right on it." Later, the pilot reported that at 2 miles east of the airport while on final approach, the aircraft suddenly pitched up and flipped over. After recovering, he was able to continue the approach and land safely.

An examination of the rfrgr after it landed revealed that the V-tail was damaged. The leading edge of the right stabilizer was deformed downward about 1 3/4 inches and its lower skin was buckled between the front and rear spars. The front spar of the right elevator (ruddervator) was twisted. Skin on both ruddervators was deformed. No preaccident malfunction or failure was evident.

The 1751 surface weather observation at the Tucson International Airport was: 3,500 feet scattered, 9,000 feet scattered, 25,000 feet thin overcast; visibility ~ 50 miles; temperature ~ 51°F; dewpoint ~ 42°F; wind ~ 360° at 6 knots; alimeter ~ 30.13 inches Hg.

The traffic pattern winds at the time of the accident are not known. However, at the time of the 1605 sounding at Tucson, the winds aloft were:

<table>
<thead>
<tr>
<th>Altitude (feet above sea level)</th>
<th>Direction (° true)</th>
<th>Speed (knots)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface (2,582)</td>
<td>260</td>
<td>8</td>
</tr>
<tr>
<td>3,536</td>
<td>290</td>
<td>11</td>
</tr>
<tr>
<td>4,429</td>
<td>287</td>
<td>12</td>
</tr>
<tr>
<td>5,366</td>
<td>287</td>
<td>15</td>
</tr>
<tr>
<td>6,365</td>
<td>289</td>
<td>16</td>
</tr>
<tr>
<td>7,365</td>
<td>287</td>
<td>18</td>
</tr>
<tr>
<td>8,294</td>
<td>284</td>
<td>19</td>
</tr>
<tr>
<td>9,120</td>
<td>280</td>
<td>19</td>
</tr>
<tr>
<td>9,917</td>
<td>284</td>
<td>18</td>
</tr>
</tbody>
</table>

The 1605 sounding showed also a strong superadiabatic layer between 2,906 feet and 4,965 feet. The lapse rate in the layer was -3.3°C per 1,000 feet.
According to the Airmen’s Information Manual (AIM), every airplane generates a wake while in flight and wingtip vortices can persist for a period of time. The strength of the vortex is governed by the weight, speed, and shape of the wing of the generating aircraft. The vortex is strongest when the generating aircraft is heavy, clean, and slow. The strength of the vortex diminishes with time and distance behind the generating aircraft, and atmospheric turbulence hastens the breakup.

Flight tests have shown that vortices from a large aircraft sink at a rate of up to 400 to 500 feet per minute. Generally, the vortices stop sinking (level off) after settling about 300 feet. The AIM recommends that pilots fly at or above the flight path of a large aircraft that is landing on a parallel runway that is closer than 2,500 feet. The parallel runways (29L & 29R) at the Tucson International Airport were about 300 feet apart.

A review of the radio transcript and radar information revealed that the upset the Bonanza bid encountered was in the vicinity of the point its flight path had crossed the flight path of the Boeing 727. When the upset occurred, the Bonanza was following 60 to 65 seconds behind the Boeing, rather than the minimum 2-minute reparation interval recommended by the AIM. At that time, the Bonanza’s speed was about 150 knots, well above its maneuvering speed of 124 knots.

The exact location of the encounter could not be determined. However, the Bonanza’s transponder reply indicated that it began descending to 3,500 feet about 11 seconds before crossing the flight path of the Boeing. At that point, the Bonanza was about 1,000 feet to the right (southeast) of the Boeing’s ground track. When the Boeing had passed that vicinity about 60 seconds earlier, it was in a left turn at 3,900 feet. Interpolation of the 1605 winds aloft shows that the wind at that altitude would have been from 287° to 250° at 11 to 12 knots. If the wind aloft had remained the same, the wake turbulence would have drifted to the east-southeast about 1,000 feet per minute. (See Figure I for a depiction of the aircraft flight paths, altitudes, and time intervals.)

The attached Brief of Accident contains the Safety Board’s conclusions, findings of probable cause, and related factors.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G.H. PATRICK BURSLEY
Member

January 9, 1985
Flight path of Boeing 727, PSA Flight 420.
Approx 0.2 nautical mile.
Approx distance and direction wake turbulence would have drifted if the winds had continued at 287° to 290° at 11 to 12 knots (1000 to 2000 ft AGL).
Approx distance and direction wake turbulence would have drifted if the winds had shifted to north-northwest and held at 11 to 12 knots (1000 to 2000 ft AGL).
Flight path of Beech H35, N4657D.
FIGURE - 1
National Transportation Safety Board  
Washington, D.C. 20594

Brief of Accident

File No. - 1928  2/06/83  TUCSON/AZ  A/C Reg. No. N4687D  Time (LST) - 1747 MDT

--- Basic Information ---
Type Operating Certificate - NONE (GENERAL AVIATION)
Type of Operation - PERSONAL
Flight Conducted Under - 14 CFR 91
Accident Occurred During - APPROACH

--- Aircraft Information ---
Make/Model - BEECH N13
Landing Gear - TRICYCLE-RETRACTABLE
Max Gross Wt - 3500
No. of Seats - 4

--- Aircraft Data ---
Engine Make/Model - CONTINENTAL 0-470-7
Number Engines - 1
Engine Type - RECIPROCATING-CARBURETOR
Rated Power - 240 HP

--- Weather Data ---
Weather - NO RECORD OF BRIEFING
Visibility - 500 SM
Clouds - SCATTERED

--- Environment/Operations Information ---
Itinerary - Last Departure Point QUAYMA-HK
Destination - OFF AIRPORT/STRAIGHT-IN
Airport Proximity - TUCSON INTL.
Airport Data - Runway Ident. 240/75
Runway Surface - ASPHALT
Runway Status - N/A

--- Personal Information ---
Age - 40
Aircraft Type - N13

--- Medical Certificate ---
Current - YES
Total Flights - 1011
Lapse - 30 Days - UNK/HR

--- Flight Log ---
Current Flight Review - YES

--- Narrative ---
Occurrence #1
VORTEX TURBULENCE ENCOUNTERED

Phase of Operation
APPROACH

Findings:
1. TRAFFIC ADVISORY - ISSUED - ATC PSHL (LCL/GND/CLNC)
2. SAFETY ADVISORY - ISSUED - ATC PSHL (LCL/GND/CLNC)
3. PROCEDURES/DIRECTIVES - NOT FOLLOWED - PILOT IN COMMAND
4. PLANNED APPROACH - IMPROPER - PILOT IN COMMAND

Occurrence #2
AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation
APPROACH

Findings:
5. DESIGN STRESS LIMITS OF AIRCRAFT - EXCEEDED -
6. STABILIZER - OVERLOAD
7. FLIGHT CONTROL/RUDSDERVATOR - OVERLOAD

--- Probable Cause ---

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 3-7.
## Aircraft Accident/Incident Summary

<table>
<thead>
<tr>
<th>Aircraft Operator:</th>
<th>Ozark Airlines, Flight 650</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airplane Type and Registration:</td>
<td>McDonnell Douglas DC-9-31, N994Z</td>
</tr>
<tr>
<td>Location</td>
<td>Sioux Falls Regional Airport, Sioux Falls, South Dakota</td>
</tr>
<tr>
<td>Date and Time</td>
<td>December 20, 1983, 1317 central standard time</td>
</tr>
<tr>
<td>Persons on Board</td>
<td>Crew-5, Passengers-81</td>
</tr>
<tr>
<td>Injuries</td>
<td>Crew-2 minor, Passengers-None</td>
</tr>
<tr>
<td>Aircraft Damage</td>
<td>Substantial</td>
</tr>
<tr>
<td>Other Damage or Injury</td>
<td>Snow sweeper destroyed, operator fatal</td>
</tr>
<tr>
<td>Type of Occurrence</td>
<td>Collision with vehicle</td>
</tr>
<tr>
<td>Phase of Operation</td>
<td>Landing</td>
</tr>
</tbody>
</table>

The Ozark flight 650 departed Sioux City, Iowa, on an instrument flight rules (IFR) flight plan at 1253 and climbed to its assigned altitude of 11,000 feet. The crew tuned-in and listened to the Sioux Falls Automatic Terminal Information System (ATIS) broadcast shortly after takeoff. The flight was handed off from Sioux City approach control to Sioux Falls approach control at 1306. The approach controller issued descent instructions to 3,400 feet and vectors for intercepting the runway 31L S approach course. Flight 650 was cleared for the approach at 1311. At 1313, the approach controller directed the crew to contact Sioux Falls Tower. The controller stated that at that time he observed Flight 650’s radar return to be 4 miles from the Runway 03 outer marker which is 5.7 miles from the threshold of Runway 03. The captain acknowledged the instruction but did not contact the tower. When the airplane was on final approach, about 2.5 miles from the runway, the local controller initiated a call to Ozark 650, to which the captain responded. The controller then cleared the flight to land and gave the current runway visual range (RVR) as 3,500 feet. He did not advise the flight of the snow removal operation in progress on Runway 03.

The crew stated that they first saw the ground and the approach lights at about 200 feet above the ground, and then saw the runway. Because the ATIS reported blowing snow, the crew expected to see, and were not surprised to see, snow blowing across the runway about 2,000 feet beyond the threshold. They saw also that an area of pavement over 75 feet wide along the runway centerline was clear of snow. The crew stated that no information was transmitted to them either by ATIS, approach control, or local control concerning snow removal operations.
The airplane made a smooth touchdown about 1,000 feet from the threshold. The spoilers deployed and the copilot, who was flying, was just beginning to apply reverse thrust when the airplane entered a cloud of snow. At that time, the right wing struck a large snowsweeping vehicle which was traveling in the same direction to the right of the runway centerline. The crew stated that at no time did they see a vehicle or a rotating beacon, and they thought the snow cloud was the reported blowing snow.

The right wing was separated from the airplane by the impact, and a large flash fire erupted from the fuel cloud escaping from the separated wing. The airplane veered to the right and continued along the runway in the landing direction. It went off the runway on the left side and came to rest 4,125 feet from the approach end of Runway 03. The collision occurred about 2,200 feet from the approach end of the runway.

The passengers evacuated the airplane using the escape slides at the two forward exits. There were no injuries to the passengers and the three flightcrew members. The two flight attendants were treated for minor injuries. The snowsweeper operator was killed.

Witnesses driving on the parallel taxiway saw a large fireball which rapidly died out and also a fire on the fuselage of the airplane which extinguished as it traveled down the runway. There was no fire when the airplane came to rest. The broom sweeper's wreckage remained on the runway burning, and the fire was extinguished by firefighters.

During winter months at many airports in the north, runways, taxiways, and the air carrier ramp areas of the airport necessarily are cleared of snow while they are being used by landing, taxiing, and parking aircraft. All vehicles operating on, or adjacent to, usable runways or taxiways are required to be equipped with two-way radios and must be in contact with the tower or be escorted by a vehicle with a two-way radio in contact with the tower. All communications between such vehicles and the tower are on the ground control frequency of 121.9.

At the time of the accident, runway sweeping was necessary and was in progress. The sweeper was a commercial Snowblast Vehicle with a gross weight in excess of 34,000 pounds, and was equipped with a two-way radio, standard vehicular lights, and an SAE standard 10-inch, 360° amber rotating beacon on top of the cab roof. Witnesses stated that they had observed the beacon operating when the sweeper was on the runway. The sweeper began work on Runway 03 about 1230 and made 4 to 6 swaths the full length of Runway 03 during the operation. Because of air traffic, the control tower had directed the sweeper to leave the runway three times. The last time the sweeper operator was in contact with the tower was at 1309:40, and no further communications were had between the sweeper operator and the control tower. It took the sweeper 5 to 7 minutes to traverse the length of the runway. At the time of the accident, the sweeper was traveling northeast on Runway 03 about 1,500 feet from the approach end on the east side of the centerline. There were two runway exits in the vicinity of the accident; one service road located about 1,000 feet away, and one taxiway at about 2,305 feet from the Runway 03 threshold.

On the day of the accident, the air traffic controller reported for his normally scheduled shift at 0300. At the time of the accident, he was assigned to the combined positions of clearance delivery/ground control/local control (GC/LC), having assumed these duties at 1303 and he had been on duty 77 15 hours, 16 minutes. Two hours 53 minutes were logged on operating positions within the facility (AR = 1+28, GC/LC = 1+25). Before reporting for his assigned shift, he had been off duty for 16 continuous hours.
The CC/LC controller stated that upon assuming the CC/LC operating positions, he received a normal position briefing from the controller he was relieving and was advised that there was an aircraft on the runway 3 LLS final approach and Sweeper 7 (the involved sweeper) was on the runway. He stated that operations were normal and Sweeper 7 was being directed on and off the runway between arriving and departing traffic. He stated that the runway lights were on their highest setting ('step') at the time of the accident. He stated that he received a verbal hand off of Ozark 650 from the approach controller when the flight was about 10 miles southwest of the airport and that the flight did not report on the tower frequency. He then asked the approach controller to "hit Ozark again" and that he then initiated a call to the flight on tower frequency and that the flight responded to his call. He then cleared the flight to land and issued the RVR. He stated that he could not recall whether Ozark 650 had its landing lights on or not.

The transcript of tower communications shows that neither the approach controller nor the local controller advised Ozark 650 of snow removal operations. Also, the local controller did not communicate with Sweeper 7 after he took the hand off of Ozark 650. The transcript showed that in the 12 minutes preceding the accident, the controller had six communications with Sweeper 7, involving position reports by the sweeper operator, clearance to cross on intersecting runway, and clearance off the runway for a landing airplane, then back on the runway. The last communication between the controller and Sweeper 7 occurred about 6 minutes before the accident.

Investigators questioned the CC/LC controller as to when he last recalled seeing Sweeper 7. He stated that he knew that it had crossed Runway 33 southwest bound toward the approach end of Runway 03 and that he had lost sight of it at that time. When the CC/LC controller was questioned as to where Sweeper 7 was when he issued the landing clearance to Ozark 650, he stated he did not know where it was.

Two other similar incidents have been investigated by the Safety Board. On December 15, 1933, a Japan Air Lines Boeing 747 cargo flight was cleared by the local controller to land on Runway 06 right at the Anchorage, Alaska, International Airport. At that time the runway visual range in the touchdown zone was 1000 feet in fog. Two minutes later the ground controller cleared an Airport Authority pickup truck to drive eastbound on Runway 06 right to make a taxiway run to check the braking action of the runway surface. The ground controller stated that he requested clearance from the local controller to allow the pickup on the runway. He was not aware that the 747 had been cleared to land. The local controller was busy with other communications and was not sure if he acknowledged the request from ground control. However, the ground controller believed the local controller said "okay."

The crew of the Japan Air Lines B-747 stated they did not see the vehicle prior to the collision, which occurred about 2000 feet beyond the runway threshold while the airplane's main gear was on the ground but before the nose had been lowered from the landing attitude. The vehicle's lights and rotating beacon were on at the time. The crew observed a call flash and felt a jolt under the airplane at which time the anti-skid inoperative warning light illuminated, followed shortly thereafter by an indication of number 1 hydraulic system inoperative. Although the entire wheel truck assembly was separated from the left landing gear, the captain was able to slow the airplane and turn off the runway. There was no major damage to the airplane. The pickup truck was destroyed and the driver received serious injuries.
On March 3, 1384, at the Greater Cincinnati Airport, a Piedmont Airlines being 737 was forced to make a go-around after touchdown on Runway 36 in order to avoid seven snow removal vehicles operating on the runway. When the Piedmont flight was approximately 15 miles from the airport and under the control of Cincinnati Approach Control, the local controller had given the ground controller approval to clear the snow removal vehicles onto Runway 36. The snowplows were proceeding northbound on the runway in a "V" formation and were accompanied by an automobile which maintained communication with the ground controller.

The airplane contacted the tower when at the outer marker and was cleared to land by the local controller. There was no coordination or conversation between the local controller and ground controller concerning the vehicles on the runway when the landing clearance was issued.

The weather was reported as: ceiling 300 feet obscured, runway visual range 1200 feet in snow and blowing snow. As the airplane touched down on the runway, the captain saw a rotating amber beacon on one of the vehicles and initiated a go-around immediately. The airplane lifted off and passed over the vehicles with an estimated clearance of 10 feet. It landed safely at the airport following the occurrence.

The National Transportation Safety Board determines that the probable cause of these accidents were inadequate Control Tower Service by Air Traffic Control Personnel. Factors relating to these accidents were weather conditions: snow, obscuration, low ceilings, and vehicles on the runway. Refer to the attached Briefs of Aviation Accidents.

As a result of these investigations, the Safety Board issued the following recommendations to the Federal Aviation Administration:

- Develop a mechanical/aural/visual (or combination thereof) alert device and require its use by local and ground controllers to coordinate their activities when a vehicle has been cleared to operate on the active duty runway for an extended period such as in snow removal operations. (Class II, Priority Action) (A-85-15)

- Periodically emphasize in the training of air traffic control personnel providing airport advisory services the proper application of runway usage procedures stressing positive coordination between control positions. (Class II, Priority Action) (A-85-16)

- Periodically emphasize in the training of air traffic controller personnel the requirements contained in the Air Traffic Control Handbook 7310.651. March 1984 for restricting vehicle and aircraft operations in the ILS critical areas when the ILS is being used for approach/landing guidance and the reported ceiling, visibility or runway visual range are below the specified levels. (Class II, Priority Action) (A-85-17)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairmen

/s/ PATRICIA A. GOLDMAN
vice Chairmen

/s/ G. H. PATRICK BURSLEY
Member

February 1, 1985
### Insurance Policies

- **Airplane**

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<td>Variety of Options Available</td>
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<tr>
<td>Loss</td>
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### Aircraft Information

- **Model**
- **Serial Number**
- **Registration**
- ** Ownership**
- **Registration**
- **Airworthiness**

### Aircraft Specifications

- **Engine Type**
- **Power Output**
- **Payload Capacity**
- **Range**

### General Information

- **Location**
- **Date**
- **Contact Information**

---

*Note: The above information is a representation of the text content in the image.*
Brief of Accident (Continued)

Occurrence: ON GROUND COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Finding(s):
1. WEATHER CONDITION - SNOW
2. WEATHER CONDITION - OBSCURATION
3. CONTROL TOWER SERVICE - INADEQUATE - ATC PSNL(LCL/GND/CLNC)
4. OBJECT - VEHICLE

---Probable Cause---

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 3

Factor(s) relating to this accident is/are finding(s) 1, 2, 4
National Transportation Safety Board  
Washington, D.C. 20594

brief of Accident/Incident

File No. 6000  
12/19/83 ANCHORAGE, AK  
A/C Reg. No. J01531  
Time (LCI) - 4:05 AM

--- Basic Information ---
Type Operating Certificate - AIR CARRIER - FLAG/DOMESTIC
Make/Gross Wt - BOEING 747-200F
No. of Seats - UNK/NR

--- Aircraft Information ---
Make/Model - BOEING 747-200F
Engine - P & W J79D-70
Number Engines - 4
Type of Engine - TURBOFAN
Rated Power - 53000 LBS THRUST

--- Environment/Operations Information ---
Itinerary - Last Departure Point - TOKYO, JAPAN
Destination - SAME AS ACC/INC

--- Pilot-In-Cockpit Information ---
Certificate(s)/Rating(s) - Biennial Flight Review
AOP Current - 17000
AOP Eligible - 30000
AOP Experience - 11000
AOP Licenses - A, B, C

--- Narrative ---
At 2359 the Local Controller cleared the flight to land on RWY 6L. At 0001 the ground controller cleared a state-operated pick-up truck onto RWY 6L for a tajpab run. The ground controller stated that he requested clearance from the local controller to allow the truck on the runway. He was not aware that the RWY 6L had been cleared to land. The local controller was busy with other communications. He was not sure if he acknowledged the request from ground control. However, the ground controller believed the local controller said "Okay." The ACFT struck the truck about 2000 ft beyond the approach end of the runway but the nose had not yet been lowered. F/O took the landing attitude. The flight crew stated that they did not see the truck prior to the collision. At 0013 the RWY visual range (LAM) was 600 ft variable 200 ft.
Brief of Accident/Incident (Continued)

File No. - 6000  12/19/83  ANCHORAGE, AK  A/C Reg. No. JA8131  Time (LCL) - 0005 AM

Occurrence: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings:
1. LIGHT CONDITION - DARK NIGHT
2. WEATHER CONDITION - LOW CEILING
3. WEATHER CONDITION - FOG
4. WEATHER CONDITION - OBSCURATION
5. CONTROL TOWER SERVICE - INADEQUATE - ATC PHNL/UND/CLNC
6. OBJECT - VEHICLE

Probable Cause:

The National Transportation Safety Board determines that the Probable Cause(s) of this Accident/Incident is/are

Factor(s) relative to this Incident is/are finding(s) 1, 2, 3, 4, 5, 6.
National Transportation Safety Board  
Washington, D.C. 20594

Brief of Incident

**Film No.** - 5831  
**Date** - 3/08/84  
**Erlangen, NY**

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**Incident Information**

- **Type of Operation**: Scheduled/Domestic/Pax/Largo
- **Flight Conducted Under**: 14 CFR 121
- **Incident Occurred During**: Landing

**Aircraft Information**

- **Make/Model**: Boeing 737-200  
- **Landing Gear**: Tricycle-Retractable  
- **Max Gross Weight**: 90,000 lbs  
- **No. of Seats**: 112

**Environment/Operations Information**

- **Weather**
  - **Weather Briefing**: FOG
  - **Wind Direction**: 130°/010 KTS
  - **Visibility**: 100 SM
  - **Lowest Cloud Ceiling**: 300 FT
  - **Lowest Ceiling**: 300 FT OBSCURED
  - **Obstructions**: None
  - **Precipitation**: Snow
  - **Condition of Light**: Daylight

- **Iinerary**
  - **Last Departure Point**: Louisville, KY
  - **Destination**: Newark, NJ

- **Airport Proximity**
  - **Airport Type**: Ordinary
  - **Airport Name**: Cincinnati Int'l
  - **Runway Identification**: 34
  - **Runway Surface**: Concrete
  - **Runway Distance**: 9500', 1500'

- **Personnel Information**

- **Pilot-in-Command**
  - **Certificate/Rating(s)**: Commercial-First Flight End
  - **Rated Power**: 15500 lbs.

- **Medical Certificate**: Valid Medical-No Waiver/Limit

- **Flight Time (Hours)**
  - **Total**: 0.0
  - **Last 24 Hours**: 0.0

- **Instrument Rating(s)**: Airplane

**Narrative**

While the aircraft was about 15 miles southwest of the airport, being vectored for a Run 34 Cat I approach, the local controller gave the ground controller permission to clear snow removal equipment to proceed north on Run 34 to exit Run 34 at the intersection of Run 21. The aircraft reported at the outer marker and was cleared to land. There was no conversation between the controllers as to the status of the snow removal equipment. Just after touchdown, the captain observed the amber rotating beacon of one of the vehicles about 1000 feet ahead. The captain made an immediate go-around & the aircraft missed the runway by an estimated 10 ft. The runway visual range (RVR) was reported as 3100 feet.
brief of incident (continued)

file no. - 5031
3/08/84 erlangs, ky
a/c res. no. n7464

occurrence - miscellaneous/other
phase of operation - landing

findings:
1. weather condition - low ceiling
2. weather condition - snow
3. weather condition - obscuration
4. control tower service - inadequate
5. object - vehicle
6. aborted landing - performed - pilot in command
7. go-around - initiated - pilot in command

---------------

probable cause:
the national transportation safety board determines that the probable cause(s) of this incident
is/are finding(s) 4

factor(s) relating to this incident is/are finding(s) 1, 2, 3, 5
### AIRCRAFT ACCIDENT/INCIDENT SUMMARY

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<tr>
<td>Other Damage or Injury: None</td>
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<tr>
<td>Type of Occurrence: Loss of Power/Loss of Control</td>
<td></td>
</tr>
<tr>
<td>Phase of Operation: Climb to cross</td>
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</table>

On April 28, 1984, N6079R, a Piper Aerostar, serial number 61P-0735-8063359, was scheduled for a pleasure flight from Lancaster, Pennsylvania, to Gainesville, Florida, on an instrument flight rule (IFR) flight plan, with a final cruising altitude of FL 180.

On the morning of the accident, the pilot of N6079R traveled from Baltimore, Maryland, to Lancaster, Pennsylvania, to pick up the airplane that had been upgraded with a Machen, Inc., 656 Superstar Conversion. At that time, he received a 30-minute dual familiarization flight and a short review of the performance charts and flight manual supplement associated with the conversion. The fuel tanks were topped off after the familiarization flight.

About 1125, the pilot of N6079R received a partial weather briefing from Washington Flight Service Station (FSS). At 1422, he called the Harrisburg Flight Service Station, obtained an abbreviated briefing from Lancaster to Gainesville, and filed a flight plan. Official weather reports and forecasts the day of the accident showed no significant weather along the route of flight, and there were no SIGMETs or AIRMETs pertinent to the area of the accident. Ceilings were between 4,000 and 5,000 feet with layers to above 20,000 feet; visibility beneath was unrestricted.

A witness at the Lancaster Airport described the pilot as nervous and said his "hands were shaking." Also, the instructor who had given him the familiarization ride testified that the pilot said he felt uncomfortable and nervous. However, a close friend with whom the pilot had talked by telephone just before
takeoff did not detect nervousness in his voice. The instructor
saw the aircraft takeoff and observed nothing unusual.

Following its takeoff at 1448, Lancaster Tower released
N6079R to Harrisburg Approach Control at 1450; the flight was
subsequently handed off to the New York Air Route Traffic Control
Center (ARTCC) and then to the Washington ARTCC. Each Center
communicated with the flight, and the pilot acknowledged and
responded to instructions after each transmission. At 1457:42,
Washington Center cleared the flight to "maintain one eight
zero." Several other routine instructions were given to and
acknowledged by the pilot of N6079R. At 1503:25, N6079R
transmitted, "Aerostar six oh seven nine Romeo leaving seventeen
for eighteen." The next transmission from the flight was a
Mayday call at 1505:26, which was acknowledged by Washington
Center at 1505:34. N6079R responded at 1505:38, "OK, Mayday,
lost engines, lost engines, dropping fast." This was the last
transmission from N6079R. Radar contact was lost less than 2
minutes later. The aircraft crashed shortly thereafter in a
grassy field adjacent to a road in Cockeysville, Maryland. The
airplane was demolished and the two occupants were killed. There
was no fire, and there were no injuries to persons on the ground.

The readout of the recorded radar data from the Baltimore
Approach Control facility revealed that N6079R descended from
16,900 feet to 2,300 feet in about 90 seconds, an average descent
rate of more than 9,700 feet per minute.

Witnesses saw the aircraft after it descended through the
overcast when it was estimated to be between 3,000 to 4,500 feet
above ground level (AGL). Weather at the site was partly cloudy.
According to several witnesses, one a current pilot, there was a
discernible pitchup, described by some witnesses as abrupt, the
wings were "banking" or "shifting" from left to right
continuously, the plane rolled to an inverted position and then
entered a nosedown attitude. The flaps and gear were up.
Several witnesses saw something fall from the airplane before it
hit the ground.

The Piper Aerostar was purchased in January 1984, and, in
February 1984 at the request of the pilot, had been modified by
the addition of an auxiliary fuel tank. The pilot had flown the
plane to Florida and back three or four times after the fuel tank
installation.

N6079R was upgraded most recently with a Machan, Inc., 656
Superstar Conversion, which included the installation of two
turbocharger-equipped engines, with full feathering propellers.
The conversion was made by a firm certified by the Federal
Aviation Administration (FAA) for repair and maintenance on Piper
Aerostar airplanes. Work on N6079R was completed and checked out
by an airframe and powerplants (AAP) mechanic, and was test flown
the day before the accident. The instructor/test pilot noticed no unusual characteristics with regard to cooling, engine stability vis-a-vis rate of fuel flow, manifold pressure, or high oil temperatures. He stated that during the familiarization flight with the pilot on the day of the accident the fuel tank selectors were in the on position, that fuel in all tanks would be used with the selectors in that position, and that there was no reason for them to have been changed. The pilot's attention was directed to the expanded Hachen Superstar portion of the flight manual, especially the power-to-fuel ratio settings, and during the flight, emphasis was directed to engine gauges, the new digital fuel flow system, and power settings.

The National Transportation Safety Board's examination of the wreckage said engines and propellers indicated that neither engine was developing power at impact. Both propellers were attached to their respective hubs and all blades were in the feathered position. Oil was present in both propeller governing units. The engines were free of preimpact deficiencies which would have affected normal engine operation. The electric fuel boost pump switches were found in the off position and the fuel gauges on rich. When the boost pumps are off during climb above 10,000 feet, insufficient positive fuel head pressure to the engine driven high pressure fuel pumps results in rich fuel cavitation and fuel starvation. The first indication of potential starvation would have been noticeable on the fuel pressure gage, located in the lower right instrument panel. The normal operating procedures listed in the FAA Approved Airplane Flight Manual require the electric fuel boost pumps to be on during climb above 10,000 feet; the takeoff checklist on the left sun visor of the airplane also included this statement. Flight tests conducted by Hachen verified that the engines will quit at altitude if the leveloff is initiated by first reducing propeller rpm. The engines cannot be restarted if the mixture is rich.

The fuselage was demolished, and the lower forward area and belly area were crushed upward and accordioned aft. The cattage was separated from the fuselage. The right wing was broken into three major sections: an inboard section out to about wing station (WS) 140 with retracted flap attached, an outboard wing panel from WS 140 to 195, and the wing extension assembly with the wingtip attached. At WS 195, the wing extension assembly was separated from the outboard wing panel along the chordwise row of rivet attachment points to the upper and lower surfaces of the wing skin. On the outboard end of the wing panel at WS 195, attachment clips were installed on the wing rib, but there were no rivet holes within these clips to provide for attachment to the intercostals of the wing extension assembly. The aft intercostal of the wing extension assembly did not contain rivet holes to provide for the attachment of the clips on the right wing panel. The forward intercostal contained three drilled holes, but there was no evidence that rivets had
ever been installed. The aileron inboard end was partially attached at the inboard hinge; the remainder of the right aileron was separated from the vflng and was found in two pieces about 1/2 nil- from the accident site. One of the pieces contained a positive bend which aligned with a positive bend and fracture in the right wing. The left wing was also broken into three main pieces. An inboard section out to WS 135 with retracted flap attached, an outboard panel from WS 135 to WS 195, and the wing extension assembly. The attachment clips for the vflng extension assembly were pulled from the vflng rib and were still attached to the intercostals on the wing extension assembly. The left aileron was separated from the wing at the hinge points.

All fractures observed during the examination of the wreckage were typical of overload failures. The alignment of the positive bend in the right aileron with the positive beod in the right vflng is evidence that the two bent together prior to separation of the aileron. Although the attachment rivets between the right vflng extension assembly and the intercostals were missing, and the absence of the rivets would compromise the structural integrity of the wing assembly, the evidence indicates that this omission was not a factor in this accident.

The pilot was certificated as a private pilot, airplane single engine land, on May 5, 1968. A multiengine rating was issued in March 1975 and an instrument rating in May 1970 after initial disapproval and flight retesting each time, and a single engine sea rating was issued in July 1975. In June 1983, the pilot reported a total of 2,500 flight hours on his application for a third class medical certificate. However, no assessment can be made of flight time reported on his application and multiengine experience since complete records do not exist, and the absence of entries in his logbook precludes an evaluation of training received. The AEA had no recorded violations against the pilot. He had been involved in a ground loop accident in 1968, and in 1971 he suffered injuries in a helicopter accident while receiving dual instruction.

The airplane had been flown 105 hours since its purchase in January 1984. Although there were no Aerostar entries in the pilot's flight log, he had received 60.5 hours dual instruction by the sellers of the Aerostar since purchase, including the 30-minute familiarization flight on April 28 following the Superstar conversion. In addition, 40 hours of dual flight training had been received while flying the Piper chopper. However, the Piper flight instructor did not issue a transition certificate, but recommended further multiengine practice with an instructor. In a report on his assessment of the pilot's performance, the instructor listed deficiencies, such as the pilot's inability to remember procedures, lack of understanding of the procedures, poor
performance of flight maneuvers, and slow reaction time.

The pilot held a third class medical certificate with a corrective lens limitation, issued on June 24, 1983. His doctor had seen him for a brief visit a week before the accident and said he believed the pilot was physically and mentally sound. A toxicology test following the accident was negative for drugs and alcohol.

In summary, the investigation of this accident revealed that the loss of both engines resulted from fuel starvation because the electric fuel boost pumps most probably were not on during the climb above 10,000 feet. It is not likely the pilot turned them off during the climb, but rather that he never turned them on initially as required by the flight manual and checklist. Although he was certified for multi-engine instrument flight, his demonstrated proficiency 1 month before the Hachen conversion was not adequate to earn him a transition certificate. There is sufficient evidence to suggest that the pilot was nervous and uncomfortable about flying to Florida. Self-induced psychological stress over his minimal experience in the newly converted, high performance airplane may have contributed to or been responsible for his unease. Once dual engine failure occurred, the demanding situation exceeded the pilot's capabilities and caused him to lose control of the airplane. In addition, part of the descent would have been in instrument conditions, and spatial disorientation could have contributed to his inability to maintain control. Given the pilot's recorded lack of proficiency in the Aerostar, he probably was not capable, in a stressful situation, to perform the steps in the emergency checklists for "Engine Failure During Flight" and "Restarting Feathered Engine" which contained up to 28 steps. Given the rapid descent rate disclosed by the radar data, any abrupt control input or attitude change could result in positive G forces exceeding the airplane's limitations.

The National Transportation Safety Board issued the following recommendation to the FAA as a result of this investigation:

Issue an Airworthiness Directive to require a one-time inspection (and repair if necessary) of Models PA-6O-6018, -601P, and -602P Piper Aerostar airplanes to determine whether the intercostals of the wing extension assemblies are properly attached with rivets to the wing rib structure at wing station 195. (Class II, Priority Action) (A-85-31)

The attached Brief of Accident contains the Safety Board's conclusions, findings of probable cause, and related factors.
BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ GH. PATRICK BURSLEY
Member

May 2, 1985
**Brief of Accident**

**File No.** - 728  
**4/28/84**  
**COCKEYSVILLE, MD**  
**A/C Reg. No.** - N6079R  
**Time (LCL)** - 1507 EDT

### Basic Information

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### Aircraft Information

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### Environment/Operations Information

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<tr>
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<td>Wx Briefing</td>
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### Personnel Information

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### Narrative

ON THE DAY OF DEPARTURE THE FLT HAD RECEIVED A 30 MIN FAMILIARIZATION FLT UPON COMPLETION OF THE SUPERSTAR CONVERSION. EMPHASIS WAS DIRECTED TO ENG GAGES, FUEL FLOW, 1 COUNTER, 4 POWER SETTING. THE FLT WAS FLOWN AT 5,000 FT. THE FLT THEN OBTAINED A Wx BRIEFING & FILED A FLT PLAN. ABOUT 15 MIN AFTER DEPARTURE WHILE CLIMBING THRU FL 170, THE FLT RADIOED THAT HE HAD LOST BOTH ENDS. THE ACFT WAS SUBSEQUENTLY OBSERVED DESCENDING UNCONTROLLED OUT OF THE OVERCAST AT ABOUT 3,000 FT. ALL THE RIGHT AILERON SEPARATED. THE FUEL BOOST PUMPS WERE FOUND IN THE "OFF" POSITION. THE AFP STATES THAT THE ROCKET PUMPS SHOULD BE ON DURING CLIMB ABOVE 10,000 FT. THE FLT HAD BEEN ENROLLED IN AN AEROSTAR TRANSITION SCHOOL THE PREVIOUS MONTH DURING WHICH A 2-HR COMBINED DEMONSTRATION/FLT EVALUATION FLT WAS CONDUCTED; THE INSTRUCTOR PLT RECOMMENDED FURTHER MULTI-END TRAINING.
Brief of Accident (Continued)

Event No. - 928  4/20/64  COCKEYSVILLE, MD  A/C Reg. No. N6079R  Time (LCL) - 1547 EST

Occurrence 01  LOSS OF POWER (TOTAL)  - NON-MECHANICAL
Phase of Operation  CLIMB - TO CRUISE

Findings:
1. FLIGHT MANUALS - NOT FOLLOWED  PILOT IN COMMAND
2. FLUID/FUEL STARVATION
3. FUEL BOOST PUMP SELECTOR POSITION - IMPROPER  PILOT IN COMMAND
4. IMPROPER USE OF PROCEDURE - LACK OF TOTAL EXPERIENCE IN TYPE OF AIRCRAFT  PILOT IN COMMAND

Occurrence 02  LOSS OF CONTROL  IN FLIGHT
Phase of Operation  CLIMB - TO CRUISE

Findings:
5. AIRCRAFT PERFORMANCE - TWO OR MORE ENGINES  INOPERATIVE
6. AIRCRAFT HANDLING  UNCONTROLLED  PILOT IN COMMAND
7. IMPROPER USE OF EQUIPMENT/AIRCRAFT  SPATIAL DISORIENTATION  PILOT IN COMMAND
8. IMPROPER USE OF EQUIPMENT/AIRCRAFT  INADEQUATE RECURRENT TRAINING  PILOT IN COMMAND

Occurrence 03  AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation  DESCENT - UNCONTROLLED

Findings:
9. FLIGHT CONTROL/AILERON  OVERLOAD
10. DESIGN STRESS LIMITS OF AIRCRAFT  EXCEEDED  PILOT IN COMMAND
11. FLIGHT CONTROL/AILERON  SEPARATION

Occurrence 04  IN FLIGHT COLLISION WITH TERRAIN
Phase of Operation  DESCENT - UNCONTROLLED

--- Probable Cause ---

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

Factor(s) relating to this accident is/are finding(s) 4, 5, 8
AIRCRAFT ACCIDENT/INCIDENT SUMMARY

File No. : 5059

Aircraft Operator : 1. U.S. Air Force. 89th Military Airlift Wing
                   2. Mr. John R. Kowalczyk

Airplane Type and Registration: 1. Boeing VC-137-BN 58-6971
                                2. Cessna 3105 N3057L

Location : Akron, Ohio

Date and Time : September 30, 1984, 1758 Eastern Daylight Time

Persons on Board - Injuries : 1. Crew 17 Passengers 28 - No Injuries
                               2. Crew 2 - No Injuries

Aircraft Damage : 1. None
                   2. None

Other Damage or Injury : 1. None
                         2. None

Type of Occurrence : Air Traffic Control System Operational Error

Phase of Operation : 1. Climb - TO Cruise
                    2. Cruise - Normal
On September 30, 1984, at about 1758 \( 1/ \), Air Force 2, \( 2/ \) a Boeing VC-137B (civilian N-707-153) operated by the 89th Military Airlift Wing, and N3057L, a Cessna 310, passed within less than the prescribed air traffic control (ATC) separation due to an ATC system operational error \( 3/ \). The incident occurred near Akron, Ohio.

The Cessna was operating on an Instrument flight rules (IFR) clearance on a flight from Green Bay, Wisconsin, to Annapolis, Maryland. The flight was operating at an assigned altitude of 12,000 feet and was under the control of the Federal Aviation Administration's (FAA) Cleveland, Ohio, Air Route Traffic Control Center (ARTCC).

Air Force 2 had departed the Cleveland Hopkins Airport on an IFR clearance to Andrews Air Force base, Maryland. After departure from Cleveland, Air Force 2 was assigned an altitude of 8,000 feet by the Cleveland departure controller, and control of the flight was transferred to the Cleveland ARTCC. On initial contact With the Cleveland ARTCC controller, (\( 4/ \)) Air Force 2 was cleared to climb to flight level 230 (FL 230). \( 4/ \)

Both airplanes were identified and were being observed on radar to be proceeding southeastbound with Air Force 2 behind but overtaking N3057L. \( 2/ \) Air Force 2 was about 15 miles behind the Cessna when the Cleveland ARTCC controller instructed the flight to climb and maintain FL 230. At the time the climb instruction was issued, recorded radar data indicated that Air Force 2 was maintaining an indicated airspeed (IAS) of about 250 knots and a rate of climb of about 1,500 feet per minute. As the flight passed through 10,000 feet, the aircraft commander increased the flight's airspeed to about 320 knots IAS and then increased the rate of climb to about 3,300 feet per minute.

1/ All times shown herein are Eastern daylight time and are based on the 24-hour clock.

2/ Identification when transporting the Vice President of the United States.

3/ An error which results in less than the applicable separation minima between two or no-e aircraft, or between an aircraft and terrain or obstacles and obstructions prescribed by FAA Handbook 7110.65 and supplemental instructions.

4/ A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 230 represents a barometric altimeter indication of 23,000 feet.

5/ 14 CFR Part 91.70 requires that, "Unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 m.p.h.)."
As Air Force 2 continued its climb, the Cleveland ARTCC's computer conflict alert function 6/ activated as to both airplanes, alerting the controller to a prospective incursion on the prescribed separation. The controller, acting upon this information, instructed Air Force 2 to maintain 12,000 feet. Air Force 2 acknowledged the change in altitude assignment and stated to the controller that the flight was passing 12,200 feet in its climb when the instruction was issued and that the flight would descend to 12,000 feet.

Recorded radar data from the Cleveland ARTCC indicated that Air Force 2 reached an altitude of 13,000 feet before arresting its climb and descending to 12,000 feet. Additionally, the data indicated that a minimum slant range distance of 0.25 nautical mile existed between the airplanes at 1759:49. At this time, Air Force 2 was 600 feet below N3057L descending and passing off the Cessna's right. The minimum prescribed ATC separation is 1,003 feet vertical or 5 miles lateral clearance between the two airplanes.

The flightcrews of both airplanes stated that, at the time of the occurrence, instrument meteorological conditions (IMC) existed and that they did not see each other. Additionally, the pilot of the Cessna stated that he was not aware of the occurrence until contacted by Safety Board investigators.

The Cleveland ARTCC controller, who was responsible for the separation of the airplanes, was a full performance level controller with 25 years experience. He was properly certificated for his position and was medically qualified. During an interview conducted after the incident, the controller stated, "I should have turned him rather than climbed him." The controller had been assigned to his operating position about 10 minutes before the operational error took place. He stated that his workload was light to moderate at the time.

The Safety Board's investigation determined that the operational error occurred because of the unsatisfactory performance of the individual air traffic controller. The controller failed to assure that the prescribed minimum ATC separation would be maintained between Air Force 2 and the Cessna when their flightpaths crossed. The controller used poor judgment and poor control technique when he cleared Air Force 2 to climb through the altitude being maintained by the Cessna. Two other control techniques — vertical or lateral separation — were available, either of which would have assured the prescribed separation between the airplanes. First, the controller could have cleared Air Force 2 to maintain 12,000 feet until well past the Cessna and then issued the clearance to climb to FL 230; or the controller could have issued a turn to Air Force 2 and when the minimum lateral separation was attained, instructed the crew to climb to FL 230.

6/ An aural and/or visual alert to controllers that an actual or potential aircraft separation hazard exists. The alert is generated by preset separation parameters within the ATC computer. Some alerts indicate an actual compromise of separation; some alerts indicate that prescribed separation will be compromised if corrective action is not taken.
The Safety Board's investigation concluded that the Air Traffic Control System otherwise operated satisfactorily. The radio communications, radar, computer hardware and software were operating as designed and did not contribute to the operational error. In fact, the conflict alert function warned the controller of the potential conflict between the two airplanes.

The attached Briefs of Aviation Incidents contain the Safety Board's finding(s) and determination of probable cause(s) and factor(s) relating to this incident.

As a result of this investigation, the Safety Board issued the following safety recommendation to the Department of Defense:

Equip all current and newly acquired fixed-wing and rotary-wing aircraft operated by the military departments, which are used primarily to transport passengers, with state-of-the-art cockpit voice recorders and digital flight data recorders that record sufficient parameters for effective accident investigation, and place these recorders in the aircraft for maximum survival potential. (A-84-134)

In its response letter, dated February 4, 1985, the Department of Defense agreed with the intent of this safety recommendation. The Secretary of Defense has directed that all airplanes used by the 89th Military Airlift Wing be retrofitted with more capable recorders.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/   JIM BURNETT
Chairman

/s/   PATRICIA A. GOLDMAN
Vice Chairman

/s/   G.H. PATRICK BURSLEY
Member

May 8, 1985
National Transportation Safety Board
Washington D.C., 20594

Brief of Incident

File No. - 5059  1/28/84  AKRON, OH
A/C Reg No.  N4760/HA  10/71  Time (LCL) - 1750 LDT

- Basic Information -
  Type of Operation: MILITARY/AF
  Aircraft Make/Model: P & M IF-3
  Engine Type: TE-44-160AN
  Rated Power: UNK/HR

- Aircraft Information -
  Max Gross Weight: 25000
  Nav/Freq/Altitude: UNK/HR
  Stall Warning System: UNK/HR

- Weather Data -
  Weather Condition:
  Wind Speed/Degree: UNK/HR
  Visibility: UNK/HR
  Obstructions to Vision:
  Precipitation:
  Condition of Light:

- Environment/Operational Data -
  Itinerary:
  Last Departure Point:
  Destination:
  Departure Time:
  Runway:
  Runway ID:
  Runway LHR:
  Runway Status:
  Runway Height:

- Personel Information -
  Pilot-In-Charge:
  Flight Line:
  Current rating:
  Number of Years:
  Aircraft Type:
  Instrumentation:

- Instrumentation -

- Narrative -
  A BUEHL VC-137B-W, USAF 598-6871, was operating as AIR FORCE 2 (AF-2), LIFTAXED CLEVELAND OH, AT ABOUT 1745 EDT ON AN IFR CLEARED, AFTER DEPARTING CLEVELAND, AF-2 WAS ASCENDED AN ALT OF 6000 FT MSL BY CLEVELAND TERMINAL CONTROL. AS WAS TRANSFERRED TO CLEVELAND ARTCC, AN INITIAL CONTACT WITH CLEVELAND ARTCC, AF-2 WAS CLIMBED TO FLIGHT LEVEL 150. A CESSNA 310, N107L, WAS CRUISING IN THE SAME VICINITY ON AN IFR CLEARANCE AT 19000 FT. THE AIRCRAFT OF CLEVELAND ARTCC, AS AF-2 WAS CLIMBED THROUGH 12000 FT, ARTCC'S AIC COMPUTER CONFLICT ALERT FUNCTION WAS ACTIVATED FOR BOTH ACES, ALARMING THE CONTROLLED OF A POSSIBLE LOSS OF CRUISE ALTITUDE. THE CONTROLLED INSTRUCTED AF-2 TO MAINTAIN 12000 FT. AF-2 ACKNOWLEDGED. HOWEVER, AF-2 REACHED AFFX 13000 FT BEFORE STARTING INCREASING & DISCONTINUED INCREASIN. RADAR DATA SHOWED A MIN SLANT RANGE DIST OF 1/2 MI WITH 600 FT VERT SIFN. THIS CONSTITUTED AN AIC CONFLICTUAL AIC CONFLICTUAL THAN STANDARD SIFN. THE ACES WERE IN ATC SIFN & ALF THE CONFLICTING TRAFFIC.
Brief of Incident (Continued)

File No. - 5059  9/30/84  AKRON OH  A/C Reg. No. B67/F  Time (Loi) - 1758 EDT

Occurrence  MISCELLANEOUS/OTHER
Phase of Operation  CLIMB - TO CRUISE

Findings:
1. TWR SEPARATION STANDARDS - NOT MAINTAINED - ATC PERSONNEL(ARICE)

---Probable Cause---

The National Transportation Safety Board determines that the Probable Cause(s) of this incident are finding(s) 1.
National Transportation Safety Board
Washington, D.C. 20594

Brief of Incident

File No. - 5059  9/30/84  AARON OH  A/C Reg. No. N0357L  Time (LST) - 1758 EDT

--- Basic Information ---

Type Operating Certificate - NONE (GENERAL AVIATION)  Aircraft Damage - NONE

Type of Operation - PERSONAL  Aircraft Damage - FIRE
Flight Conducted Under - 14 CFR 91  Crew - 0
Incident Occurred During - CRUISE  Fatal - 0

--- Aircraft Information ---

Make/Model - CESSNA 310J  Serious - 0
End Make/Model - CONTINENTAL IO-470-U  Minor - 0
Number Engines - 2  None - 45
Engine Type - RECIP-FUEL INJECTED  ETI Installed/Activated - UNK/NR
Ratings - 250 HP  Stall Warning System - Y/LB

--- Environment/Operations Information ---

Weather Data - 
WX Briefing - FSS  Itinerary
Method - IN PERSON  Last Departure Point - GREEN BAY WI
Completeness - FULL  Destination - ANNAPOlis MD
Wind Dir/Speed - UNK/NR  Airport Frascati - OFF AIRPORT/TAXI
Visibility - UNK/NR  Runway Ident - N/A
Lowest Sky/Clouds - UNK/NR  Runway Lth/Uld - N/A
Lowest Ceiling - 3000 FT OVERCAST  Runway Surface - N/A
Obstructions to Vision - FOG  Runway Status - N/A
Precipitation - RAIN  Runway Conditions - DUSK
Condition of Light - DUSK

--- Personal Information ---

Pilot-In-Command Certificate(s)/Rating(s) - COMMERCIAL/SE LAND+ME LAND
Biennial Flight Review - YE9  Age - 54
Months Since - 13  Medical Certificate - VALID MEDICAL-WAIVER/QUALIFIED
Aircraft Type - C-310  Flight Time (Hours) -

--- Narrative ---

A BOEING VC-1379-BH, USAF 632-691B, OPERATING AS AIR FORCE 2 (AF-2), DEPARTED CLEVELAND, OH, AT ABOUT 1745 EDT ON AN IFR CLEARANCE. AFTER DEPARTING CLEVELAND, AF-2 WAS ASSIGNED AN ALT OF 8000 FT MSL BY CLEVELAND DEPARTURE CONTROL 1 & WAS TRANSFERRED TO CLEVELAND ARTCC. ON INITIAL CONTACT WITH CLEVELAND ARTCC, AF-2 WAS CLEARED TO CLIMB TO FL FLIGHT 230, A CESSNA 310J, N0357L, WAS CRISIS IN THE GAME VICINITY ON AN IFR CLEARANCE AT 13,000 FT & WAS ALSO UNDER CONTROL OF CLEVELAND ARTCC. AS AF-2 WAS CLIMBING THRU 12,000 FT, ARTCC'S AIC COMPUTER CONFLICT ALERT FUNCTION WAS ACTIVATED FOR BOTH AF-2 & THE AIRCRAFT OF A PREVIOUSLY REQUESTED AND RECEIVED CLEARANCE. THE AIC ALERTED AF-2 TO MAINTAIN 12,000 FT. AF-2 ACKNOWLEDGED, HOWEVER, AF-2 RECEIVED APPROX 13,000 FT BEFORE STARTING DECLIN & SLPN CONTINUED DECREASING. DATA SHOWED A MIN BLAST RANGE DIST OF 1/4 MI WITHOUT P1 UNK SLPN. THIS CONSTITUTED AN AIR OPERATIONAL ERROR INVOLVING LESS THAN STANDARD SGNL. THE AIC UMS IN IMC & HUD OF THE PLSS SAW THE CONFLICTING TRAFFIC.
Brief of Incident (Continued)

File No. - 5057  9/30/84  AKRON, OH  A/C Reg. No. N3057L  Time (LST) - 1758 EDT

Occurrence: MISCELLANEOUS/OTHER
Phase of Operation: CRUISE - NORMAL

Finding(s):
1. IFR SEPARATION STANDARDS - NOT MAINTAINED - AIC PERSONNEL (ARTCC)

---- Probable Cause ----

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/are finding(s) 1.
<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
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<td>5058</td>
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| Aircraft Operator                                                         | 1. U.S. Air Force, 89th Military Airlift Wing  
2. Mr. Bruce E. Collins     |
| Airplane Type and Registration:                                           | 1. Boeing VC-137-BN 58-6970  
2. Mooney M20C N6507U          |
| Location                                                                  | Seattle, Washington                         |
| Date and Time                                                             | October 18, 1984, 1445 Pacific Daylight Time|
| Persons on Board - Injuries                                               | 1. Crew 16 Passengers 33 - No Injuries  
2. Crew 1 - No Injuries                                                  |
| Aircraft Damage                                                           | 1. None                                     |
|                                                                          | 2. None                                     |
| Other Damage or Injury                                                    | 1. None                                     |
|                                                                          | 2. None                                     |
| Type of Occurrence                                                        | Near Midair Collision                       |
| Phase of Operation                                                        | 1. Approach - Between Initial and Final Approach Fixes |
|                                                                          | 2. Cruise                                  |
On October 18, 1984, about 1445:27, the flightcrew of Air Force 2, a Boeing VC-137B (civilian B-707-153) operated by the 89th Military Airlift Wing, reported to the Boeing Field Airport Traffic Control Tower (ATCT) local controller that the flight had to take evasive action to avoid another aircraft. The near midair collision was reported by the aircraft commander (AC) who was occupying the right cockpit seat, regarded to be the copilot's seat. He assigned copilot was seated in the left seat and was flying the aircraft on an instrument approach to runway 31L at Seattle Boeing Field Airport. Shortly after the incident, the AC stated that the traffic was a Mooney airplane (low wing, single engine).

At the time of the incident, Air Force 2 was operating on an instrument flight rules (IFR) clearance and was inbound for a landing at Boeing Field. The flight contacted the Seattle Terminal Radar Approach Control (TRACON) east arrival controller at 1436:35, and requested a touchdown time of 1447. Air Force 2 was vectored by the east arrival controller for the localizer backcourse approach to runway 31L.

Weather at the time was described by the flightcrew of Air Force 2 as good with the sky clear and reported visibility at 15 miles.

At 1441:40, the east arrival controller instructed Air Force 2 to descend to 3,000 feet and to proceed inbound on the final approach course. At 1442:34, the flight was cleared for the approach and instructed to cross the LACRE Intersection at or above 2,600 feet and to contact Boeing Tower on 120.6 upon arrival at the LACRE Intersection. LACRE Intersection is 7.5 miles (distance measurement equipment) from the airport. The flight acknowledged the clearance. At 1442:49, the east arrival controller advised Air Force 2 of traffic at its 10 o'clock position, 2 miles distant. The flight acknowledged the traffic advisory, but advised the controller that it was not in sight. At 1443:11, the east arrival controller issued a second traffic advisory to Air Force 2 regarding traffic at its 11 o'clock position, 1 1/2 miles distant and on a northbound heading. Air Force 2 acknowledged the traffic advisory but again advised that it did not have the traffic in sight.

At 1443:29, Air Force 2 advised the east arrival controller that the flight was changing to the Boeing Tower frequency. At 1444:15, the east arrival handoff controller called the Boeing ATCT flight data controller and advised that Air Force 2 would be contacting then and that the flight did not have the traffic in sight that was off to its left. At 1444:45, Air Force 2 reported on the Boeing Tower frequency and advised that the flight had to take evasive action to avoid traffic.

1/ All times shown herein are Pacific daylight time and are based on the 24-hour clock.

2/ Identification when transporting the Vice President of the United States.

3/ An instance when a report is received by ATC personnel from an aircrew member that a collision hazard existed between two or more aircraft.
The aircraft commander, in an interview by a Safety Board investigator after the incident, stated that the weather was good and that the flightcrew had been advised of the traffic. The AC, seated in the right seat, first observed the traffic out of the airplane cockpit's left-side window. The airplane appeared to be level with his aircraft and on a collision course. He estimated its distance from his aircraft to be 1,000 to 1,500 feet when first sighted. The AC assumed control of the aircraft from the left-seat pilot, retarded the power, and pushed the nose of the airplane over (down) slightly. The traffic passed directly over the midsection of Air Force 2 about 100 to 200 feet above the airplane. The traffic did not appear to have taken evasive action.

During an interview conducted on October 19, 1984, the Seattle TRACON's east arrival controller stated that he first saw the traffic about 50 miles south/southeast of the Seattle-Tacoma International Airport (SEA) and continued to monitor its progress. When it became apparent that the target could possibly be traffic for Air Force 2, he issued traffic advisories. The controller instructed Air Force 2 to contact Boeing Field Tower at the LACRE Intersection, and after his second traffic advisory when the flight was at LACRE, Air Force 2 advised him that the flight was changing radio frequencies. He replied, "Air Force 2, go ahead."
He instructed the east arrival handoff controller to advise Boeing Tower that the flight was on a 7 1/2-mile final to runway 31 and that it did not have the traffic in sight.

The SEA has a terminal control area (TCA). The TCA was structured by the FAA with SEA as the primary airport. Boeing Field Airport, located about 5 miles north of SEA, is outside the boundary and under the altitude floor of the TCA as is the Boeing Field runway 31L localizer backcourse approach course. Boeing Field Airport is used extensively by general aviation. Additionally, the airport serves the Boeing Airplane Companies as a departure and arrival point for flight testing of their commercial and military airplanes.

The pilot of the small single-engine airplane, N6507U, was interviewed by Safety Board investigators on November 28, 1984. He stated that he was not aware of the incident until FAA Flight Standards personnel contacted him about 2 weeks after the occurrence. The pilot stated that about 3 to 4 weeks before the Incident, his airplane was vandalized and the antenna for the No. 2 radio was stolen, rendering the No. 2 radio inoperative. The pilot stated that the No. 1 radio was not functioning properly either and that he had not completed maintenance on the system because he normally used the No. 2 radio for communications. On the day of the incident, the pilot was conducting a business trip from Spanaway, Washington, airport, located south of Tacoma, Washington, near McChord Air Force Base, to Arlington, Washington. He departed Spanaway about 1423. Because of the airplane's radio problems, the pilot did not file a flight plan and he was not able (nor was he required) to contact ATC for traffic advisories or to obtain an ATC clearance to fly through the TCA.
The pilot stated that, during the previous 3 years, he had averaged about 200 hours per year, operating in or out of the Seattle area. The pilot stated that on all previous flights, either into or out of the Seattle area, he always had contacted ATC for either traffic advisories or a TCA clearance. However, on the day of the incident, because he was unable to communicate with ATC, he planned his flight so as to proceed east of the Seattle TCA. He believed that, at the time of the incident, he must have been preoccupied with attempts to get his No. 1 radio working and had his head down in the cockpit. The pilot verified that his airplane, a Mooney M-20C, was not equipped with an altitude encoding transponder.

Based on the Mooney pilot’s reported cruising altitude of 2,500 feet mean sea level, recorded radar data obtained from the Seattle TRACON indicated that a minimum slant range distance of slightly less than 1/10th of a mile existed between the airplanes at 1445:07. Air Force 2 was on a heading of 303° and 8650713 was on a heading of 346°.

The pilot recalled that he did observe a "heavy" airplane off his port (left) wing at a distance of 1 to 2 miles. The "heavy" appeared to be inbound to Boeing Field at or below his cruising altitude of 2,500 feet. He did not observe any traffic close to him at any time. The Safety Board believes that the heavy airplane observed by the Mooney pilot in fact was Air Force 2 and that the observation was made after the near midair collision had occurred.

The Safety Board’s investigation determined that the incident occurred in a see-and-avoid airspace environment which contained a mixture of controlled IFR traffic and uncontrolled VFR traffic. The uncontrolled VFR traffic was detected by the air traffic controller, and the flightcrew of the IFR traffic (Air Force 2) was advised of the traffic’s relative position on two occasions. The near midair collision occurred because the flightcrew of Air Force 2 did not sight the VFR traffic in a timely manner and take appropriate action to avoid the other airplane. Moreover, when the VFR traffic was not observed after two ATC advisories, the flightcrew of Air Force 2 could have (but did not) requested a vector (heading) to avoid the traffic. When the flightcrew of Air Force 2 finally obtained visual contact with the traffic, an evasive maneuver was necessary to preclude an inflight collision between the airplanes.

Finally, the investigation determined that the pilot of N650713 used poor judgment in initiating a flight in close proximity to the Seattle TCA with both radios inoperative. This precluded the pilot from being in contact with ATC for traffic advisories or to obtain a clearance to fly through the Seattle TCA.

The Safety Board’s investigation determined that the ATC system operated satisfactorily. The radio communications, radar, and computer functioned as designed and did not contribute to the near midair collision. The traffic advisories issued by the Seattle TRACON controller were proper and were in accordance with current FAA procedures.
The attached briefs of Aviation Incidents contain the Safety Board's finding(s) and determination of probable cause(s) and factor(s) relating to the incident.

As a result of this investigation, the Safety Board issued the following safety recommendation to the Department of Defense:

 Equip all current and newly acquired fixed-wing and rotary-wing aircraft operated by the military departments, which are used primarily to transport passengers, with state-of-the-art cockpit voice recorders and digital flight data recorders that record sufficient parameters for effective accident investigation, and place these recorders in the aircraft for maximum survival potential. (A-84-134)

In its response letter, dated February 4, 1985, the Department of Defense agreed with the intent of the safety recommendation. The Secretary of Defense has directed that all airplanes used by the 89th Military Airlift Wing be retrofitted with more capable recorders.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G.H. PATRICK BURSLEY
Member

May 8, 1985
**National Transportation Safety Board**  
**Washington, D.C., 20594**

**Brief of Incident**

**File No.:** 5058  
**8/18/84** SEATTLE, WA  
**A/C Reg. No.:** N6970  
**Time (LCL):** 1445 PDT

### Basic Information

<table>
<thead>
<tr>
<th>Type of Operation</th>
<th>Aircraft Damage</th>
<th>Fatal</th>
<th>Serious</th>
<th>Minor</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILITARY/AF</td>
<td>NONE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Flight Conducted Under</td>
<td>-14 CFR 91</td>
<td>Crew</td>
<td>Pass</td>
<td>Other</td>
<td>0</td>
</tr>
</tbody>
</table>

### Aircraft Information

- **Make/Model:** BOEING VC-137B-BN  
- **Landing Gear:** TRICYCLE-RETRACTABLE  
- **Max Gross Wt:** 235000 lbs  
- **No. of Seats:** UNK/NR

- **Eng Make/Model:** PiW TF-33  
- **Number Engines:** 4  
- **Engine Type:** TURBOPROP  
- **Rated Power:** UNK/NR

### Weather Data

- **Wx Briefing:** MILITARY  
- **Method:** UNK/NR  
- **Completeness:** FULL  
- **Basic Weather:** VMC  
- **Wind Dir/Speed:** 060/003 KTS  
- **Visibility:** 15.0 SM  
- **Lowest Sky/Clouds:** CLEAR  
- **Obstructions to Vision:** NONE  
- **Precipitation:** NONE

### Itinerary

- **Last Departure Point:** SEATTLE, WA  
- **Destination:** SEATTLE, WA  
- **Airway:** BOEING FIELD  
- **Runway Ident:** 31L  
- **Runway Lth/Wd:** 10000/200  
- **Runway Surface:** ASPHALT  
- **Runway Status:** DRY

### Personel Information

- **Age:** 33  
- **Medical Certificate:** VALID MEDICAL-ND WAIVERS/LIMIT  
- **Biennial Flight Review:** 4602  
- **Flight Time (Hours):**  
- **Current:** UNK/NR  
- **Months Since:** UNK/NR  
- **Make/Model:** UNK/NR  
- **Instruments:** UNK/NR  
- **Aircraft Type:** UNK/NR  
- **Multi-Eng:** UNK/NR  
- **Rotorcraft:** UNK/NR

### Narrative

Brief of Incident (Continued)

File No. - 3058  10/19/84  SEATTLE-WA  A/V Reg. No. 064970  Time (LST) - 1443 PDT

Occurrence:  HEAT COLLISION BETWEEN AIRCRAFT
Phase of Operation:  APPROACH - IFR TO FAR/OUTER MARKER (IFR)

Findings:
1. COMMUNICATIONS - NOT POSSIBLE - PILOT OF OTHER AIRCRAFT
2. TRAFFIC ADVISORY - ISSUED - ARTC PERSONNEL (DEL/APCH)
3. VISUAL LOOKOUT - IMPERATIVE - COPILOT
4. VISUAL LOOKOUT - SILLAYEU - PILOT IN COMMAND
5. REMOVAL ACTION - PERFORMED - PILOT IN COMMAND

---Probable Cause---

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/are finding(s) 1, 4.

Factor(s) relating to this incident is/are finding(s) 1.
National Transportation Safety Board
Washington, D.C. 20594

Brief of Incident

File No. - 50594
9/1/84 SEATTLE, WA
A/C Reg. No. N507U
Time (LCT) - 1445 PDT

---Basic Information---
Type Operating Certificate - NONE (GENERAL AVIATION)
Aircraft Damaged - None
Injuries - None

---Aircraft Information---
Make/Model - MOONEY M20C
Landing Gear - TRICYCLE-RETRACTABLE
Engine Type - Lycoming O-360
No. of Seats - 4

---Environment/Operations Information---
Weather Data
Wx Briefing - No Record of Briefing
Method - N/A
Completeness - N/A
Precipitation - None
Visibility - 1/2 SM

Airline/Route
Last Departure Point - SFNWAAY, WA
Destination - ARLINGTON, WA

---Personnel Information---
Fg/Cmdr.
Certifications/Rate(s) - Private, SE Land

---Narrative---
During arrival, a Boeing VC-137B-PM, USAF 559-6870, Operating as Air Force 2 (AF-2), was cleared for a localizer back-course. At 1442:59, TRACON advised AF-2 of traffic at 10 O'clock position at 2 mi. Alt U.N.A. At 1443:11, TRACON advised AF-2 the traffic had moved to 11 O'clock position at 1-1/2 mi. AF-2 acknowledged both transmissions. At 1443:29, AF-2 advised that the PLT was changing its flight to Boeing 6060. Shortly thereafter, the AFCT CMDR of AF-2, seated in the right seat, saw the traffic. A MOONEY M20C, N507U, on a collision course. He took control and initiated evasive action. The PLT of N507U was cruising at 3500 ft outside the Seattle TCA. He did not see AF-2, which had converged from his right N.A. ARL. The MOONEY's #1 radio was indi & its #2 radio antenna had been vandalized, thus the PLT was not in radio contact with ATC. The last digit on his transponder was static on 1050 Code 100. The PLT was being transmitted. The transponder had no mode C or alt reporting capability. All of the backcourse arch was outside the TCA.
Brief of Incident (Continued)

<table>
<thead>
<tr>
<th>Occurrence</th>
<th>NEAR COLLISION BETWEEN AIRCRAFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase of Operation</td>
<td>CRUISE</td>
</tr>
</tbody>
</table>

**Findings(s)**

1. COMM/NAV EQUIPMENT: TRANSMITTER - INOPERATIVE
2. COMM/NAV EQUIPMENT: RECEIVER - INOPERATIVE
3. COMMUNICATIONS - NO POSSIBLE - PILOT IN COMMAND
4. VISUAL LOOKOUT - DELAYED - PILOT OF OTHER AIRCRAFT
5. REMEDIAL ACTION - PERFORMED - PILOT OF OTHER AIRCRAFT

---Probable Cause---

The National Transportation Safety Board determines that the Probable Cause(s) of this incident is/are finding(s) 4.

Factor(s) relating to this incident is/are finding(s) 1, 2, 3.
On November 11, 1983, at 1526, Eastern Airlines (Eastern) flight 836, N812EA, a B-727-225A, with 157 passengers and 7 crew members aboard, took off from Miami International Airport, Miami, Florida. The flight crew stated that the climbout was normal until the flight reached approximately 10,000 feet. At that point a loud bang was heard, followed by illumination of the red DOORS and red RIGHT GEAR warning lights above the landing gear lever. In accordance with prescribed procedures, the flight officer moved the landing gear lever from the OFF to the UP position. Following the first officer’s actions, the second officer reported loss of fluid and pressure in the A and B hydraulic systems. The primary flight controls reverted to manual operation, and the climb was terminated.

The flight crew advised Miami Center of the loss of both hydraulic systems and requested permission to maintain 11,000 feet while trying to determine the cause of the malfunction. The pilot of flight 836 advised that he would dump more than 19,000 pounds of fuel while trouble-shooting the hydraulic system and completing all applicable abnormal checklist procedures. The flight crew could not determine the right main landing gear (RMLG) position by viewing it through the visual inspection hole located in the main cabin floor. Flight 836 then requested radar vectors to the Miami International Airport for a fly-by. Miami Center coordinated with Miami Approach Control and Miami Tower, and the aircraft made the fly-by on runway 27 right while in a clean configuration. The flight controller at Miami International Airport flight control tower, an Eastern mechanic at the ramp tower, and Eastern personnel positioned near the approach end of runway 27 right observed that the left main landing gear (LMLG) and the nose landing gear (NLG) were inside their wheel wells and that their respective gear doors were closed. The RMLG door was in what appeared to be the unpressurized open position, but the RMLG was not extended.
Upon completing the fly-by, night 836 was cleared to climb to 3,000 feet on a heading of 090°. Once more the flight crew reviewed the pertinent abnormal checklists and manual reversion flight limitations, after which the captain elected to attempt to lower all landing gear by using the emergency manual extension procedure. The second officer read the pertinent instructions, placed near each landing gear manual crank socket, inserted the crank in the LMLG manual extension socket, and cranked it down; the cockpit LMLG down-and-locked green light illuminated. The second officer then inserted the crank in the RMLG socket and repeated the procedure. The crank rotated without restriction, but when the procedure was completed, the cockpit RMLG down-and-locked green light did not illuminate; instead, the gear unsafe warning light remained illuminated. The procedure was repeated for the NLG, and when completed, the NLG down-and-locked cockpit green light became illuminated. The captain regarded one of the throttles and the landing gear unsafe warning horn was heard, indicating that one or more landing gear were not down and locked.

After reviewing once more all the abnormal procedures and manual reversion checklists and limitations, the captain requested a second fly-by at Miami International Airport. The flight controllers, after coordinating with the Eastern mechanic at the ramp tower and other Eastern mechanics positioned near runway 27 right, cleared and vectored the flight for a low approach to runway 27 right and to circle to land on runway 9 right. During the second fly-by it was observed that the LMLG and NLG were extended, both the LMLG and RMLG doors were open, and the RHLG was inside the wheel well. Miami Tower relayed this information to the flight crew.

After completing the second fly-by, the flight proceeded to an area northwest of Miami International Airport where the crew once more reviewed the abnormal procedures, executed a few negative °C° load maneuvers, and prepared for a manual reversion approach with the right main landing gear stuck inside the wheel well and the other two landing gear in the down and locked position. Flight 836 requested a WING on runway 9 right in order to have the grass area south of the runway on the aircraft's right side. The flight controller cleared the flight, and the aircraft was landed on the runway. As the aircraft slowed down during the ground roll, the right wing dropped and contacted the ground. The aircraft veered about 45° to the right, the LMLG collapsed and separated, the NLG separated, and the aircraft skidded to a stop 2,500 feet from the departure end of the runway and about 100 feet south of the runway's primary surface.

Immediately after the aircraft came to a stop, fire and rescue personnel and equipment positioned near the crash site started to spray foam on the aircraft and to assist with the emergency evacuation, which was begun within 10 seconds after the aircraft stopped. The captain, the jump seat rider, the first officer, and the second officer exited the aircraft via the right-side cockpit window, and proceeded to the right-forward slide, where they assisted in the passenger evacuation. All 152 passengers were evacuated through the slides, located at the main cabin forward left and right and rear left and right entrance doors. The overwing exits were not opened or used during the evacuation. The evacuation was well coordinated and carried out expeditiously. One passenger's injury was classified "serious" but this was due to a lengthy hospital confinement for a cardiac condition. The aircraft was substantially damaged; there was no fire.

It was determined that the loud bang heard by the flight crew in the right main gear wheel well was an explosive blowout of the right main landing gear No. 3 tire while retracted in its wheel well. The Safety Board's investigation determined that the explosion caused structural damage which resulted in the loss of hydraulic systems A and B and precluded emergency manual extension of the right main landing gear. Examination
of the No. 3 tire indicated that it failed due to massive ply separations around its crown. The origin of the ply separations was located along the chafer strip/toe bead area. The extensive damage in this area was from two sources—abrasion and excessive heat. Damage from either source would have allowed high-pressure nitrogen (approximately 175 psig) to enter the ply system under dynamic conditions, causing ply separation.

Similar ply separations were found in three other tires in Eastern's inventory at or near the toe bead showing that the routine holography inspection of only the crown portion of newly retreaded tires is inadequate to detect ply separations at the toe bead and along the sidewall. The Thompson Aircraft Tire Corporation (TATCO) and Eastern implemented a complete bead-to-bead holography inspection of its B-727 fleet starting on January 6, 1984. The results of the program through March 31, 1984, showed a substantial increase in tires rejected for heat-related defects over the same period in 1983.

The most likely source of the excessive heat that damaged the tires was the brakes. It was determined that new B.F. Goodrich (BFG) brake lining cups were installed by Eastern on its B-727 fleet around June 1983. BFG issued Service Bulletin No. 418 on July 25, 1983, followed by an FAA Notice 8320.288 on September 23, 1983, which stated, in part, that these linings caused accelerated brake rotor wear which could result in their becoming worn below minimum thickness. Wear-down of rotors beyond minimum thickness causes progressively higher brake temperatures for the same energy dissipation. As brake temperatures gradually rise above normal limits, tire bead seat areas gradually deteriorate. The deterioration becomes progressively worse with repeated exposure to higher-than-normal temperatures.

The hydraulic lines for the A and B hydraulic systems running through the right wheel well were severely damaged in several locations by the explosion of the No. 3 tire. Hydraulic fluid and pressure in the B system was lost when the line between the main brake accumulator and the brake pressure switch was severed. Since this portion of the B system is pressurized continuously at 3,000 psig, the flightcrew could have done nothing to prevent the loss of B system pressure through this line. Moreover, since there is a balance line between the B system and A system reservoirs, about half of the volume in the A system reservoir was lost through the B system leak. This left about 2.5 gallons of fluid remaining in the A system reservoir.

The A system lost its remaining fluid through the line which pressurizes the main landing gear lock actuator and the wheel retraction brake. This line is part of the main landing gear retraction system. When the cockpit gear handle is in the OFF position, hydraulic pressure is released from all landing gear hydraulic lines and actuators and the line is pressurized only when the cockpit gear handle is in the UP position. The first officer's action of placing the gear handle in the UP position caused all landing gear retraction lines, including the line which was severed, to receive A system pressure. This circumstance resulted in the further loss of fluid and complete loss of pressure in the A system.

The first officer's action of placing the gear handle in the UP position and leaving it there was in accordance with the B-727 Operations Manual which states:

- If landing gear door light illuminates during climb, cruise, or descent, position landing gear lever UP and observe gear door warning light extinguished. Leave landing gear lever in UP position. If gear door warning light does not extinguish, observe landing gear operating speed limit. Expect performance penalties.
This accident and five previous tire blowout incidents show clearly that no significant loss of airplane stability or controllability occurs when landing gear doors are blown open or severed from the airplane, although there is a loss in performance due to an increase in drag. However, in this and the five other cases, all hydraulic lines in the wheel wells were damaged substantially. In this and one of the other cases, both A and B hydraulic systems were lost. The A system was lost when the flight crew followed the Aircraft Operations Manual and put the gear handle in the UP position.

Examination of the hydraulic, electrical, and control system components in the right wheel well of the accident airplane showed extensive damage which resulted from the exploding tire. As discussed above, hydraulic lines for both the A and B systems were bent, deformed, and severed. Some wing gear hydraulic valves were broken from their attachments. Electrical wires, bundles, clamps, and connectors were damaged. One wire was severed. Alleron control cables for the manual reversion system were damaged and a cable guide was broken. A system component in the wheel well were unprotected from the damaging effects of an exploding tire.

The Safety Board investigation concluded that the No. 3 right main landing gear tire which had been damaged previously, possibly during repair operations, exploded in the wheel well after it had been further weakened by heat transfer from the wheel brake system. The explosive force resulted in the disruption of hydraulic system lines and eventual depletion of hydraulic fluid and a total hydraulic system pressure loss.

As a result of this investigation, the Safety Board recommended that the Federal Aviation Administration:

Require operators of B-727 airplanes to establish a training program for flight crews addressing recognition, assessment, options, and procedures to be followed in the event a tire has exploded in a wheel well. The training program should be based, in part, on the discussion in the letter transmitting this recommendation. (Class II, Priority Action) (A-85-81)

Issue an Air Carrier Operations Bulletin, or require additional information in the Aircraft Operations Manual, Abnormal Procedures/Expanded Checklist section and Hydraulic—Alternate Operations section, to provide information and instructions to be followed by a flight crew after a tire has exploded in a wheel well. The information and instructions should be based, in part, on the discussion in the letter transmitting this recommendation. (Class II, Priority Action) (A-85-82)

Review with the Thompson Aircraft Tire Corporation and Eastern Air Lines the provisions of Advisory Circular No. 145-4, "Inspection, Retread, Repair, and Alterations of Aircraft Tires," emphasizing that tire bead seat areas should not be sanded (Section 8a. "Tire Repairs for Tires Operated Above 120 MPH") and that final inspections of retreaded tires should rigorously follow the guidelines of Section 10. "Nonrepairable Aircraft Tires." (Class II, Priority Action) (A-85-83)
Issue an advisory circular describing the damage to tires that can result from elevated brake temperatures. Emphasize the importance of visually inspecting bead seat areas prior to mounting and the need to perform bead-to-bead holograms for heat damage whenever exposure to higher-than-normal brake temperatures is suspected, including occurrences where there has been faster-than-normal rotor wear. Emphasize the need to replace tires suspected of having been subjected to heat damage and brake linings suspected of causing faster-than-normal rotor wear or higher-than-normal brake temperatures for any reason as soon as possible to minimize heat damage to tires. (Class II, Priority Action) (A-85-84)

Request the B.F. Goodrich Company to amend Service Bulletin No. 418, "Landing Gear, AU 727 Models, Main Landing Gear Brakes - inspection for Excessive Rotor Wear" dated July 25, 1983, to provide adequate warning that tire damage also is possible from the continued use of the "new" brake lining cups and to require the removal of all "new" brake lining cups on a priority basis. (Class II, Priority Action) (A-85-85)

In cooperation with the Boeing Commercial Airplane Company, determine the feasibility of shielding the A and B hydraulic system lines, electrical wiring, and control system cables located in the wheel wells of B-727 airplanes, and of modifying the wheel well lighting systems to make them less vulnerable to damage in the event of a tire explosion within the wheel well. (Class II, Priority Action) (A-85-86)

The attached Brief of Accident contains the Safety Board's findings, conclusions, and probable cause.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G.H. PATRICK BURSLEY
Member

September 5, 1985
National Transportation Safety Board
Washington D.C. 20426
Brief of Accident

File No. - 3373
11/11/83 MIAMI/FL
A/C Reg. No. N812EA
Time (LCT) - 2100 EST

Basic Information
Type Operating Certificate - AIR CARRIER - FLAG/DOMESTIC
Airline Operating Certificate - EASTERN AIRLINES
Type of Operation - SCHEDULED, DOMESTIC, PAX/CARGO
Flight Conducted Under - 14 CFR 121
Accident Occurred During - LANDING

Aircraft Information
Make/Model - BOEING 727-226A
Landgrip Gear - TRICYCLE-RETRACTABLE
Max Gross Wt. - 183000
No. of Seats - 159

Environment/Operations Information
Weather Data
Weather Briefing - COMPANY
Method - TELEPHONE
Completeness - WEATHER NOT PERTINENT
Basic Weather - UNCP
Visibility - 7.0 SM
Lowest Sky/Clouds - CLEAR
Lowest Ceiling - NONE
Obstructions to Vision - NONE
Condition of Light - RIGHT (RIGHT)

Personal Information
Pilot-in-Command
Certificat(s)/Rating(s)
A/P 
E/LAND/IHE LAND

Medical Certificate - VALID MEDICAL-WAIVERS/REST

Flight Data
Flg Data Review - YEB
Flight Time (Hours) - 4011

Instrument Rating(s) - AIRPLANE

Narrative
Brief of Accident (Continued)

File No. - 3323
11/11/83
MIAMI, FL
A/C Reg. No. N432EA
Time (Lcl) - 2100 EST

Occurrence #1
AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation
CLIMB - TO CRUISE

Findings:
1. LANDING GEAR - TIRE - PREVIOUS DAMAGE
2. MAINTENANCE - INSTALLATION - IMPROPER - OTHER MAINTENANCE PNL
3. LANDING GEAR - TIRE - OVERTEMPERATURE
4. LANDING GEAR - TIRE - EXPLODED
5. HYDRAULIC SYSTEM - LINE - FAILURE - PARTIAL
6. FLUID - HYDRAULIC - EXHAUSTION
7. HYDRAULIC SYSTEM - DISABLED
8. EMERGENCY PROCEDURE - POOR -

Occurrence #2
FORCED LANDING
Phase of Operation
LANDING - FLARE/TOUCHDOWN

Occurrence #3
OTHER GEAR COLLAPSED
Phase of Operation
LANDING - FLARE/TOUCHDOWN

Findings:
9. HYDRAULIC SYSTEM - NO PRESSURE
10. DOOR - LANDING GEAR - MOVEMENT RESTRICTED
11. GEAR EXTENSION - NOT POSSIBLE
12. LANDING GEAR - MAIN GEAR - OVERLOAD
13. LANDING GEAR - NOSE GEAR - OVERLOAD

--- Probable Cause ---

The National Transportation Safety Board determines that the Probable Cause(s) of this accident is/are finding(s) 1/2/3/4/7/8/9/10