

CIVIL AERONAUTICS BOARD  
ACCIDENT INVESTIGATION REPORT

Adopted: November 5, 1953

Released: November 10, 1953

AMERICAN AIR TRANSPORT, INC. - NEAR SELLECK, WASHINGTON,  
APRIL 23, 1953The Accident

A C-46F, N 1693M, operated by American Air Transport, Inc., crashed on Cedar Mountain, approximately eight miles east of Selleck, Washington, at approximately 0055, April 23, 1953.<sup>1/</sup> Both pilots were killed; the only other occupants, two company pilots riding as passengers, survived. The aircraft was demolished upon impact. There was no fire.

History of the Flight

American Air Transport, Inc., an irregular air carrier, was operating this flight as a ferry operation from Columbia, South Carolina to Seattle, Washington for the purpose of later conducting a Civil Air Movement of military personnel from Seattle.

Captain John W. Schroeder and First Officer James P. Gilbert flew the aircraft from Columbia to Cheyenne, Wyoming, departing Columbia at 1305 EST, April 22, 1953, and arriving at Cheyenne at 1835 MST of the same date. The flight from Columbia to Cheyenne was completed without incident. A second crew, Captain Maurice A. Booska, Chief Pilot of the company, and First Officer Donald F. Dwelley, rode as passengers to Cheyenne, at which point they relieved Schroeder and Gilbert, who continued with the flight as passengers.

The aircraft was serviced at Cheyenne, making the total fuel load 1,200 gallons of 100-octane gasoline. Captain Booska received a weather briefing at the U. S. Weather Bureau Airport Station; following this, he filed a VFR flight plan to Boise, Idaho via Airways Green 3 and Red 1.

Departing from Cheyenne at 2043 MST (delayed owing to repair of the left navigation light), the flight proceeded uneventfully. The pilot made position reports over Rawlins and Rock Springs, Wyoming; Malad City and Burley, Idaho; and three minutes east of Boise at 2252. In all position reports except Rock Springs and Malad City (where no altitude was given) the flight altitude was reported as 12,000 feet.

Upon request from the flight, Boise radio furnished the Boeing Field-Seattle forecast and the 2228 en route weather between Boise and

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<sup>1/</sup> All times referred to herein are Pacific Standard, unless otherwise noted, and based on the 24-hour clock. The approximate time of the accident is based upon ground speed made good on course between the last two positions reported by the pilot.

Seattle. The pilot then filed an IFR flight plan to destination, and the following clearance was transmitted by Boise radio at 2254: "ATC CLEARS N 1693M TO THE SEATTLE RANGE VIA RED 1, BLUE 32, BLUE 12, GREEN 2. MAINTAIN 12,000 FEET." The clearance was acknowledged by the pilot. Later position reports indicated that the flight was at 12,000 feet when over Baker, Oregon at 2331 and Pendleton, Oregon at 2353. Near Yakima, Washington the flight was cleared for descent to 10,000 feet and upon reporting over Yakima at 0026, it was further cleared to descend to and maintain 8,000 feet. Ellensburg, Washington radio received a position report at 0037 that the flight passed over Ellensburg<sup>2</sup>/at 0034, 8,000 feet, IFR. Ellensburg radio transmitted the Boeing Field 2330 weather to the flight at 0040; the pilot acknowledged and advised that he would contact Seattle Air Route Traffic Control Center on 120.3 megacycles when over Easton, Washington.

The pilot contacted Seattle Center at 0047 and reported over Easton at 8,000 feet, inbound to Boeing Field. Seattle Center thereupon issued the following clearance: "NECTAR ONE SIX NINE THREE METRO YOU ARE CLEARED TO CROSS HOBART AT 8,000 SEATTLE AT OR ABOVE 4,000 MAINTAIN 4,000 NO DELAY EXPECTED CONTACT SEATTLE APPROACH CONTROL OVER HOBART FOR FURTHER CLEARANCE OVER."

The controller in the Seattle Center who was handling this flight was at his control board, about four feet from a loud-speaker installed on top of the unit. The read-back of the clearance by the pilot of N 1693M seemed to the controller to be as follows: "ROGER, CLEARED TO - - - (distinct pause involving a lapse of three or four seconds) CROSS THERE FOUR THOUSAND OR ABOVE THE RANGE STATION, AH, FOUR THOUSAND, REPORT HOBART TO YOU." A correction, "NEGATIVE REPORT HOBART TO SEATTLE APPROACH CONTROL," was then immediately transmitted. The pilot replied, "HOBART TO SEATTLE APPROACH CONTROL ROGER." These contacts were made at approximately 0048. There was no record of further transmission from the aircraft.

When the pilot failed to report over Hobart, and the flight became overdue at Seattle, controllers in the Seattle Center and Boeing Field tower attempted to contact the flight, but without success. Search and rescue activities were then instituted. The accident scene was found the next day and the two survivors were rescued.

### Investigation

A two-way belt recorder was installed in the Seattle Center. A play-back of the recording revealed that transmissions to and from the aircraft had transcribed very clearly. It was learned that incoming signals to the unit were recorded while in the electronic circuit and not after being broadcast in the room by the loud-speaker; therefore, any extraneous noises in the control room were not reflected in the recording. The

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<sup>2</sup>/ The Ellensburg and Seattle radio range stations are 90 miles apart on Green Airway 2, Ellensburg being east of Seattle. The Easton fan marker is located on the west leg of the Ellensburg range and is 38 miles from the station. The Hobart fan marker is on the east leg of the Seattle range, 15 miles from the station

transcription revealed that the correct content of the clearance read back to the Center, as opposed to the controller's initial impression, was (pauses indicated by dashes): "ROGER THIS UH NINE THREE METRO IS CLEARED TO - UH - - - HOBART - - - TO - CROSS THERE FOUR THOUSAND OR ABOVE - - - THE RANGE STATION AH FOUR THOUSAND AND WE'RE TO REPORT TO YOU AT UH HOBART OVER." The subsequent corrective message and the pilot's acknowledgment were the same as reported in the previous section. The controller testified that transmissions from the aircraft were clear and easily readable.

The aircraft first struck a large tree located approximately 210 feet east of the crest of Cedar Mountain at about the 4,000-foot level. The aircraft was on a heading of approximately 270 degrees at impact and was on course. The wreckage was scattered along a 950-foot swath on both sides of the crest.

Examination of the wreckage revealed no evidence that any malfunction or failure of any component part of the aircraft had occurred prior to impact. Propeller dome settings showed that the propellers had been operating in cruising range, and examination of the engines indicated that they were developing appreciable power. The entire nose of the aircraft was crushed and torn. Instruments and radio equipment were smashed and scattered over a considerable area. Owing to the mutilated condition of the cockpit, it was impossible to obtain evidence of control positions and instrument readings, with one exception: one badly damaged altimeter was set at a barometric pressure reading of 29.80 inches. The left main landing gear was still attached to the wreckage of the left nacelle and was in the retracted position, but not locked. The right main landing gear structure was also attached to its wrecked nacelle, and was about three-fourths extended.

Investigators were unable to determine the frequency to which the various radio units had been tuned. The ART-13 frequency selector switch was set on Channel 2 but the "On/Off" switch was in the "Off" position. Audio switches on the captain's jack box which were in the "On" position were: Red ADF, marker beacon, VHF #1, range selector on "Voice" and microphone selector on "VHF #1." Several audio switches on the copilot's jack box were sheared off, but of those left intact the following were in the "On" position: Red compass, marker beacon, and VHF #1.

An aftercast of weather conditions showed that after leaving Cheyenne the flight was in clear weather except for a few cumulus clouds until it reached Burley, Idaho. It passed through a cold front at this point and through another in the vicinity of Pendleton, Oregon in which areas moderate turbulence and icing might have been experienced. Onshore flow of moist, unstable air over northwest Washington caused low ceilings, occasional rain showers, and visibility about one mile. These low clouds, banking up against the Cascades, obscured the mountains and built up considerably above flight level. Icing above 5,000 feet MSL and moderate turbulence were probably experienced in the cumulus and cumulonimbus clouds over the mountains. Schroeder and Gilbert reported that it was raining and there were occasional snow showers at the time of the crash.

A company official stated that Captain Booska had flown to Seattle approximately fifteen times in the past year, while First Officer Dwelley

had flown there only three or four times. It was unknown how many of these trips were made with IFR conditions existing in the Seattle area.

Another company official testified that he had known Captain Booska for several years and had flown with him numerous times. He advised that Captain Booska was in the habit of handling all radio contacts, and always read back clearances in a crisp and positive manner.<sup>3/</sup> Based upon his familiarity with Captain Booska's voice, he stated that after hearing a copy of the recording, he was positive that the pilot talking to Seattle Center was Captain Booska.

A close relative of each pilot also listened to the copy of the recording. They advised that they could detect only one pilot's voice, and identified it as Captain Booska's.

A Jeppesen chart recovered at the accident scene indicated the minimum en route altitude between Ellensburg and Seattle as 8,000 feet. A Seattle Boeing Field low frequency approach plate also recovered at the scene showed that the minimum altitude between Ellensburg and the Hobart fan marker was 8,000 feet, and descent to a minimum en route altitude of 4,000 feet was permitted between Hobart and the Seattle radio range station. Investigation and testimony revealed that these altitudes were established by the Administrator, and were currently in effect. It was the controller's responsibility not to authorize flight below authorized minimum en route altitude.<sup>4/</sup>

Civil Air Regulations Part 60 states that a pilot is not to descend below prescribed minimum en route altitude.<sup>5/</sup> This requirement was also reflected in the operations manual of the company. Pilots were required to be familiar with pertinent Civil Air Regulations and the operations manual.

It was found that oxygen was available for the pilots and passengers, as shown by the preflight check of the aircraft at Columbia. The oxygen

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<sup>3/</sup> Standard voice procedure does not require that clearances or other messages be read back by the pilot unless specifically requested by the controller.

<sup>4/</sup> "ANC Procedures for the Control of Air Traffic"

2.0401 Minimum Altitudes: A controller shall not assign nor authorize flight at an altitude along any route below the minimum IFR altitudes established by the Administrator for such route. Where a minimum IFR altitude has not been established, a controller shall not assign nor authorize flight at an altitude known to be lower than the minimum safe altitude as prescribed by Civil Air Regulations (60.17).

<sup>5/</sup> CAR Section 60.17. "Minimum Safe Altitude: (d) IFR Operations. The minimum IFR altitude established by the Administrator for that portion of the route over which the operation is conducted. Such altitude shall be that which the safe conduct of the flight permits or requires, considering the character of the terrain being traversed, the meteorological services and navigational facilities available, and other flight conditions. . . ."

supply for the pilots was sufficient for about four hours on demand-type supply, which could also be supplemented by a constant-flow system available from the cabin. Captain Schroeder testified that his portion of the flight was conducted between 2,000 and 5,000 feet above the ground and use of oxygen was therefore unnecessary. Neither he nor Mr. Gilbert used oxygen between Cheyenne and the place of the accident.

When the flight was over Malad City, Captain Schroeder went forward for about 10 minutes and spoke to the pilots; no mention was made of fatigue in the course of the conversation. The aircraft was at 12,000 feet, to the best of his recollection, and neither of the pilots was using oxygen.

Before departure from Columbia, the company obtained a ferry permit from the CAA, since the aircraft would have been overdue for a number 4 (150-hour) check before arrival at Seattle, where the check was to be performed.

A review of records pertaining to the flight disclosed no irregularity as to gross weight, load distribution, or conduct of the flight up to the point where the last clearance was given. Pertinent maintenance and other historical records for the aircraft failed to reveal that it was in any way unairworthy. The company, the aircraft, and the crew were properly certificated.

### Analysis

Although the flight was on an IFR flight plan from Boise to the scene of the accident, and instrument weather existed in the accident area, weather was only indirectly a factor in this accident.

It is obvious that the pilot descended below the minimum safe altitude prescribed for IFR flight between Easton and Hobart.

The pilot misunderstood his clearance, as evidenced by the two errors he made in the read-back: (1) The belief that crossing altitude at Hobart was to be 4,000 feet rather than 8,000 feet, as stated in the clearance, thus indicating to him that he was to descend to 4,000 feet before reaching Hobart and (2) to report to Seattle Center over Hobart rather than Seattle Approach Control as specified in the clearance. The controller stated that he did not detect the first error; the second error was caught and corrected. The read-back, as the controller stated he heard it, therefore had quite a different meaning from that which was conveyed to the pilot. Failure to detect the error was a contributing factor to the accident. The contacts were made under a routine situation and there was nothing to indicate why the controller did not detect all of the message, other than the normal noise level in the room.

The prescribed minimum en route altitude for this segment was 8,000 feet. Civil Air Regulations and the company operations manual place the responsibility on the pilot to maintain minimum en route altitude. Even if he felt that he understood the clearance correctly, he should not have descended, for the flight had not yet arrived over Hobart, and descent before reaching

Hobart was contrary to provisions of the company operations manual, Civil Air Regulations, and minimum en route altitude as established by the CAA.

With regard to Captain Booska's familiarity with the minimum altitude requirement over this segment, it will be recalled that testimony disclosed that he had flown to Seattle approximately 15 times during the past year. The charts found in the wreckage were mandatory navigation equipment. It is not understood why he did not refer to his charts for minimum en route altitude information, as a check against the clearance and his knowledge of the route, unless his physical condition caused him to overlook it.

It is noted that Captain Booska and Mr. Dwelley were passengers in the aircraft or had been actually flying it for almost 13 hours. It will also be recalled that the flight was at 12,000 feet for some time. Since Captain Schroeder testified that the pilots were not using oxygen at the time he was talking to them when at 12,000 feet over Malad City (about two-fifths of the distance between Cheyenne and Seattle), it might indicate that oxygen was not used throughout the flight. If the flight from Cheyenne to Yakima was made without using oxygen, it is possible that in this period of over four hours at 12,000 feet, the pilots would have experienced some loss of mental alertness which, in general, cannot be detected by the individual; these effects have been observed in aero-medical studies of oxygen want (anoxia or hypoxia). McFarland has pointed out that "oxygen want has a progressive and insidious effect on the central nervous system that will impair an airman's performance and influence the safety of flight. Laboratory studies have shown that mental deterioration, such as loss of memory and judgment, may significantly impair performance at altitudes similar to those at which several air transports have crashed into mountains. Illustrations can be given of airmen who have jeopardized the safety of flight at altitudes between 10,000 and 15,000 feet by not using their supplementary oxygen.<sup>6/</sup> The accident occurred approximately one-half hour after passing Yakima; it is possible that the effects of oxygen want might have been partially ameliorated during this period at 8,000 feet and lesser altitudes.

### Findings

On the basis of available evidence, the Board finds that:

1. The carrier, the aircraft, and the crew were properly certificated.
2. The flight between Columbia, South Carolina, and the Easton, Washington, fan marker was uneventful.
3. The Seattle Center controller issued a proper clearance to the flight.
4. The read-back of the clearance by the pilot was in error on two points - crossing altitude for Hobart, and the erroneous understanding that he was to report to the Seattle Center over Hobart; the controller detected only the latter error.

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<sup>6/</sup> McFarland, R. A., Human Factors in Air Transportation; McGraw-Hill Book Company, Inc., New York, 1953, pp. 155-156.

5. The aircraft descended below the minimum altitude of 8,000 feet and crashed near the crest of a mountain at 4,000 feet MSL.

6. Both pilots probably experienced impaired efficiency due to oxygen want and fatigue.

7. There was no malfunction or failure of any component of the aircraft.

Probable Cause

The Board determines that the probable cause of this accident was the pilot's misunderstanding of the clearance, failure to check en route altitude against available charts, and descent below prescribed minimum en route altitude. The fact that the controller did not detect the first of two errors made by the pilot was a contributing factor.

BY THE CIVIL AERONAUTICS BOARD:

/s/ OSWALD RYAN

/s/ HARMAR D. DENNY

/s/ JOSH LEE

/s/ JOSEPH P. ADAMS

/s/ CHAN GURNEY

## S U P P L E M E N T A L   D A T A

### Investigation and Hearing

The Civil Aeronautics Board was notified of this accident at 0200, April 23, 1953. An investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. A public hearing ordered by the Board was held in Seattle, Washington on May 19, 1953; depositions were also taken from company representatives who were unable to attend the Seattle hearing, at Miami, Florida on June 10, 1953.

### Air Carrier

American Air Transport, Inc., was a Florida corporation, with offices at the Miami International Airport, Miami Springs, Florida. The company was engaged in the transportation of persons and property under a letter of registration issued by the Civil Aeronautics Board, and an air carrier operating certificate issued by the Civil Aeronautics Administration.

### Flight Personnel

Captain Maurice A. Booska, age 34, was employed by American Air Transport, Inc., on July 1, 1947. He was the holder of a valid airman certificate with airline transport pilot rating 501402 for single and multi-engine land aircraft. Captain Booska had a total of 6,790 flying hours, of which 2,538 were in Curtiss C-46 equipment, and 487 hours of instrument flying time. His last instrument check was accomplished on November 15, 1952. Captain Booska received a CAA physical examination on November 3, 1952.

First Officer Donald E. Dwelley, age 30, was employed by American Air Transport, Inc., on December 19, 1952. He was the holder of a valid airman certificate with commercial pilot and instrument ratings. He had a total of 348 flying hours, of which 88 hours and 35 minutes were in C-46 aircraft. His last CAA physical examination was accomplished on April 10, 1953.

### The Aircraft

N 1693M, a Curtiss C-46F, Serial No. 22,498, was owned by the U. S. Air Force, and operated by American Air Transport, Inc. It had a total of nearly 7,477 flying hours, and was currently certificated by the Civil Aeronautics Administration. The aircraft was equipped with two Pratt & Whitney R-2800 engines and Hamilton Standard 23E50-6491A-9 propellers. The aircraft underwent a number 3 (100-hour) check at Seattle, Washington on April 14, 1953, and had been operated 78 hours and 50 minutes since the check. At the time of the accident it had exceeded the time for a number 4 check by approximately 8 hours and 15 minutes, but the overtime was permissible since a ferry permit was issued prior to departure.