

AIRCRAFT ACCIDENT REPORT

ADOPTED: August 16, 1960**RELEASED:** August 22, 1960

MIDAIR COLLISION INVOLVING
BEECHCRAFT, C-35, N 1839D, AND WYOMING AIR NATIONAL GUARD F-86L, 52-3662,
NEAR CHEYENNE, WYOMING, MUNICIPAL AIRPORT, DECEMBER 15, 1959

SYNOPSIS

At 1520 m.s.t., December 15, 1959, an F-86L flown by Captain William E. Meckem, the wingman in a formation of two Wyoming Air National Guard F-86L's, and a Beechcraft C-35, flown by Mr. Gene A. Lewis, collided at 9,000 feet m. s. l., or 2,850 feet above the ground. The collision occurred about 4 5 miles south-southwest of the southern boundary of the Cheyenne Municipal Airport, within the airport control zone. The pilot of the Beechcraft, the only occupant, received fatal injuries. The pilot of the F-86L ejected safely but sustained minor injuries. Both aircraft were destroyed

Shortly before the collision the F-86L flight leader made a simulated ILS and low approach during which the wingman flew in safety-observer position. Following the low approach the wingman joined in close formation. The accident occurred thereafter while the flight was proceeding to the initial point to enter the tactical pattern for landing. The Beechcraft was en route to Denver, Colorado, from St. Cloud, Minnesota, with an en route business and fueling stop at Dickinson, North Dakota.

Both flights were being made on VFR flight plans and the weather conditions in which the collision occurred were: High thin cirrus clouds; visibility 90 miles.

At the time of the collision the F-86L formation was on a heading of 110 degrees magnetic, in straight and level flight, and at a computed true airspeed of 312 knots. Analytical calculations indicate that the Bonanza was being flown on a heading of approximately 154 degrees magnetic, in straight and level flight, and at a calculated true airspeed of 139 knots. The evidence indicates that the flight conditions for the Beechcraft were constant for at least a 60-second period prior to the collision. For the first 30 seconds of the same period the F-86L formation was climbing, accelerating, and turning left. For the final 30 seconds the flight conditions of the colliding F-86L were constant as stated.

The accident took place in excellent weather conditions which, under the appropriate Civil Air Regulations and military rules, place the responsibility for collision avoidance on the pilot through visual detection and avoidance of other aircraft.

An analytical study (Attachment A) based on all of the evidence shows that at the start of the 60-second period the colliding aircraft were separated 3.48 statute miles. At this time the F-86L's were positioned 129 degrees to the right rear of the Beechcraft and the Beechcraft was 67 degrees to the left of the nose of the aircraft of the jet formation leader. During the final 30-second period the F-86L's were positioned 110 degrees to the right rear of the Bonanza while the Bonanza was 26 degrees to the left of the nose of the aircraft of the jet formation leader. Separation between the planes was then 2.8 statute miles.

It is the conclusion of the Board that, from all the evidence, an overtaking situation occurred in which the F-86L's overtook the Bonanza from the right rear. The Board concludes that during closure there was sufficient opportunity for the jet formation leader to have seen the Beechcraft and to have avoided the collision, in accordance with the responsibility of the pilot of an overtaking aircraft. It is the further conclusion of the Board that the opportunities afforded Mr. Lewis were not sufficient to have expected him to have seen the jets.

Following the accident the Air National Guard unit at Cheyenne required that on missions which require a safety observer the pilot performing this responsibility will do so throughout the entire mission. The directive requires that the safety observer will not join formation even though that portion of the flight requiring a safety observer is completed. The unit also raised, for its jet aircraft, the flight altitudes specified for the control zone prior to the initial point 1,000 feet. The first action intends to enable all pilots flying as a flight to look for other aircraft. The second action intends to reduce collision exposure by greater traffic segregation.

Investigation

Beechcraft C-35, N 1839D. Investigation disclosed that on December 15, Mr. Gene A Lewis, the pilot of N 1839D, planned and prepared for a flight from St. Cloud, Minnesota, to Denver, Colorado, with an en route combined business and fueling stop at Dickinson, North Dakota. He departed St. Cloud at 0700 ^{1/}and flew, VFR - no flight plan - to Dickinson, arriving about 1050. There Mr. Lewis conducted his business and the Bonanza was fueled to capacity by adding 22.3 gallons of gasoline.

Mr. Lewis left Dickinson at 1235 and shortly after takeoff air-filed a VFR flight plan to Denver with the Dickinson FAA communications station. According to the flight plan he proposed to fly to Rapid City, South Dakota, direct to Denver, at 8,500 feet. He estimated 3 hours and 15 minutes en route with 5 hours of fuel aboard. About 1343 Pilot Lewis contacted Rapid City radio stating he was at 4,500 feet over the city, VFR to Denver. He requested and was furnished the latest winds aloft and weather appropriate to his flight.

About 1515 N 1839D called Cheyenne radio on 122.1 mcs. and requested the latest winds aloft. Mr. Lewis identified his flight as "Bonanza N 1839D" and stated he was VFR en route to Denver; he did not give his position or altitude. The controller furnished the most favorable winds aloft for a Bonanza en route from Cheyenne to Denver, which were between 8,000 and 11,000 feet.

^{1/} All times herein are mountain standard based on the 24-hour clock; altitudes are mean sea level unless otherwise indicated.

Mr. Lewis asked that the information be repeated, which was done. His acknowledgment was the last communication from the aircraft.

F-86L Flight. At 1420 that afternoon F-86L, 55-3662, piloted by Captain William E. Meckem, and F-86L, 52-9993, piloted by First Lieutenant Howard T. Anderson, took off from the Cheyenne Municipal Airport as a flight of two. Both pilots were members of the 187th Fighter Interceptor Squadron, Wyoming Air National Guard, which is based on the Cheyenne joint-use airport. The unit performs an air defense mission using the F-86L, an all-weather single-place jet interceptor.

The purpose of the flight was a tactical evaluation for Lt. Anderson, given by Captain Meckem who was also a full-time training supervisor for the squadron. Briefly, the tactical evaluation is performed pursuant to CONAC (Continental Air Command) directives and intends to permit an evaluation of pilot proficiency relative to combat-readiness standards. It is given semiannually and incorporates the various ground and flight training curricula necessary in the all-weather intercept mission. Accordingly, prior to the flight, Lt. Anderson demonstrated to Captain Meckem satisfactory knowledge of the F-86L aircraft and its systems and the regulatory materials governing the squadron's air defense mission. He also conducted a briefing of the flight portion of the evaluation covering its various requirements. These included a scramble from a simulated advanced state of readiness, a maximum performance without afterburner climb to high altitude, all-weather type G. C. I. intercepts, a simulated instrument penetration, and ILS low approach. The flight portion also included, if remaining fuel permitted, a simulated flameout pattern following the ILS approach.

Because of the all-weather nature of the flight, after takeoff Lt. Anderson flew his aircraft principally by reference to instruments while Captain Meckem flew as safety observer, positioning his aircraft behind, slightly below, and to the right of Lt. Anderson. At this time it was Captain Meckem's responsibility as safety pilot for the flight to look out for other aircraft and avoid collision. This responsibility is according to appropriate Civil Air Regulations and Air Force directives. According to their testimony, this was clearly understood by both pilots.

Weather conditions at this time and at the time of the accident were: High thin cirrus; visibility 90 miles.

About 1500, after the intercept phase was finished, Lt. Anderson called Cheyenne tower and requested a practice VFR-VOR jet penetration and ILS low approach. 2/ The tower cleared the flight as requested, advising it to maintain VFR at all times, to report leaving the VOR outbound at 20,000 feet, and when leaving the outer marker inbound to the ILS runway. The reports were made. At 1517, about 200 feet over the middle marker and at approximately 160 knots, Lt. Anderson finished the ILS and reported "on the go" to the tower. He continued down the runway and as the aircraft accelerated retracted speed brakes, gear, and flaps. At this time the simulated instrument flight portion of the mission ended and Lt. Anderson returned to visual flight. Captain Meckem remained in the safety-observer position as chase pilot. Each of the pilots said that at this time he watched for other aircraft but saw none.

2/ The penetration is an instrument procedure to transition jet fighters from high altitude to the instrument landing system. Low approach meant the plane would not land after the ILS but would go around, passing over the landing runway. The ILS at Cheyenne is from east to west, the runway is 26, 260 degrees.

As the flight crossed the airport above runway 26 Lt. Anderson asked for a "simulated flameout pattern." ^{3/} The tower approved the request; however, Captain Meckem, about this time, informed Lt. Anderson he had insufficient fuel for the maneuver prior to landing. Lt. Anderson, therefore, transmitted to him, "Let's enter on initial and join on the turn." This transmission in jet fighter parlance meant the simulated flameout would not be made, the flight would proceed to the initial point, ^{4/} enter the initial approach, ^{5/} and land. It also meant for Captain Meckem to join in close formation. Although the tower was not directly informed of the intention the controller said he overheard the transmission and understood the meaning.

The tower controller stated he watched the low approach and saw the jet flight make an approximate 30-degree right turn just past the end of the runway. This was in conformity with a noise-abatement procedure to avoid flying over the Ft. Warren hospital. He stated that he watched the flight then continue outside the traffic pattern limits in a left climbing turn. At this time the controller turned his attention to a T-33 which was in the traffic pattern for landing. The controller indicated that the next call from the jet flight would occur when it entered the tactical pattern at the initial point for runway 26.

The testimony of Lt. Anderson was in agreement. He stated that his flight passed well to the right of the Ft. Warren hospital, located two-three miles beyond the end of the runway. He stated that approximately abeam of the hospital he began a left turn. He said it was a climbing turn and that the climb was started after the ILS was finished, power was applied, and the aircraft was clearly accelerating with gear and flaps up. The left bank was 30 degrees. Lt. Anderson continued the left turn to 110 degrees, interrupting it once on a heading of about 180 degrees to clear the turn. Captain Meckem closed in the turn to close formation. He took position on Lt. Anderson's right wing with his aircraft slightly below the level of Lt. Anderson's with four to five feet wing-tip separation. Fore and aft he flew the "slat line." As the turn progressed the flight accelerated to 270 knots indicated airspeed.

Because precision, planning, and coordinated smoothness were important considerations in a satisfactory performance of the evaluation, Lt. Anderson planned to reach 9,000 feet, 270 knots, and the 110-degree heading simultaneously. For all practical purposes this was done and both pilots estimated that it occurred about 30 seconds before the collision. The pilots testified it was clear to them that at this point Lt. Anderson was the formation leader and Captain Meckem was the wingman. Accordingly, because flying formation requires the wingman's undivided attention to the leader, the responsibility to see and avoid other aircraft was entirely that of the formation leader. This is in accordance with Civil Air Regulations and military directives.

^{3/} A pattern used in event of a jet power loss commonly referred to as a "flameout." The pattern is practiced by nearly all units using subsonic and transonic fighters.

^{4/} This is a location five miles east of runway 26. Jet fighters pass over the location, establish a flightpath from it along the runway extended centerline to the end of the landing runway. The landing from this position is a 360-degree overhead pattern.

^{5/} Initial approach is that portion along the runway extended centerline.

Lt. Anderson stated that he clearly understood his responsibility and believed he had maintained a careful lookout for other air traffic. In his testimony he recalled stopping the turn about 180 degrees to clear the area, particularly in the direction he intended to continue. He testified that during the last 30 seconds he scanned the left quadrant, then straight ahead, and then the right quadrant. Lt. Anderson stated that at the same time he scanned he also checked Captain Meckem's position. He stated that when he returned his vision forward he saw an aircraft immediately in front of him and made a violent pullup to avoid it. He said it all occurred so quickly he had no time to warn Captain Meckem or even to identify the plane. Lt. Anderson said, in retrospect, he believed that he had scanned for other aircraft in a normal manner and was sure he looked in the area where the Beech was located but had not seen it. He further indicated that except for brief altitude, airspeed, and heading checks there were no duties or occurrences which required his attention within the cockpit.

Captain Meckem testified that his attention was concentrated on the formation formup and thereafter on holding close position. He was generally aware that heading, speed, and altitude were as Lt. Anderson described them. He was also of the opinion that these factors were constant for at least the final 30 seconds before collision. He said that so far as the collision itself was concerned he recalled a flash on his windscreen an instant before impact. He did not recognize the Bonanza, in fact, assumed he had collided with the T-33 which had been overheard in the traffic pattern.

A concentration of small fuselage pieces of the Beechcraft and its mutilated empennage were found 4.5 miles south-southwest of the southern boundary of the airport. This wreckage marked the approximate location over which the collision occurred. The F-86L crashed about 1.5 miles southeast and the Beechcraft about one-half mile south of this location.

Examination of the Beechcraft showed the aircraft struck the ground 40 degrees nosedown on a southerly heading. The wings were attached to the cabin; however, the structure from the aft cabin rearward was destroyed. The powerplant was torn out.

Examination of the Beechcraft structure provided clear information relative to the inflight impact sequence. It showed that the F-86L nose and fuselage structure above the wing penetrated the right side of the Bonanza fuselage at about station 141.0, a location just aft of the rear cabin window. The window frame remained attached to the cabin; the structure aft of the location was destroyed. On the opposite side of the Bonanza fuselage most of the rear cabin window and all structure rearward of station 121.0 were destroyed. Between the left and right locations there was a clear line of destruction which formed an angle of approximately 110 degrees through the fuselage measured clockwise from the nose relative to the fuselage centerline of the Beechcraft. The manner in which the structure was affected showed that the line of shearing was from right to left; however, there was no discernible evidence of vertical forces.

The fact that the Beechcraft wings showed no inflight contact damage indicated that the right wing of the F-86L passed below the plane of the Bonanza wing. Because the F-86L was nearly straight and level at impact, this fact further shows the Bonanza was also nearly straight and level. Finally, calculations based on the heading and speed of the F-86L, the approximate speed of the C-35, and the 110-degree line of structural shearing through the Beechcraft fuselage show a resulting

heading for the Bonanza at impact of 154 degrees magnetic. From the only known witness to the collision it was learned that the Bonanza was flown straight and level on a constant heading for a period which he estimated as three to five minutes before the midair impact. Although the witness thought the Bonanza pulled up and banked left one to three seconds before impact, the structural evidence clearly indicates this either occurred after the collision or it was an illusion created as the two planes of different size and speeds merged and collided. The approximate true airspeed of 139 knots for the Bonanza was based on the manufacturer's operating data for the aircraft at normal cruise and at 9,000 feet. It is noteworthy that a reasonable variation of this speed factor above or below normal cruise in this instance will not appreciably alter the computed heading of the Beechcraft.

The Cheyenne Municipal Airport is located on the north side of the city. In addition to being the home base of the Air National Guard Squadron it also serves three scheduled air carriers and considerable general aviation and military traffic. The airport has a conventional five-mile radius control zone and utilizes conventional left traffic patterns, one for light aircraft and the other for heavy traffic. The first is close in and the latter is within three miles of the center of the airport. In addition, the F-86L's use a tactical approach and 360-degree overhead landing pattern. All of the patterns were published and disseminated locally. The use of the airport by the jet fighters and the fact that they made instrument low approaches was also published in the Airman's Guide according to its publication procedures.

Another factor relative to this collision is that the F-86L flight utilized UHF (ultra high frequency) communications and the Beechcraft was equipped with VHF (very high frequency) communications. The tower did not, nor does any tower normally, simulcast on both VHF and UHF communications. The F-86L pilots and the Bonanza pilot, therefore, could not overhear radio communications made with respect to the other.

Analysis

From the evidence gathered in the accident investigation it is apparent that the collision occurred outside of the Cheyenne Airport traffic pattern but within the limits of the airport control zone. It occurred while both flights were being made on VFR flight plans and in weather conditions which were virtually clear; visibility was reported as 90 miles. Under these circumstances Civil Air Regulations 6/ impose upon the pilot direct and full responsibility to avoid collision through visual detection and avoidance of other aircraft. The Civil Air Regulations also state rules regarding right-of-way under various conflicting situations. Because averting collision rested solely with the pilots it is imperative in accident investigation to determine the opportunities afforded each pilot to carry out this responsibility. In order to determine and evaluate them it is necessary not only to determine the manner in which the aircraft collided but also the relative position of each aircraft with respect to the other during the 60-second period of closure prior to collision. The testimony of the jet pilots, the inflight structural damage to the Beechcraft, and other information gathered during the investigation

6/ CAR Part 60.10, 60.12 and 60.14

provided a good foundation for an accurate analysis of these important considerations.

Analysis of the factual information and physical evidence leads the Board to the determination that the inflight contact sequence began with the Beechcraft on a heading of 154-degrees and the F-86L on a heading of 110 degrees. Initial inflight contact occurred when the F-86L nose structure contacted the fuselage of the Beechcraft just behind the right rear cabin window. The sequence progressed as the nose structure above the wing of the F-86L penetrated and cut through the Beechcraft fuselage at an angle of 110 degrees to the fuselage centerline measured clockwise from the nose. Forces attending the sequence sheared off the Bonanza fuselage aft of the swath line while the right wing of the F-86L most probably passed below the plane of the wings of the Beechcraft.

Because the colliding F-86L was in straight and level flight during the sequence and because the wings of neither aircraft made contact it is most apparent the Bonanza was also straight and level. This is substantiated by the lack of any vertical deformation to the structure involved in the collision. These factors cause the Board to believe that no evasive action occurred which would indicate the Bonanza pilot saw the F-86L's during the collision closure.

As part of the Board's analysis a vector diagram, Attachment A, was prepared using the aforesaid factual material necessary to the study. In this manner the probable flightpaths of the aircraft were determined for the 60-second period of closure prior to the collision. From the study it was possible to determine the relative position of each aircraft to the other at any given period. Similarly, it was possible to assess the opportunities afforded each pilot to have sighted the other's aircraft in order to avoid the collision.

The study shows that at the beginning of the 60-second period the colliding aircraft were separated 3.48 statute miles. At this time the Beechcraft was located 67 degrees to the left of the nose of the jet formation leader's aircraft. It would have been slightly above the leader and visible to him through the canopy glass, presenting a quartering rear profile. During the first 30 seconds, while the F-86L's were turning, the angular position of the C-35 gradually shifted to a position about 26 degrees to the left of the nose of the leader's aircraft and to approximately eyelevel. During the final 30 seconds, with formation straight and level, the position of the Beechcraft would remain unchanged.

The study also shows that at the beginning of the 60-second period the F-86L formation was positioned 129 degrees to the right rear of the nose of the Beechcraft, or approximately 40 degrees to the rear of the 90-degree position. The jets would have been below the level of the Beechcraft. During the first 30 seconds the position of the jet formation would gradually shift forward until it was positioned level at a sighting angle of 110 degrees to the right rear of the nose of the C-35. During the final 30 seconds this position would remain unchanged.

Conclusions

From the available evidence and analytical study of this accident it is the conclusion of the Board that an overtaking situation occurred in which the F-86L formation overtook the Beechcraft from its right rear. The Board concludes that during the 60-second period of closure the Beechcraft was positioned well within the forward visual quadrant of the jet formation leader and that it presented an

adequate profile for visual detection within the distance which separated the aircraft. The Board therefore concludes that there was an adequate opportunity for the jet formation leader to have seen the Beechcraft in time to have led his wingman off collision course, in accordance with the responsibility of an overtaking pilot.

At all times during the 60-second period before collision the jet formation was positioned well to the right rear of the Beechcraft. This position was as much as 129 degrees and was never less than 110 degrees. It is fundamental that a pilot's primary responsibility is to direct his attention to the most critical area, which is the 180-degree quadrant ahead of his aircraft. While this is not intended to mean that a pilot should not search all areas available to him, it does mean that his greatest effort should be in the direction of flight with reliance that an overtaking pilot will similarly fulfill the same responsibility. Accordingly, the Board does not believe that the opportunities afforded Mr. Lewis were sufficiently adequate to have expected him to have seen the jets.

The Board believes that the action by the National Guard unit to require the safety pilot to remain in this role throughout an entire mission is an effective measure. It is believed to be effective in that the requirement will permit greater utilization of both pilots in such flight in the difficult task of looking for other aircraft. The second action taken was to raise the jet altitude minimum prior to initial approach. This was also done by the Air Guard unit. The Board believes that if there is a concentration of traffic in the Cheyenne Airport area between 3,000 and 4,000 feet, action to utilize a higher altitude by the fighters should also be effective in reducing collision exposure.

Probable Cause

The Board determines that the probable cause of this accident was that during an overtaking situation the jet formation leader failed to see the Beechcraft in time to lead his wingman off collision course.

BY THE CIVIL AERONAUTICS BOARD:

/s/ WHITNEY GILLILLAND
Chairman

/s/ G. JOSEPH MINETTI
Member

/s/ ALAN S. BOYD
Member

/s/ J. S. BRAGDON
Member

Chan Gurney, Vice Chairman, did not participate in the adoption of this report.

S U P P L E M E N T A L D A T A

Investigation and Taking of Depositions

The Civil Aeronautics Board was notified of this accident shortly after it occurred on December 15, 1959. An investigation was initiated in accordance with the provisions of the Federal Aviation Act of 1958. Depositions, ordered by the board, were taken in Cheyenne, Wyoming, on February 4, 1960.

Flight Personnel

Pilot Gene A. Lewis, 37, resided in St. Cloud, Minnesota, and was the senior member of Scenic Outdoor Advertising, Inc., part owner of the Beechcraft C-35. He held a private pilot certificate with single-engine land rating issued by the Federal Aviation Agency June 29, 1959. FAA records indicate that at that time he had acquired 19 hours dual, of which six hours were on cross-country. He also had 82 hours solo, of which 62 were cross-country. As near as can be determined, at the time of the accident he had accumulated a total of 325 hours of flying. Mr. Lewis satisfactorily passed, without waiver, a class III medical examination April 22, 1959.

Captain William E. Meckem, age 31, resided in Dubois, Wyoming. At the time of accident he was employed by the 187th Fighter Interceptor Squadron of the Wyoming Air National Guard as an air training supervisor on a full-time basis. He was a rated pilot on flying status and possessed a 3-2 (white) instrument card issued by the Air Force. Captain Meckem also held a commercial pilot certificate with single-engine land and instrument ratings. He held a currently valid military physical examination certificate. He had flown a total of 2,450 hours. Of this total 1,250 were in military aircraft, of which 160 were in the F-86L aircraft.

First Lieutenant Howard T. Anderson, age 30, resided at 1663 Chester, Aurora, Colorado, and was employed as a professional pilot. Lieutenant Anderson was also a member of the 187th Fighter Interceptor Squadron as a part-time reserve officer. He was a squadron pilot. He was a rated pilot on flying status and held a 3-2 (white) instrument card issued by the Air Force. He also held a commercial pilot certificate with single-engine, multiengine, and instrument ratings. Lieutenant Anderson held currently valid FAA and Air Force medical certificates. He had accumulated a total of 1,400 hours, of which 800 were in civilian aircraft and 600 were in military aircraft. He had flown 500 jet hours, of which 250 were in the F-86L aircraft.

The Aircraft

Beechcraft C-35, N 1839D, was manufactured in March 1952, by the Beech Aircraft Company. Available records indicated it was purchased by its present owners May 19, 1959. The most recent periodic inspection was performed July 24, 1959. All airworthiness directives had been complied with and records indicated the aircraft to have been maintained in an airworthy condition. A recording tachometer showed a total of 1,784 hours for the aircraft and a log entry of engine overhaul on January 18, 1958, indicated that since then the engine had operated 737 hours. The engine was a Continental, model E-185-11, and it was equipped with a Beechcraft propeller, model 215-107, blade model 215-207-88.

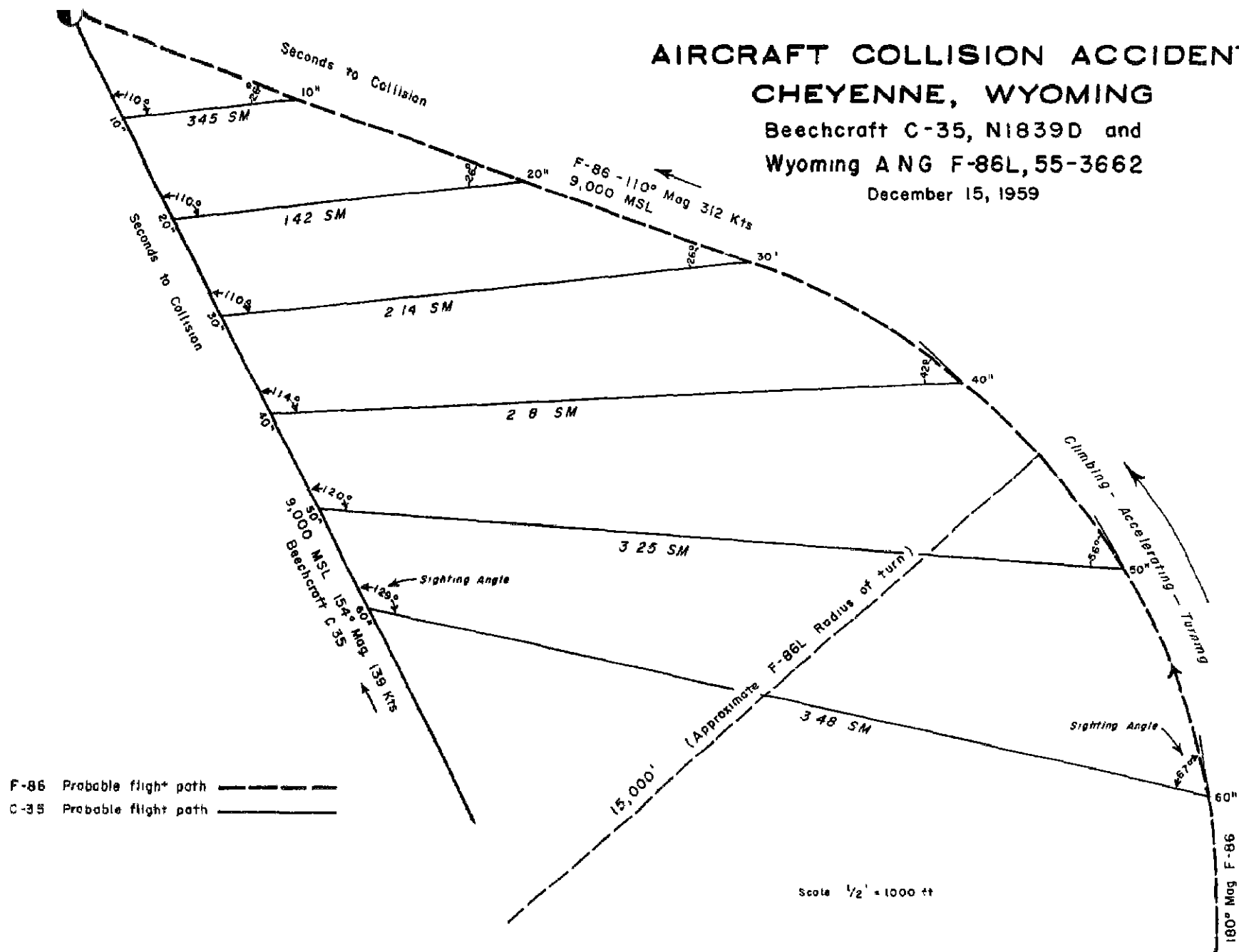
F-86L, 55-3662, was manufactured by North American Aviation, Inc., in 1953. It was possessed and maintained by the 187th Fighter Interceptor Squadron based on the Cheyenne, Wyoming Municipal Airport. Aircraft records indicated it had flown 988 hours, of which 28 were since last overhaul. The last line maintenance and preflight inspection was performed December 15, 1959, the day of the accident. The aircraft was powered by a General Electric J-47-GE-33 turbojet engine. Total time on the engine was 408 hours.

AIRCRAFT COLLISION ACCIDENT CHEYENNE, WYOMING

Beechcraft C-35, N1839D and
Wyoming ANG F-86L, 55-3662

December 15, 1959

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F-86 Probable flight path
C-35 Probable flight path