Near Midair Collision, Vicinity of Front Royal, Virginia, Northwest Airlines, Boeing 720B, N736US, Lockheed Aircraft Corporation, Convair 240, N737Z, April 26, 1972

Micro-summary: **Evasive maneuvers by this Boeing 720B saves the day in this potential midair with a Convair 240.**

Event Date: **1972-04-26 at 1635 EST**

Investigative Body: **National Transportation Safety Board (NTSB), USA**

Investigative Body's Web Site: **http://www.ntsb.gov/**

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FILE NO. 4-0002

AIRCRAFT INCIDENT REPORT

NEAR MID AIR COLLISION
VICINITY OF FRONT ROYAL, VIRGINIA
NORTHWEST AIRLINES, BOEING 720B, N736US
LOCKHEED AIRCRAFT CORPORATION, CONVAIR 240, N737Z

APRIL 26, 1972

ADOPTED: OCTOBER 26, 1972

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D. C. 20591
REPORT NUMBER: NTSB-AAR-72-30

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SPECIAL NOTICE

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WASHINGTON, D. C. 20591
AIRCRAFT INCIDENT REPORT

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NEAR MIDAIR COLLISION
VICINITY OF FRONT ROYAL, VIRGINIA
NORTHWEST AIRLINES, BOEING 720B, N736US
LOCKHEED AIRCRAFT CORPORATION, CONVAIR 240, N737Z
APRIL 26, 1972

SYNOPSIS

Northwest Airlines scheduled passenger Flight 78, a Boeing 720B, N736US, took evasive action to avoid colliding with a Lockheed Aircraft Corporation Convair 240, N737Z. The incident took place at approximately 8,600 feet, 8 miles west of Front Royal, Virginia, at 1635 e.s.t., April 26, 1972.

Two Northwest Airlines stewardesses required medical attention for minor injuries.

There was no damage to either aircraft, and they both continued to their respective scheduled destinations.

The National Transportation Safety Board determines that the probable cause of this incident was the lack of visual scanning vigilance on the part of both flightcrews to provide safe in-flight separation while operating in VFR flight conditions.

The Safety Board recommends that the Federal Aviation Administration:

1. Undertake an educational program to impress on pilots that when flying on an IFR clearance in VFR conditions, separation from VFR traffic is not being provided and any traffic information issued by a controller is only a supplement to visual scanning by the crew.

2. Emphasize to the Washington ARTCC the importance of complying with the "keep-'em-high" program outlined in FAA Advisory Circular AC 90-59, dated February 28, 1972.

INVESTIGATION

Northwest Airlines Flight 78 (NW78) departed from Seattle, Washington, at 1213 1/ for the second leg of a continuing flight from Portland, Oregon, to Dulles International Airport, Washington, D.C. The flight was conducted under Instrument Flight Rules (IFR), and was without incident until the en route descent in Visual Flight Rule (VFR) conditions for an approach to Dulles Airport. There were 77 passengers and a crew of seven aboard the flight.

NW78 established initial contact with Washington Air Route Traffic Control Center (ARTCC) at 1626:30 while descending to Flight Level 210. The controller confirmed identification of the NW78 radar target by means of the aircraft's transponder identification feature.

At 1630:10, NW78 was given a radar vector for traffic and was cleared to descend to and maintain 8,000 feet 2/.

At 1631:05, the clearance was amended, and the flight was cleared to "descend and cross Front Royal at and maintain eight thousand." At 1635, NW78 initiated the avoidance maneuver. At 1636:40, the flight was cleared to proceed direct to the Front Royal VOR (Very High Frequency Omnidirectional Range) and to depart Front Royal on a heading of 120°.

Communications between NW78 and Washington Center terminated after the following sequence of transmissions:

At 1637:05, Washington ARTCC advised NW78 to contact Dulles Approach Control on 119.2 MHz.

At 1637:10, NW78 acknowledged the transmission.

At 1637:15, NW78 asked the Center if they had any other traffic for "Northwest seventy-eight."

The Center responded at 1637:18, "Northwest seventy-eight negative."

At approximately 1635, the first officer saw a Convair-type aircraft, at the 10 o'clock position, which appeared to be at the same altitude and on a converging course. The first officer stated that he seized the controls and executed a descending left turn to avoid the other aircraft.

1/ All times used herein are eastern standard, based on the 24-hour clock.

2/ All altitudes are mean sea level (m.s.l.) unless otherwise noted.

According to the Northwest Airlines captain who was flying the aircraft at the time of the incident, the control column was thrust hard forward and the yoke hard over to the left. He observed that the first officer was applying the control inputs and that almost simultaneously he glimpsed a two-engine, low-wing transport type aircraft passing overhead from about the 10 o'clock position to the 4 o'clock position. After the aircraft was returned to level flight, the captain asked Washington Center if there was any conflicting traffic in the area and they advised, "Negative."

At 1639:48, NW78 reported the incident to Dulles Approach Control as follows:

> "Okay, seventy-eight and we're just getting collected now we had a near miss right over Front Royal we were eight thousand and I think we might have some injured people on board, we're checking it now; we had to take extremely evasive action to avoid a midair."

NW78 landed on Runway 1 Right at Dulles Airport without further incident. The two injured stewardesses were taken to the hospital and released after examination.

The Convair 240, N737Z, was on a VFR flight plan from Bradley International Airport, Windsor Locks, Connecticut, to Dobbins Air Force Base, Georgia. The flight followed a route from Sparta, New Jersey, to Martinsburg, West Virginia, to Pulaski, Virginia, and to Dobbins Air Force Base. The Convair 240 requested and received an altimeter setting (30.15 in. Hg) from Martinsburg Flight Service Station at approximately 1620. The crew stated that they climbed to 8,500 feet prior to reaching Martinsburg and maintained that altitude for the rest of the flight. They were never in radio contact with the Washington ARTCC, nor were they required to be. The aircraft was equipped with a transponder, and, according to the crew, it was operating on Code 1200 (VFR code).

The copilot of the Convair 240 stated that when in the vicinity of the Front Royal VOR, he was startled to see a large aircraft passing below and to the right at the approximate 3 o'clock position and on an easterly heading. He estimated the vertical clearance, at the point of passing, to have been 300 to 400 feet. The Convair 240 was on a heading of approximately 230° magnetic (M) at the time of the incident. When he first observed the other aircraft, the copilot placed his hands on the control column but did not disengage the autopilot or alter the flightpath of his aircraft. The pilot of the Convair 240 stated that he did not see the other airplane. Both pilots stated that they immediately noted their altitude was exactly 8,500 feet.

The five passengers of the Convair 240 were not aware of the near collision, and the flight continued to Dobbins Air Force Base and landed without further incident.

Immediately prior to the time the Washington ARTCC controller effected a radar handoff of NW78 to Dulles Approach Control, NW78 overtook and passed an Air Force C-131, using call sign "Roach 49." This airplane, a military version of the Convair, was at 7,000 feet and was operating in accordance with an IFR flight plan from Offutt Air Force Base, Nebraska, to Andrews Air Force Base, Maryland. The pilot of Roach 49 stated that he observed two airplanes pass approximately 4 miles ahead of his airplane in the vicinity of Front Royal. Also, he estimated the altitude of the two airplanes to be approximately 10,000 to 11,000 feet, and stated that they appeared to have 500 to 1,000 feet vertical separation.

The Cockpit Voice Recorder (CVR) from NW78 was not examined, as the recorder was not removed at Dulles prior to the next flight. The Flight Data Recorder (FDR) tape was examined in Safety Board's Washington Office.

The FDR information was plotted for the period from 3 minutes before to 2 minutes after the incident. The evasive maneuver was evident by a change in the vertical acceleration (g). The vertical acceleration went from a normal 1.00 g to 1.40 g positive, to 0.82 g negative, to 1.55 g positive, to a normal 1.00 g positive. The altitude trace showed a gain of 75 feet to 8,675 feet m.s.l., then a descent to 8,075 feet m.s.l. The heading trace turned left from 107° M to 90° M then back to the right, past the original heading.

The reported weather for Dulles Airport at 1625 was: thin scattered clouds at 25,000 feet with 20 miles visibility. The Northwest flightcrew reported, "sky conditions at the time were scattered clouds at about 10,000 feet and in haze." The Convair 240 crew reported the weather condition at the time of this incident as VFR with visibility in excess of 5 miles in all directions, even toward the sun.

On May 2, 1972, a static system check was performed on Convair 240, N737Z. With the test set corrected to 8,000 feet, the pilot's altimeter read 8,005 feet, and the copilot's altimeter read 7,985 feet.

An inspection and leak check was made of the No. 1 and No. 2 static and flight recorder systems on N736US. There were no discrepancies found in either system. The altimeters and flight recorder were removed, bench checked, and were found to be within tolerances.

The Washington ARTCC controller stated that at the time the incident occurred, he was working five IFR flights in the vicinity of Front Royal and that they were all producing double slash (transponder return) targets. He stated he did not see a VFR target in the area.

The Federal Aviation Administration's (FAA) En Route Air Traffic Control Handbook 7110.9B dated April 1, 1971, outlines priorities as follows:

> Give first priority to separation of aircraft as required in this manual. Give second priority to services that are required but do not involve separation of aircraft. Give third priority to additional services to the extent possible.

The issuance of radar traffic information is designated as an "additional service" in Chapter 4, Section 11 of Handbook 7110.9B. Paragraph 805 of Section 11 states:

> Provide additional services to the extent possible contingent upon your capability to fit it into the performance of higher priority duties and on the basis of the following:
>
> a. Provision of a service is not mandatory because many factors (such as limitations of the radar, volume of traffic, communications frequency congestion and your workload) could prevent you from providing it.
>
> b. You have complete discretion for determining if you are able to provide or continue to provide a service in a particular case.
>
> c. Your decision not to provide or continue to provide a service in a particular case is not subject to question and need not be made known to the pilot(s).

The Washington Center was not complying with the "keep-'em'high" program outlined in FAA Advisory Circular No. AC 90-59, dated February 28, 1972. (See Appendix B.) This program requires that terminal airspace be configured so that high-performance aircraft enter the terminal area at 10,000 feet m.s.l. and remain at that altitude as long as possible before beginning a descent to 5,000 feet above airport elevation. The pilot of the Convair 240 stated that in planning the flight VFR, he decided to pass well west of the Washington area in consideration of the incoming and outgoing jet traffic. He further stated in part as follows:

> "Since the current traffic control policy of 'keep-'em-high' is generally in effect - this policy is to keep arriving turbojet traffic at the highest possible altitude as long as possible."

The pilot thought that he was far enough west to be out of danger from eastbound descending jets. (See Appendix B.)

Section 91-67(a) of the Federal Aviation Regulations, states:

> When weather conditions permit, regardless of whether an operation is conducted under Instrument Flight Rules or Visual Flight Rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft in compliance with this section.

ANALYSIS

The Convair 240's cruising altitude of 8,500 feet was in accordance with procedures defined in Part 91 of the Federal Aviation Regulations. The Northwest flight was under radar control of Washington ARTCC and had been cleared to descend to 8,000 feet m.s.l.

Mountainous terrain, west of Washington, D. C., forces VFR traffic to altitudes above 5,000 feet. IFR traffic which arrives from the west and is allowed to descend below 10,000 feet creates a collision hazard between controlled and uncontrolled aircraft which Advisory Circular AC 90-59 was designed to help prevent.

The air traffic controller who was working NW78 at the time of the incident was also working four other IFR aircraft. VFR traffic advisories are provided to IFR traffic subject to the workload and discretion of the controller. If the controller had seen the VFR target (the Convair 240), he would have given the information to Flight 58, since five aircraft would not constitute a sufficiently heavy workload to prohibit the issuance of a traffic advisory. However, the five beacon targets in a concentrated area may have prevented the controller from seeing the VFR target operating in the same area.

Assuming a maximum in-flight visibility of 20 miles (reported by the National Weather Service at Dulles Airport at 1625), each aircraft could have been visible to the other for approximately 3 minutes and 20 seconds prior to the near collision. At the approximate closure angle of 125°, the Convair would have remained at the approximate 11 o'clock position relative to NW78, and NW78 would have been at the approximate 1 o'clock position and slightly above the Convair throughout this time period.

Thus, it is the opinion of the Board that this time frame, as well as the relative position of each aircraft to the other, should have provided ample opportunity for each crew to have observed the other aircraft and to have taken corrective action well before the near collision occurred.

The "see and avoid" concept remains a primary doctrine for collision avoidance between aircraft operating in visual meteorological conditions. Operational conditions such as high closing speeds and physiological inhibitors to visual detection, which would have limited the ability to see and avoid the other aircraft, were not factors in this incident. Vigilance must be maintained by flightcrews to see and avoid other aircraft whether the operation is being conducted under instrument flight rules or visual flight rules. ATC radar advisory service, where available, is intended as a supplement to the required pilot vigilance.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this incident was the lack of visual scanning vigilance on the part of both flightcrews to provide safe in-flight separation while operating in VFR flight conditions.

RECOMMENDATIONS

The Safety Board recommends that the Federal Aviation Administration:

1. Undertake an educational program to impress on pilots that when flying on an IFR clearance in VFR conditions, separation from VFR traffic is not being provided and any traffic information issued by a controller is only a supplement to visual scanning by the crew. (A-72-209)

2. Emphasize to the Washington ARTCC the importance of complying with the "keep-'em-high" program outlined in FAA Advisory Circular, AC 90-59, dated February 28, 1972. (A-72-210)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

Louis M. Thayer, Member, was absent, not voting.

October 26, 1972.

APPENDIX A

CREW INFORMATION

A. Boeing 720B, N736US

The pilot-in-command, Captain Robert L. Scott, aged 44, held Airline Transport Pilot Certificate No. 437248. His first-class medical certificate was dated April 1, 1972. His total flying time was 15,618 hours, 5,738 hours of which were in the Boeing 720.

First Officer Richard Drzal, aged 28, held Airline Transport Pilot Certificate No. 1621943. His first-class medical certificate was dated May 10, 1971. His flying time was 2,908 hours, 1,200 hours of which were in the Boeing 720.

B. Convair 240, N737Z

Pilot Carl P. Setili, aged 54, held Airline Transport Pilot Certificate No. 33591-40. His first-class medical certificate, dated December 16, 1971, contained the following limitation: "Holder shall possess correcting glasses for near and distant vision while exercising the privilege of his airman's certificate." He had accumulated 10,140 hours flying time, as shown on the application for his medical certificate.

Copilot Raleigh E. Drennon, aged 37, held Airline Transport Pilot Certificate No. 1346291. His first-class medical certificate was dated June 7, 1971. The application for his medical certificate shows 2,200 hours of civilian flying time and 3,300 hours of military flying time.

APPENDIX B

AC NO: AC 90-59

DATE: 28 Feb 72

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: ARRIVAL AND DEPARTURE HANDLING OF HIGH PERFORMANCE AIRCRAFT

1. PURPOSE. This Advisory Circular describes ATC handling of high performance aircraft in terminal areas. It is designed to familiarize pilots with the keep-'em-high procedures so that total effectiveness of the program may be realized.

2. RELATED DOCUMENTS.

   a. Airman's Information Manual, Parts I and IV.

   b. FAA Order 7110.22A, Arrival and Departure Handling of High Performance Aircraft.

3. DISCUSSION.

   a. The FAA Near Midair Collision Report of 1968 revealed that a high percentage of terminal near midair collisions occur below 8,000 feet within 30 miles of an airport with a control tower. The most critical area of this airspace is at the lower altitudes which are extensively used by controlled and uncontrolled aircraft. In an effort to reduce the number of incidents of this nature, the FAA developed a program which is designed to minimize exposure of controlled arriving and departing high performance aircraft in the terminal area. It is commonly referred to as the "Keep-'em-High" program. The procedures have been in effect for about one year and they have proven to be an effective noise abatement program in addition to reducing the time that high performance aircraft are exposed to uncontrolled aircraft at lower altitudes.

b. The keep-'em-high program requires terminal airspace be configured so that high performance aircraft enter the terminal area at 10,000 feet and remain at that altitude as long as possible before beginning descent to 5,000 feet above airport elevation. Descent below the 5,000 foot altitude begins when the arrival enters the descent area established for the landing direction. Departing aircraft are climbed to the highest altitude filed by the pilot as soon as possible after takeoff. In keeping with this program, controllers will not initiate clearances to arriving and departing high performance aircraft which will place them at lower altitudes commonly used by uncontrolled aircraft. Routine pilot requests for altitudes below 5,000 feet above airport elevation will not be honored until the aircraft has entered the descent area established for the landing runway. At non-radar approach control facilities exceptions are made to provide the controller flexibility in accommodating lower altitude requests within specific parameters.

c. To assist VFR pilots, FAA facility chiefs will normally issue Facility Bulletins explaining the program and describing local procedures. It will be accompanied by a graphic notice depicting descent areas and normal arrival and departure routes. These charts are designed to help VFR pilots to identify areas and routes that are normally used by high performance aircraft. Avoiding these areas will result in a higher degree of safety in the terminal area.

4. APPLICABILITY. As used in this program, high performance aircraft means turbojets and large turboprops that file IFR at 5,000 feet AGL or above. In most cases the formal facility bulletin will be issued. At the lower density locations the keep-'em-high procedures will be applied by controllers without a formal advertising program. Since these procedures are designed for safety enhancement and noise relief for airport neighbors, they will be applied at all times by air traffic controllers except when different altitudes are necessary due to unusual circumstances, e.g., turbulent conditions, thunderstorm activity, local noise abatement requirements, aircraft emergencies, etc.

5. MISCELLANEOUS. The FAA believes this program enhances safety and affords significant noise relief to our airport neighbors. Pilots of high performance aircraft, when flying IFR, are urged to cooperate with Air Traffic Control. When pilots of these particular aircraft are flying VFR they are encouraged to abide by the keep-'em-high philosophy, i.e.,

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remain as high as possible as long as possible. Pilots of other VFR aircraft are urged to avoid, to the extent possible, the routes and descent areas most frequently used by high performance aircraft in the terminal area. When these areas must be traversed, extreme vigilance should be exercised by VFR pilots. Although controllers will abide by the established keep-'em-high procedures most of the time, there are times, as mentioned earlier, when deviations will be required.

William M. Flener

WILLIAM M. FLENER
Director, Air Traffic Service