

AIRCRAFT ACCIDENT REPORT

ADOPTED: April 24, 1964

RELEASED: May 1, 1964

AAXICO AIRLINES, INC.
C-46-F, N 67941, NEAR GREAT FALLS,
MONTANA, AUGUST 14, 1963

SYNOPSIS

An AAXICO Airlines, Inc., C-46-F, N 67941, a cargo flight, crash landed in a plowed field and skidded into a small earthen dam approximately 35 miles east-northeast of Malmstrom Air Force Base, Great Falls, Montana, at approximately 1500 m.s.t., on August 14, 1963.

The crash occurred after the pilot failed to maintain altitude and appropriate single-engine airspeed following the shut-down of the right engine. The first officer sustained fatal injuries; the captain sustained serious injuries; and the aircraft was substantially damaged. There was no fire.

The Board determined the probable cause of this accident was the failure of the captain to effect a proper and timely assessment of a powerplant malfunction, followed by improper judgment and technique during a single-engine emergency operation.

Investigation

An AAXICO Airlines, Inc., C-46-F, N 67941, a cargo flight, crash landed in a plowed field and skidded into a small earthen dam approximately 35 miles east-northeast of Malmstrom Air Force Base (AFB), Great Falls, Montana, at approximately 1500 m.s.t.,^{1/} on August 14, 1963.

The crash occurred after the pilot failed to maintain altitude and appropriate single-engine airspeed following the shut-down of the right engine. The first officer sustained fatal injuries; the captain sustained serious injuries; and the aircraft was substantially damaged. There was no fire.

AAXICO Airlines, Inc., LOGAIR^{2/} Flight 1814, was operated as an air cargo flight under a contractual agreement dated July 1, 1963, with the United States Air Force.

LOGAIR Flight 1814 originated at Hill AFB, Ogden, Utah, at 0525 on August 14, 1963. The flight proceeded without incident to Boeing Field, Seattle, Washington, where an en route cargo and fuel stop was made at 0845. At 1026, LOGAIR Flight 1814 departed Boeing Field for Malmstrom AFB, the next scheduled stop. The trip was uneventful.

^{1/} All times herein are mountain standard based on the 24-hour clock.
^{2/} Logistic air support.

The approach to runway 20 at Malmstrom AFB was described by ground observers as normal. Following a hard landing during which the aircraft porpoised several times, a right turnoff onto the taxiway was accomplished. The aircraft rolled to a stop on the edge of the ramp area and witnesses reported that the right engine had quit. After several minutes and numerous attempts, the engine was finally restarted and the aircraft was taxied to the ramp parking area. The landing was accomplished at 1308 after an elapsed flight time of six hours and two minutes from Hill AFB, Ogden, Utah.

The incoming flight crew reported that the first officer had made the approach and landing at Malmstrom AFB. No significant discrepancies were noted in the aircraft engine log, and the flight crew made no attempt to determine the cause of the right engine stopping.

A crew change was effected at Malmstrom AFB. Captain Clyde H. Bour, Jr., and First Officer George D. Houck were to continue LOGAIR Flight 1814 to Hill AFB its destination. Two hundred and sixty gallons of 115/145 octane fuel were added to bring the total fuel to 600 gallons.

The captain checked the local, en route, and terminal weather and filed a VFR flight clearance on Military Form 175 to Ellsworth AFB, Rapid City, South Dakota, with a one-hour refueling and cargo stop at Minot AFB, North Dakota. Estimated time en route was five hours and five minutes, and there was four hours fuel aboard. Estimated time en route to Minot AFB was two hours and twenty minutes.

During the engine start, ground observers heard the right engine backfire several times after starting. The captain stated he then shut down both engines and determined that the right engine fuel selector valve was not properly seated. He further stated both engines were then restarted and ran normally and the aircraft checked out properly on run-up.

At 1404, LOGAIR Flight 1814 departed Malmstrom AFB to proceed direct to Minot AFB. Weight and balance computations indicated the gross takeoff weight of the aircraft was 47,124 pounds, which was below the maximum allowable of 48,000 pounds. Investigation revealed the center of gravity (c.g.) was within allowable limits. Weather conditions at Malmstrom AFB at departure were reported as: scattered clouds at 7,000 feet, visibility 55 miles, temperature 89°F., dew-point 47°F., wind from 310° at 7 knots, altimeter setting 29.98.

The field elevation of Malmstrom AFB is 3,525 feet.^{3/} Terrain east of Malmstrom AFB within 25 to 30 nautical miles, rises to heights of more than 5,000 feet. Elevations then decrease en route to Minot AFB and average 2,500 to 3,000 feet over the plains areas.

According to the captain, normal takeoff was made from runway 20 using 2,700 r.p.m. and approximately 50 inches of hg. After takeoff, power was reduced to Maximum Except Takeoff (METO) which was 2,550 r.p.m. and 44 inches of hg. At this time, a left turn was initiated toward a northeasterly outbound heading. At approximately 500 feet above the surface, climb power of 2,500 r.p.m. and 38 inches hg. was established. According to the captain's statement, both engine oil inlet temperatures were between 95 and 100 degrees C.

^{3/} All altitudes are above mean sea level unless otherwise noted.

After approximately 10 minutes of climb at this power setting and at airspeeds of from 125 to 130 knots, an indicated altitude of 4,500 feet was attained. The captain stated the first officer then called his attention to the right engine oil inlet temperature gauge which was indicating approximately 115°C. The maximum authorized inlet oil temperature listed in the FAA Approved Flight Manual for AAXICO Airlines is 93°C. The left engine oil inlet temperature gauge still indicated between 95° and 100°C. At this time, the airplane was approximately 20 miles from Malmstrom AFB.

The captain said power was then reduced to 2,250 r.p.m. and 3¼ inches of hg. and a slow climb was continued. Rate of climb was between zero and 100 feet per minute at this power setting. Oil inlet temperatures lowered at this power setting: the left engine temperature gauge read just under 95°C., and the right reduced to between 100° and 105°C.

After an additional 10 minutes of climb at 2,250 r.p.m. and 3¼ inches hg., the captain stated he brought the engine power setting back to cruise power for a few minutes. The captain said that shortly thereafter, he realized he needed more altitude and again increased power to 2,400 r.p.m. and 38 inches of hg.

A witness approximately 29 miles east-northeast of Malmstrom AFB and just north of the aircraft's flightpath situated on terrain of approximately 3,500-foot elevation described his observations. "It (the airplane) caught my attention because it was so low. I thought it was going to hit one of the mountains when it came up real slow and just missed it and then dropped quite a bit." (See Attachment I.)

After climb was resumed, the captain reported the right engine oil inlet temperature rose to 120°C., and the oil pressure dropped to 50 pounds.

As the aircraft continued eastward, it flew near the Goldhahn Ranch which is at an elevation of 3,200 feet, and is located 41 nautical miles from Malmstrom AFB, where another witness observed the aircraft. "I saw smoke coming from the right engine. The airplane passed directly over me at about 500 feet altitude. Both engines were working, the gear was retracted and flaps up. . . . As the airplane proceeded east the smoke became more dense and seemed darker, and the airplane seemed to be gaining a little altitude. When it was about five or six miles east of me the smoke disappeared and the plane started to circle to the north. It made a 180-degree turn and proceeded westbound. When it passed to the north of me there wasn't any smoke visible and I couldn't see if the prop was feathered at that time." (See Attachment I.)

Subsequently, the captain said the aircraft had reached approximately 5,500 feet indicated altitude and he observed the right engine oil quantity gauge indicating only 20 gallons of oil remaining of a total of 30 gallons.

Another witness who held a private pilot's license stated he observed the aircraft fly over his ranch still in an eastbound direction. "It was at low altitude, approximately 50 feet above the ground. Its flight attitude was unsteady and the motors were laboring. I observed smoke of black color and major intensity pouring from the right . . . motor." Subsequently, he observed the aircraft make a turn to the left and fly west back toward the Geraldine Airport. (See Attachment I.)

About this time, the captain instructed the first officer to go back and observe the right engine. While the first officer was out of his seat, the right engine began to backfire and the captain then shut down the engine and feathered the propeller. The aircraft was approximately 50 nautical miles east-northeast of Malmstrom AFB and had flown approximately 12 miles past the Geraldine Airport^{4/} at Geraldine, Montana. The captain reversed course to return toward Malmstrom AFB and began a gradual descent of from 100 to 200 feet per minute. He recalled seeing the Geraldine Airport and believed he was 300 to 400 feet above the terrain at the time. The captain said that when the right propeller was feathered, the left engine was set at 2,400 r.p.m. and the aircraft was in a slight descent at an airspeed of from 100 to 105 knots. The cowl flaps of the left engine were then placed in trail position. Prior to shut down of the No. 2 engine, the cowl flaps were left at the closed position, oil pressures remained at approximately 50 psi, and cylinder head temperatures remained at approximately 200°C.

As the aircraft approached Geraldine westbound, two witnesses in the area observed it. (See Attachment I.) One witness stated his attention was drawn to a low flying aircraft about 300 feet above the ground 1/4 to 1/2 mile away flying in a west-northwest direction. He observed the right propeller turning slowly. The second witness observed the aircraft with a feathered right propeller flying at less than 500 feet above the ground headed ". . . a little north of west."

After flying westbound past the Geraldine Airport, of which the captain was aware, he said power was increased to 2,550 r.p.m. on the left engine. When the airspeed dropped to 100 knots, he descended the aircraft to a lower altitude because he believed ground effect^{5/} would help him maintain altitude. At the same time, the terrain appeared lower to the northwest so he turned in that direction. When the airspeed dropped to below 100 knots, the captain went to "full power." Airspeed dissipated through 95 knots and altitude could not be maintained with full power. Therefore, the captain began to make several turns to avoid the rolling terrain. At this time, the captain said the left inlet oil temperature gauge indicated approximately 130°C., cylinder temperature 200°C., and airspeed had dropped to 90 knots.

Several witnesses observed the aircraft following its course change to a northwest direction after passing Geraldine. (See Attachment I.) One witness, located approximately four miles northwest of Geraldine, observed the aircraft pass above him. It was approximately 250 feet above the ground with a feathered right propeller. Thinking the aircraft was about to crash, the witness climbed from the rock crusher he was operating and followed the aircraft for about three miles in his pickup truck before losing sight of it. Another witness observed the aircraft with the right propeller feathered flying north-northwest at an estimated altitude of 50 to 100 feet. These and other witnesses describe the aircraft as making turns, some as steep as 45 degrees.

^{4/} Geraldine Airport, located one statute mile south of the city of Geraldine, Montana, has an east-west hard surfaced, 2,900-foot runway at an elevation of 3,180 feet m.s.l. There are no approach obstructions and the airport is situated on level terrain 37 nautical miles east-northeast of Malmstrom AFB. The runway had been extended from 2,500 feet to 2,900 feet and resurfaced the day before the accident. The shortest landing distance permitted by Civil Aeronautics Manual 42 for N 67941, under the existing conditions, was approximately 3,380 feet.

^{5/} The effect of the ground or surface in turning the down-wash, or induced flow from the wings or rotor of an aircraft hovering or flying near it, thus reducing induced drag and increasing lift.

About this time, the captain stated, the aircraft was approaching a dry lake and the first officer called the captain's attention to the possibility of landing on the lake. The captain did not consider this a necessity because he stated he could still maintain 90 knots with METO power.

After the airspeed dropped to below 90 knots, the captain believed he would have to make a crash landing on a smooth field. Approaching a field, the airspeed dropped to 85 knots and he shouted something - which he does not remember - to his copilot. He vaguely remembers gradually retarding the throttle. After a short roll over the crest of a hill, and down a steep slope he was confronted with an embankment which was the last thing he remembers.

During the emergency, no attempt was made to establish radio communications with any facility.

No witnesses could be found who observed the aircraft during the crash landing.

The aircraft was found at the foot of a small earthen reservoir dam which is approximately 3,500 feet in elevation. The fuselage was on a heading 90 degrees to the left of the original ground path, 750 feet from the point of initial ground impact. The crash site was located at the bottom of a steep slope over which the aircraft passed. Because of a widespread drought, the surrounding terrain was hard and dry. Initial ground impact marks appeared in a plowed field leading to the crash site which had an upward slope of six degrees with a four-degree slope down to the right. These marks began with a left main gear tire gouge mark which gradually became deeper and which was on a heading of 188 degrees magnetic. A tail wheel tire gouge mark appeared 60 feet beyond the initial left main gear mark, and right main gear tire gouge marks appeared 78 feet beyond the initial impact marks. Left propeller slash marks appeared beginning 85 feet from the point of initial impact and continued to a point 185 feet from initial impact. A right propeller gouge mark also appeared along this area near the right main gear tire mark. Tire skid marks appeared on the top of the small hill.

The main landing gear and tail gear were torn from their attachment points and found beneath the aircraft near their normal position. The flaps were found in the "UP" position.

The fuselage and wings were intact but buckled or wrinkled in various areas. The cockpit area was torn open with the cockpit lying on its right side approximately 90 degrees to the fuselage. The cabin was twisted to the left at the bulkhead just behind the crew's seats; buckled extensively at the fuselage position to the rear of the wing; and wrinkled severely from top to bottom several inches to the rear of the left main cargo door.

Flight and engine control cables were found either severed or jammed at various positions within the fuselage. Control cables leading to the ailerons of both wings were intact but were off their pulleys. Rudder cables were intact but disclosed impact damage. Elevator trim cables were severed in the tail wheel compartment as a result of impact.

The left engine had torn loose from the nacelle but was lying in its relative position to the wing. The right engine was torn partially loose from the nacelle and was resting against the fuselage where one blade of the propeller had penetrated the fuselage.

Examination of the two propeller assemblies revealed extensive damage as a result of ground contact. The left propeller blade angle at time of impact was on the low pitch stop; the right propeller was feathered.

No evidence of pre-impact failure was found in the propeller, fuel or oil systems of the left engine.

Tear down of the right engine indicated the front master rod bearing had failed and had been flattened and 'squeezed out over the link pins that connect the link rods to the master rod cluster. Extensive metal particles clogged the lubrication hole in the front crankpin, and the front crankpin journal was scored and imbedded with metal. The secondary counterbalance and the rear master rod bearing and cam bearings were all heavily scored.

Metal particles were present in the nose case, the scavenger screens and pumps, the oil cooler, the front crankpin journal, and the lubrication holes of the front counterweight bearing. Many of the oil system jets were clogged by metal particles.

The right engine oil pressure regulator valve was found stuck in the "full pressure" or minimum by-pass position and its appearance indicated it had been subjected to considerable heat. There was no evidence of any foreign material in the valve.

A review of maintenance records on the right engine indicated that it had last been overhauled and zero timed on November 13, 1962. It was installed in the right position on another C-46, N 67941, on June 26, 1963, with 814:17 TSO.^{6/} Although the aircraft was under lease at the time, this installation was accomplished under the supervision of an AAXICO maintenance representative. A review of all writeups on the engine subsequent to its last overhaul revealed no significant chronic malfunctions or items to suggest future failures.

During the investigation of this accident, AAXICO maintenance records disclosed that N 67941 had been transferred from AAXICO to Captiol Airways in 1960; then to Zantop Air Transport in 1962; and back to AAXICO in 1963. By the use of the proration formula authorized in FAA Advisory Circular No. 121-1 in ascertaining the percentage of aircraft overhaul time expended by one operator when establishing the time remaining to overhaul for another operator acquiring the aircraft, AAXICO gained 791 hours of airframe time on N 67941.

When questioned about exceeding the engine's oil temperature and pressure limitations, the captain stated: "In the past, I have had an oil temperature running at the red line or above it. I never had attached - I felt that it is not normal according to the figures that are put down in the book, but I still felt it was normal for the airplane."

The captain had received his C-46 type rating in 1950. He had acquired a total of over 15,800 hours and had flown approximately 5,800 hours in the C-46 as pilot-in-command since that time. He joined AAXICO Airlines on July 1, 1961, and for two years, flew as a captain on Douglas C-118 aircraft operated by AAXICO on bailment from the U.S. Air Force. In preparation for flying C-46 aircraft on IOGAIR contracts, he was given 40 hours of ground school, 1:30 hours of link

^{6/} The engine had been installed on and removed from two previous aircraft prior to this time.

training, and a 1.30-hours C-46 pilot-in-command flight check by a company check pilot - all of which were passed successfully. On July 1, 1963, he was assigned as a captain on C-46 aircraft and at the time of the accident had accumulated 108 hours of C-46 pilot-in-command time on LOGAIR missions.

AAXICO crew personnel are hired by a pilot employment group and assigned to fly under contract for AAXICO. They are compensated for mileage flown in accordance with MATS mileage figures from point to point specified in LOGAIR contracts. Mileage is not payable for distances flown while in a holding pattern; awaiting ATC clearance; en route deviations due to weather; deviations to weather alternates; or on flights of less than 30 minutes which begin and terminate at the same station due to malfunctions of the aircraft, or for any other reasons.

Analysis

A careful examination of all the evidence indicates that the failure of the right engine was caused by the failure of the front master rod bearing. The evidence of the bearing, oil cooler, scavenger screens, scavenger pump, oil pressure regulator valve and pressure pump, together with the captain's statement, and the observations of ground witnesses, all confirm that the engine had been operating for some time at an excessively high oil temperature with a failure in process. The high temperature was due to the failure of front master rod bearing. This condition resulted in a rise in friction and higher than normal oil temperature. The normal oil flow and cooling were not adequate to compensate for the added heat conduction. The engine oil system became contaminated with sludge and metal as the bearing failure progressed with the final overtravel and breakup of the pistons.

It is apparent that the captain initially attempted to lower the oil temperatures by descending the aircraft with engine power reduced. These efforts were unsuccessful and oil inlet temperature continued to be excessive even after power reductions.

Oil inlet temperatures on the right engine began to exceed maximum allowable temperatures when the aircraft was approximately 500 feet above the ground after takeoff. The Board believes a reasonably prudent pilot would have made a determined effort to lower the temperatures and if they did not decrease after these efforts, an immediate return to the point of takeoff would have been made.

Numerous witnesses observed black smoke coming from the right engine as the aircraft progressed eastward. The continued excessively high oil inlet temperature, and the drop in oil pressure after power reduction, should have been an indication to the captain of an abnormally operating engine.

When the aircraft was at approximately 500 feet above the terrain (3,500 m.s.l.) and within 50 nautical miles of its departure point, the right engine began to backfire and the captain shut it down and feathered the propeller. Normal feathering was reflected in the captain's statements and in the examination of the propeller assembly.

At this point, the captain reversed course and began a 100 to 200-foot-per-minute descent.

According to C-46F performance criteria in Federal Aviation Regulations, Civil Aeronautics Manual 42, N 67941, under existing conditions, should have been

able to operate on a single-engine and maintain a 50-foot-per-minute climb within altitudes well above the accident site.

Although the landing strip at Geraldine has a physical length of 2,900 feet, and the landing distance required for N 67941's weight and configuration at the Geraldine Airport was more than this distance; nevertheless, it is believed that the aircraft could have been landed at Geraldine Airport and braked to a stop with minimum damage, if any, to the aircraft, and without loss of life.

Once having gotten so low with uneven terrain on all sides, the captain was forced to fly in the directions of lowest elevations. This required constant heading changes and turns, and some of these banks were described by witnesses to be as steep as 45 degrees.

The airspeed continued to decrease as a result of aircraft maneuvering to avoid terrain obstacles. The left engine oil temperature had increased appreciably beyond normal operating limits although the pilot stated the power was normal for the density altitude. The fact that the airspeed dropped below 100 knots is not abnormal considering the aircraft maneuvers and density altitude. The flight with constant banks and turns continued to bleed off airspeed and prevented the aircraft obtaining its normal single-engine rate of climb in time to avoid contacting the terrain. When airspeed dropped below the best METO climb speed of approximately 113 knots, and then reduced further to airspeeds below minimum control speed (V_{MC}), it was obvious that a landing had to be made.

In tracing the probable flightpath, it is evident that there were other areas where an emergency landing could have been accomplished successfully. It is apparent the captain ignored these opportunities.

The field upon which the aircraft crashed was purported by the pilot to have been selected by him for the emergency landing. However, as airspeed continued to decrease and the operating temperature of the left engine increased, the aircraft was maneuvered into an area which was surrounded on three sides by rising terrain. The tops of this terrain were above his flight altitude, and airspeed was too low to establish a climb. The Board believes the pilot was aware that a crash landing was imminent; and that the area of the crash was selected for him by circumstances over which he had no control at the time.

Therefore, the Board concludes that the accident was the result of an improper assessment by the captain of his engine instrument readings; a lack of knowledge and training in areas of aircraft performance; and a display of poor judgment.

Probable Cause

The Board determines the probable cause of this accident was the failure of the captain to effect a proper and timely assessment of a powerplant malfunction, followed by improper judgment and technique during a single-engine emergency operation.

Recommendations

As a result of the Board's investigation of this accident, it recommended to the Federal Aviation Agency that the proration formula used in FAA Advisory

Circular No. 121-1 be reviewed to assure that the time since overhaul of airframes cannot be adjusted, as a result of transfer of aircraft, beyond the approved actual time since overhaul.

Furthermore, it was recommended that the aircraft records of AAXICO Airlines fleet of C-46 aircraft be reviewed in order to assure no other aircraft are being operated beyond their approved overhaul time limit by virtue of application of the proration formula.

(See Attachment II.)

BY THE CIVIL AERONAUTICS BOARD:

/s/ ALAN S. BOYD
Chairman

/s/ ROBERT T. MURPHY
Vice Chairman

/s/ CHAN GURNEY
Member

/s/ G. JOSEPH MINETTI
Member

/s/ WHITNEY GILLILLAND
Member

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

Investigation and Depositions

The Civil Aeronautics Board was notified of this accident after its occurrence at approximately 1500 on August 14, 1963. Investigators were dispatched to the scene to conduct an investigation in accordance with the provisions of Title VII of the Federal Aviation Act of 1958, as amended. Depositions were ordered by the Board and taken at Los Angeles, California, on October 2, 1963, and at the Oakland International Airport, Oakland, California, on October 9, 1963.

Air Carrier

AAXICO Airlines, Inc., is a Florida corporation with its principal offices in Miami. It holds an Interim Certificate of Supplemental Air Service issued by the Civil Aeronautics Board (order E-18873) which authorizes the air carrier to operate charter trips in air transportation and provide service for the military establishment, and an Air Carrier Operating Certificate SW-266 issued by the Federal Aviation Agency. The carrier is principally engaged in an airfreight operation pursuant to a contract with the U.S. Air Force serving numerous Air Force Bases on a regular schedule.

Flight Personnel

AAXICO crew members are hired by a pilot employment group and assigned to fly under contract for AAXICO.

Captain Clyde H. Bour, Jr., age 41, was employed by AAXICO Airlines on July 1, 1961, and had accumulated a total of 15,834 hours flight time, of which 5,807 hours were in C-46 type aircraft. He held airline transport pilot certificate No. 46417C with single and multiengine land C-46, DC-4, 6, and 7 ratings. His last proficiency check in C-46 aircraft was with a company check pilot on June 15, 1963, when he also requalified as a captain on C-46 type aircraft. Records indicate he satisfactorily passed a first-class FAA flight physical on June 25, 1963, without waivers.

First Officer George D. Houck, age 43, was employed by AAXICO Airlines on July 1, 1961, and had accumulated a total of 13,606 hours flight time, of which 113 hours were in C-46 type aircraft. He held FAA airman certificate with commercial privileges and single and multiengine land DC-3/4 ratings. His last line check in C-46 aircraft was with a company check pilot on July 5, 1963. His last proficiency check in C-46 aircraft was on June 17, 1963. Records indicate he satisfactorily passed a first-class FAA flight physical on September 20, 1962, without waivers.

The Aircraft

N 67941, a Curtiss-Wright C-46F, manufacturer's serial No. 22391, owned and operated by AAXICO Airlines, Inc., was purchased from Slick Airways, Inc., on July 31, 1957. It was leased by AAXICO to Capitol Airways, Inc., on July 1, 1960, when it had 12,440 hours airframe TSO. It was then leased to Zantop Air Transport, Inc., on July 1, 1962, when it had 14,878 hours airframe TSO. It was returned to AAXICO Airlines on June 28, 1963, with 16,127 hours airframe TSO. At the time of the accident, it had 16,571 actual hours airframe TSO. The aircraft had a total time of 25,571 hours.

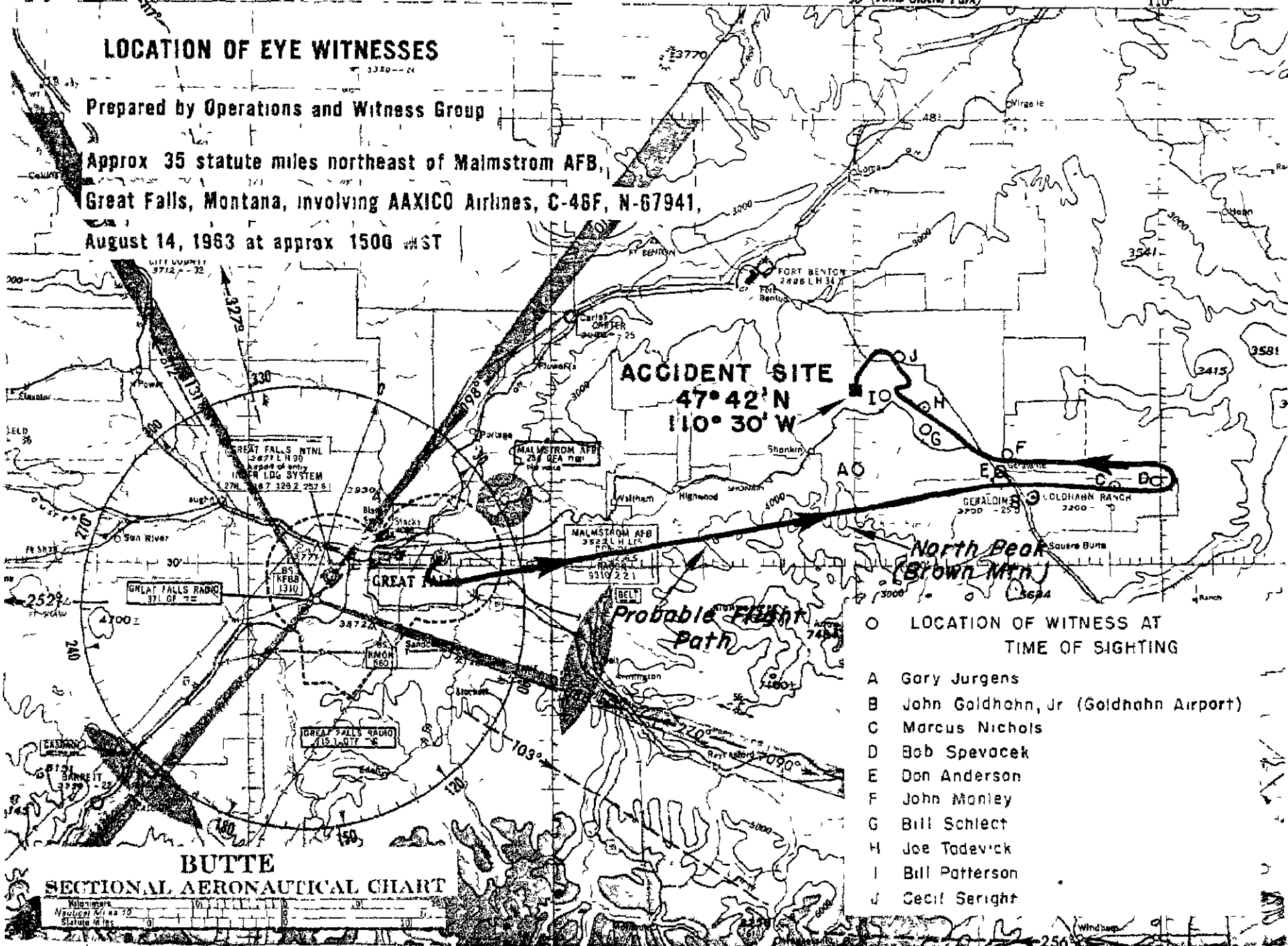
The aircraft was powered by two Pratt and Whitney R-2800-51M1 engines with the following statistics:

<u>Position</u>	<u>Serial Number</u>	<u>Installation Date</u>	<u>TSO (Actual)</u>	<u>TSO (Pro-rated)</u>	<u>Time Allowable</u>
1	FP-089278	2/20/63	997:58	962:58	1,500
2	FP-089462	6/26/63	1,257:58	1,205:58	1,500

LOCATION OF EYE WITNESSES

Prepared by Operations and Witness Group

Approx 35 statute miles northeast of Malmstrom AFB,
Great Falls, Montana, involving AAXICO Airlines, C-46F, N-67941,
August 14, 1963 at approx 1500 MST



ACCIDENT SITE
47° 42' N
110° 30' W

*North Peak
(Brown Mtn.)*

*Probable Flight
Path*

- O LOCATION OF WITNESS AT TIME OF SIGHTING
- A Gary Jurgens
- B John Goldhahn, Jr (Goldhahn Airport)
- C Marcus Nichols
- D Bob Spevacek
- E Don Anderson
- F John Manley
- G Bill Schlect
- H Joe Tadevick
- I Bill Patterson
- J Cecil Seright

BUTTE SECTIONAL AERONAUTICAL CHART

ATTACHMENT II

CIVIL AERONAUTICS BOARD
WASHINGTON 25, D. C.

C
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December 27, 1963

Mr. George S. Moore
Director
Flight Standards Service
Federal Aviation Agency
Washington, D. C. 20553

Dear Mr. Moore:

The Board's recent investigation of two accidents involving Aaxico Airlines C-46, N67941 and N67935 at Great Falls, Montana, on August 14, 1963 and Las Vegas, Nevada, September 25, 1963, respectively, revealed maintenance practices which, in our opinion, warrant your attention.

Our review of the maintenance records of N 67941 showed that operation of the aircraft had been transferred three times with the first and last operator during these transfers being Aaxico Airlines. At each transfer, the aircraft time since overhaul (TSO) was adjusted in accordance with the proration formula outlined on FAA Advisory Circular 121-1. These adjustments resulted in the aircraft being operated beyond their approved overhaul time period. In the final transfer back to Aaxico Airlines, this carrier gained approximately 790 hours of flying time on the subject aircraft solely by applications of the proration formula.

The Bureau recognizes the need for an equitable plan to establish overhaul time limits for operations with varying experience levels. However, we do not believe that the proration time on the percent of time to overhaul and the actual time since overhaul should exceed the approved TSO.

As a result of our investigation of this problem it is recommended that the proration formula in FAA Advisory Circular 121-1 be reviewed to assure that TSO cannot be adjusted, as a result of transfer of aircraft, beyond the approved actual time since overhaul. Furthermore, it is suggested that the aircraft records of Aaxico Airlines be checked to assure that no other aircraft are being operated beyond their approved time limit by virtue of application of the proration formula.

Mr. George S. Moore (2)

The Bureau's investigation of the flight log records of C-46F, N67935 revealed several incidents of maintenance practices which are not in our opinion conducive to acceptable standards of airworthiness. On August 15, 1963, at Albuquerque, New Mexico, the left magneto and both distributor fingers of the right engine were replaced by a military mechanic without appropriate FAA ratings. The approval of this work was not certified until the completion of a Logair flight to Ogden, Utah, the same date. The flight logs of N67935 for a period between August 3, 1963 to September 21, 1963, covering 14 flights, revealed that the aircraft was operated with the oil pressure of the left engine at 50 psi which is below specified limits. Corrective action was taken on five of the flights; however, it did not correct the problem.

Our investigation of the maintenance facilities of Aaxico Airlines at Oakland, California, revealed that the carrier had experienced eleven R-2800B series engine failures between the period of July 1, 1963 to September 19, 1963. We believe that this number of failures is high for a fleet of 12 C-46 aircraft. At the time of the Board's investigation, and to this date, the causes of all of these failures are unknown; however, four of the failures resulted from failure of the P/N 44764 exhaust valve.

The Bureau is aware that the P/N 44764 valve is an obsolete type and that improved types are available. We are also aware that some operators and overhaul agencies are using the newer type valves which assure better service life.

In view of the questionable maintenance practices of Aaxico Airlines, it is recommended that a review of the maintenance and inspection practices and procedures of this carrier be reviewed and improvements be made where necessary in order that acceptable airworthiness standards are assured. It is also suggested that consideration be given to time limiting P/N 44764 exhaust valves for use on C-46 series aircraft.

During investigation of these accidents, personnel of our Engineering Division discussed these findings with Messrs. K. E. Neland, J. J. Morris and J. Haddad of your Flight Standards Service and J. Kiselica, Flight Standards Division, Eastern Region.

If we can be of any further assistance in your consideration of these recommendations, please feel free to contact us.

Sincerely yours,

/s/ Leon H. Tanguay
Director, Bureau of Safety

FEDERAL AVIATION AGENCY
WASHINGTON, D. C. 20553

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In Reply
Refer to: FS-321

March 13, 1964

Mr. Leon H. Tanguay
Director, Bureau of Safety
Civil Aeronautics Board
Washington, D. C. 20428

Dear Mr. Tanguay:

This is in reply to your letter of December 27, 1963, reference B-80-96, concerning AAXICO Airlines.

The Agency has investigated the maintenance practices of AAXICO Airlines directing particular attention to C-46 aircraft N67941 and N67935.

The significant actions taken by the Agency and AAXICO are as follows:

1. Violation action is being taken against the carrier in connection with replacement of engine components by non-certificated military personnel.
2. The carrier has issued instructions to AAXICO flight crews prohibiting the use of non-certificated, unqualified mechanics for maintenance.
3. The carrier elected to replace the maintenance supervisor at Hill Air Force Base.
4. A fleet campaign directed toward erratic oil pressure problems was conducted of all AAXICO C-46 aircraft. the campaign included removal of oil coolers and temperature regulators, and adjustment of oil regulators to manufacturers' specifications. Further, engines with low oil pressure tendencies, having low-capacity oil pumps, were converted to high-capacity pumping by changing the drive/driven gear ratio.
5. In addition to the above, we determined that the following related actions were also implemented. These actions included reduction of cruise horsepower; revised operational procedures to avoid operation under unloaded cylinder pressures; avoidance of rapid changes in cylinder temperatures; revised inspection procedures requiring boroscope inspection

of all cylinders at 200-hour intervals; compression check of all cylinders and revised ignition procedures.

The effectiveness of this program has resulted in improved engine performance and reliability for AAXICO Airlines.

6. Directing attention to the Pratt & Whitney P/N 44764 valve, examination of the air carrier's records shows that eight engine failures were experienced and reported during the period of July 1, 1963, through December 1963. During this same period, thirteen engines were removed for routine overhaul and four engines were removed, repaired and returned to service. Of the eight engines failed, four experienced valve difficulties and involved engines procured from another operator.

The Agency is handling the P&W P/N 44764 valve as an overall industry problem by Airworthiness Directive action. The proposed AD is in our Office of the General Counsel in preparation for Notice of Proposed Rulemaking. This AD will require, in essence, replacement of all P/N 44764 valves during the next engine overhaul. Replacement valves may not be new or reconditioned P/N 44764 valves.

Reference is made to the Agency's Advisory Circular 121-1. With regard to the transfer of aircraft from operator to operator, we consider the pro rata time control system described in AC 121-1 to be basically sound.

The system has functioned quite well in the execution of several hundred transactions during the past four years. Unfortunately, the unusual combination of circumstances which resulted in the overhaul time combination obtained by AAXICO was not anticipated when AC 121-1 was prepared. Therefore, in view of this experience, we are studying a revision intended to preclude intentional or inadvertent time accumulation in the transfer transactions.

Our extensive interest in this matter and the initiation of actions we determined as necessary has accumulated some additional time in our reply.

Sincerely yours,

/s/ C. Schuck
for George S. Moore
Director
Flight Standards Service