Near-miss in cruise, Near Midair Collision, American Airlines, Inc., Douglas DC10, N124, and Trans-World Airlines, Inc., Lockheed-1011, N11002, Near Carleton, Michigan, November 26, 1975

Micro-summary: **Near-miss at FL350 involving this American Airlines DC-10 and Lockheed L-1011, avoided by an evasive maneuver by the DC-10.**

Event Date: **1975-11-26 at 1923:11 EST**

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

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

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File No. 1-0024

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

Adopted: January 28, 1976

NEAR MIDAIR COLLISION
AMERICAN AIRLINES, INC., DOUGLAS DC10, N124
AND
TRANS WORLD AIRLINES, INC., LOCKHEED-1011, N11002
NEAR CARLETON, MICHIGAN
NOVEMBER 26, 1975

SYNOPSIS

On November 26, 1975, American Airlines Douglas DC-10 and a Trans World Airlines Lockheed-1011 almost collided head-on at 35,000 feet near Carleton, Michigan. Both aircraft were operating in instrument meteorological conditions, within positive control airspace, and while under the control of the Cleveland Air Route Traffic Control Center. As a result of the evasive maneuver that had to be executed by the captain of the DC-10, 3 aircraft occupants were injured seriously and 21 were injured slightly. The cabin's interior was damaged extensively. None of the occupants of the L-1011 was injured.

The National Transportation Safety Board determines that the probable cause of this near-collision was the failure of the radar controller to apply prescribed separation criteria when he first became aware of a potential traffic conflict which necessitated an abrupt collision avoidance maneuver. He also allowed secondary duties to interfere with the timely detection of the impending traffic conflict when it was displayed clearly on his radarscope. Contributing to the accident was an incomplete sector briefing during the change of controller personnel--about 1 minute before the accident.

1. INVESTIGATION

History of the Flights

American Airlines Flight 182

American Airlines, Inc., Flight 182 (American 182), a Douglas DC-10-10, N124, was a regularly scheduled passenger flight between San Francisco, California, and Newark, New Jersey, with a scheduled stop at O'Hare International Airport, Chicago, Illinois. American 182 departed Chicago at 1839 e.s.t. 1/ with 13 crewmembers and 192 passengers aboard. The flight received progressive climb clearances from Chicago departure control.

At the times indicated, the following communications were exchanged between American 182 and Chicago Air Route Traffic Control Center (Chicago Center):

1915:50 (Chicago Center) - American 182, maintain flight level 370 2/
1915:55 (American 182) - One eighty two is out of 279 for 370
1916:00 (Chicago Center) - One eighty two heavy roger direct Carleton 3/ on course contact Cleveland Center 127.05
1916:05 (American 182) - Twenty seven oh five and that's direct Carleton on course so long

After American 182 changed to the Cleveland Center frequency, the following communications took place:

1916:24 (American 182) - Cleveland Center, American Flight 182 heavy with you out of 280 for 370
1916:31 (Cleveland Center) - American 182, Roger squawk 3202 and ident.

There were no further communications between American 182 and Cleveland Center for the next 6 minutes. The circumstances under which communications were resumed began at 1922:05, when United Air Lines Flight 680, which was climbing to flight level 330, asked Cleveland Center: "Any idea of the tops?" This question prompted the controller to make the following communications:

1/ All times herein are eastern standard time, based on the 24-hour clock.
2/ Flight levels are stated in 3 digits that represent hundreds of feet. FL 370 = 37,000 ft.
3/ Carleton is a navigation aid (VORTAC) located about 70 nmi east of the boundary between Chicago Center and Cleveland Center.

1922:08 (Cleveland Center) - Well, they were at 35 earlier, just a minute, let me check.
1922:13 (Cleveland Center) - TWA 37, Cleveland, what are the tops?
1922:17 (TWA 37) - They are higher than we are; it's hard to say. You can see through it; I'd say it must be at least 37.
1922:25 (Cleveland Center) - Okay, TWA 37, thank you.
1922:29 (Cleveland Center) - Six eighty, did you copy?
1922:31 (United 680) - Yes, thank you.
At 1922:38 another flight, American Airlines 26, reported: 'American 26 is just skimming the tops'.
1922:42 (Cleveland Center) - Okay, American 26, thank you and United 680, that aircraft is 370.
1922:52 (Cleveland Center) - American 182, Cleveland, what is your altitude?
1922:55 (American 182) - American 182, passing through 347 at this time, and we can see the stars above us but we're still in the area of the clouds.
1923:03 (Cleveland Center) - American 182, descend immediately to 330.
1923:06 (American 182) - Descending to 330 at this time.
1923:11 (Cleveland Center) - TWA 37, traffic twelve o'clock and a mile descending out of 345.
1923:40 (American 182) - American 182 is at 330.
1923:46 (Cleveland Center) - American 182, thank you.
1923:52 (American 182) - What altitude was that other aircraft at?
1923:57 (Cleveland Center) - He was at 35, sir.
1924:02 (American 182) - I'd check on that.
1924:07 (Cleveland Center) - Yes sir, will do.

According to the captain of American 182, the flight was climbing eastbound on jet route 584 (J-584) and approaching or going through FL 350, when they were advised to descend immediately to FL 330. He started an immediate descent with the autopilot vertical speed control. Simultaneously, he and the other crewmembers sighted the lights of another aircraft in the 12 o'clock position. He then applied forward pressure on the control wheel to avoid the aircraft. He estimated that the vertical distance between the aircraft when they passed was 100 feet, and that 3 to 4 seconds elapsed from the moment he sighted the aircraft until it passed them. At the time of the near-collision, American 182 was operating in instrument meteorological conditions (IMC), in and out of the cloud tops.

According to cockpit voice recorder (CVR) information, about 16 seconds after the Cleveland Center controller advised "United 680, that aircraft is at 370," the captain of American 182 made the intracockpit remark: "There he is." One second later, the controller cleared American 182 to descend immediately. The captain cannot remember the exact sequence of his observations and actions during the short time span in which the traffic conflict materialized and was avoided.

About 30 seconds after the flight was leveled at FL 330, cabin personnel informed the captain that some persons in the cabin had been injured. The captain requested and obtained an immediate reroute clearance to the nearest suitable airport--Wayne Metropolitan Airport, in Detroit, Michigan. He arranged for medical assistance upon arrival in Detroit.

The flight landed in Detroit at 1950. All injured persons were transported immediately to Wayne County General Hospital in Detroit for examination and treatment.

Trans World Airlines Flight 37

Trans World Airlines, Inc., Flight 37 (TWA 37) a Lockheed 1011, N11002, was a regularly scheduled passenger flight between Philadelphia, Pennsylvania, and Los Angeles, California. TWA 37 departed Philadelphia at 1815 with 11 crewmembers and 103 passengers aboard.

About 1919, the flight passed over the Carleton VORTAC at its assigned flight level of 350 and was proceeding westbound on J 584. The flight was under the control of Cleveland Center and operating in IMC. At 1922:13, the Cleveland Center controller queried the flight about the cloud tops.

About 1923, the flight engineer saw what appeared to be position lights pass under the right side of the aircraft and made an exclamation to that effect. The captain and first officer did not see any lights or another aircraft. In the cockpit discussion that followed, it was explained how reduced visibility could affect the appearance of another aircraft and its proximity. When TWA 37 arrived in Los Angeles, the crew was informed of the near-collision.

ATC Handling of the Flight

At the time of the accident, American 182 and TWA 37 were operating in positive control airspace which was under the jurisdiction of the Wayne sector of the Cleveland Center. The Wayne sector was responsible for aircraft operating at or above FL 350.

The aircraft radar beacon signals from American 182 and TWA 37 were being received by the national airspace system (NAS) Stage A Digitized (Narrow-band) Radar System and processed by the radar data processing equipment at the Cleveland Center. The equipment generated the data displayed on the radar controller's plan view display (PVD). The display for each aircraft consisted of a symbol for the aircraft's position and an alpha-numeric data block. The alpha-numeric data included the aircraft's identification or flight number and its assigned altitude. In the case of American 182, which was climbing, the alpha-numeric data also included reported actual altitude. The display on the PVD for each target was updated every 12 seconds.

The circumstances which led to the near-collision developed while the Wayne sector was being manned by two controllers: A radar controller and a manual controller. A third controller, who was assigned to the handoff position, was at lunch. Consequently, the radar and handoff positions were combined and manned by the radar controller.

The radar controller is responsible primarily for radar control of traffic within his sector. He can display targets within the sector on the PVD while inhibiting the targets for traffic outside of this airspace. He communicates with the data processing computer through various devices at his position to manage his PVD and to insert certain traffic control functions into the computer. He can initiate and accept a target's track as it moves into his sector; he can transfer a target's track to another sector, or point-out a target to another sector by forcing that target to be displayed on the other sector's PVD. The radar controller also can enter or change flight data stored in the computer such as a flight's assigned altitude or routing.

The manual controller functions as a nonradar controller. He maintains current flight data on the flight progress strips, issues departure clearances, and coordinates as necessary with adjacent sectors and air traffic facilities. Although the manual controller also can make computer inputs at the manual console, the same inputs can sometimes be made more expeditiously at the radar console.

The handoff controller, positioned next to the radar controller, assists the radar controller with his duties and coordinates with adjacent sectors and air traffic facilities.

The radar data processing equipment stores data in the computer in both received and processed forms. A radar log which contains these data was obtained from Cleveland Center for the time period during which this accident occurred.

These data showed that the target for TWA 37 was first processed for display on the Wayne sector PVD at 1903:44.5. The display showed the target at its assigned flight level of 350 and tracking approximately 290° true at a ground speed of 408 kn. The target was about 105 nmi southeast of Carleton VORTAC on J-34. The Wayne radar controller accepted the handoff of the target track from the adjoining sector at 1903:53.0 A full data block showed the progress of TWA 37 as it proceeded to Carleton VORTAC and then turned westbound onto J-584. At 1918:50, the Wayne radar controller entered the appropriate code through an alpha-numeric keyboard to initiate the transfer of TWA 37's track to the Chicago Center. At that time the target was about 6 nmi east of Carleton and tracking 282° at 400 kn. A track accept message was received from Chicago at 1918:54. The target position symbol and data block continued to be generated for display on the Wayne sector PVD until 1928:54.

The target representing American 182 was initially processed for the Wayne sector PVD at 1914:24. The data showed the aircraft to be about 100 nmi west of Carleton, climbing through FL 262 to assigned FL 370. The aircraft was tracking approximately 092° at 465 kn. The Wayne radar controller accepted the target track from Chicago at 1914:40.5. The target position symbol and a full data block were then generated for the Wayne sector. The periodic change in reported altitude showed that American 182 was climbing about 1,000 feet per minute as it proceeded eastbound on J-584.

At 1921:19.5, American 182 was about 40 nmi west of TWA 37 and reporting at FL 330. The two aircraft were on reciprocal courses and were closing at a speed of about 850 kn.

The radar controller stated that when he accepted the handoff of American 182, he realized that there might be a traffic conflict between that flight and TWA 37. However, his previous experience that day had shown that several flights climbing eastbound out of Chicago to FL 370 had been leveling off a considerable distance west of where the incident later occurred. He thought that by keeping an eye on the situation he would be able to turn the aircraft in case the required separation criteria would not be met.

When asked if there were any operational factors that might have distracted him, he said that at about the time American 182 reported at FL 280, Chicago Center called with a manual point-out and handoff of a Learjet. He accepted the handoff and for about 5 minutes thereafter he attempted to insert a change in the routing of the Learjet into the computer. According to the radar controller, the flight-planned route of the Learjet was not identical to its actual route, and Chicago Center failed to update the computer prior to handing it off to him.

The radar log showed that the Learjet had taken off from Chicago on an IFR flight plan to London, Canada. At 1917:55.5, the Wayne radar controller attempted to enter a change in the routing of the Learjet into the computer. The computer rejected the routing change because the requested route involved a point to point, or direct, routing into airspace under the control of Toronto, Canada.

The radar controller said that, normally, the manual controller would have handled the computer inputs of the Learjet but he felt that the manual controller was busy.

The radar controller considered his workload to be moderate at the time. According to the radar log, during the 10 minutes preceding the near-collision, there were 11 targets, including those for TWA 37 and American 182, being processed for display in the Wayne sector. The controller indicated that, although TWA had been handed off to Chicago at 1918, the flight was under his control since it was still in his area of jurisdiction. He also stated that an aircraft is not turned over to another sector until it has been separated from known traffic.

The radar controller recalled that he last saw TWA 37 southeast of Carleton, when he handed the aircraft off to Chicago. He did not remember when he last saw American 182.

According to ATC records, about 1922 the radar controller was relieved by the third controller who had returned from lunch. Hereafter, the relieving controller will be referred as radar controller No. 2.

Both controllers stated that during the briefing associated with the transfer of duties TWA 37, the Learjet, and several other aircraft were mentioned but American 182 was not. Federal Aviation Administration (FAA) Handbook 7210.3C, Facility Management, stipulates that the relieving controller accept responsiblity for the position only after assuring, to the extent possible, that the briefing is complete and that no unresolved questions concerning the operation of the position remain. The controller being relieved is responsible for the completeness and accuracy of the briefing.

Radar controller No. 2 made his first transmission at 1921:59; he did not communicate with the Learjet and made no computer inputs for that aircraft. He considered his workload to be light to moderate.

At 1922:52, radar controller No. 2 queried American 182 about its altitude. The flight reported its altitude (FL 347) and its weather observations. As soon as this 7-second transmission was completed, radar controller No. 2 cleared American 182 to descend immediately.

When asked what drew his attention to the traffic conflict the controller said that he was just scanning the radar and noticed that American 182's data block showed the aircraft to be at FL 345, and climbing to FL 370. TWA 37's data block showed that the flight was maintaining FL 350. The aircraft were at 12 o'clock to each other and about 3 to 4 miles apart.

When asked why he questioned the pilot of American 182 about his altitude before he issued a descent clearance, the controller stated that his first reaction was one of disbelief. In addition, he stated that since there might be a lag in the readout on his data block compared to the aircraft's actual altitude, he considered the possibility that the flight might have been higher than shown on his data block. He used the term "immediate" because he did not think that a normal descent would be adequate to resolve the traffic conflict. When he issued the clearance, the aircraft were about a mile apart; he then saw the targets merge and then separate.

The manual controller stated that during the period involved he was posting flight progress strips and entering flight plans into the computer. The flight progress strips of American 182 and TWA 37 were posted in the proper bays. He considered his workload to be light to moderate.

When the radar controller received a handoff on the Learjet, he asked the manual controller if there was a flight strip for this aircraft in the Wayne sector. When it was discovered that there was none, the radar controller sent the manual controller to the sector through which the original flight plan would have taken the Learjet. The manual controller found the strip there and took it to the Wayne sector.

According to the manual controller, he was not aware of the radar controller's problems with entering the Learjet's revised flight plan into the computer. He became aware of the near-collision when he heard the clearance for an immediate descent.

Flight Track Information

Both aircraft were equipped with digital flight data recorders (DFDR).

One second after American 182 acknowledged the advisory to descend immediately, the aircraft's pitch attitude decreased from +2.4° to +1.8°. Five seconds later, it had decreased to -10.9°--the lowest value it reached.

The pushover maneuver resulted in vertical G forces below the normal force of gravity (1G) which lasted about 6 seconds and which reached a minimum of -.86G. This was followed within about 2 seconds by positive G forces with a maximum of +2.07 G's.

Thirty seconds after the evasive maneuver was started, the aircraft had reached FL 330. A maximum pressure altitude of 34,953 ft. was reached 4 seconds after the downward pitch movement began. At this time (1923:11) TWA 37's pressure altitude was 34,965 ft. (See Appendix C.)

The NAS Stage A radar positions for the two targets were interpolated to 1/2-second intervals for the 20 seconds from 1923:00 to 1923:20. The interpolation showed that at 1923:16.5 the targets of TWA 37 and American 182 converged to within 0.108 nmi. This figure is within the range of the resolution of the radar equipment which is specified to be accurate to 1/8 nmi. in range and about 1/10° in azimuth. TWA 37 was reporting a constant flight level of 350 and American 182 reported FL 349 at 1923:08.0. At 1923:20.0 American 182's beacon reported FL 345.

The aircraft came closest at geographical coordinates 42°02'32" N. and 083°58'00" W. This position is about 23 nmi. west of Carleton, Michigan, on J-584.

Injuries and Damages

The seatbelt sign had been on throughout the 45-minute flight of American 182. Meals and beverages were being served when the captain began the pushover maneuver. During this maneuver, the flight attendants and service carts were thrown against the cabin ceiling by negative G forces. Three passengers who did not have their seatbelts fastened and one passenger who was adjusting her seatbelt also were thrown against the overhead.

During the transition from negative to positive G conditions, all unrestrained persons, service carts, and other objects which had been momentarily pinned to the overhead, came down heavily and hit the floor, the other passengers, the cabin furnishings, and other equipment. The contents of the service carts were scattered throughout the cabin.

The 10 flight attendants received minor injuries; 14 passengers were injured, 3 of them seriously. The injuries to the flight attendants consisted of miscellaneous abrasions, contusions, lacerations, and sprains. Two of the three serious injuries consisted of fractured bones (compression fracture of a vertebra and a fractured humerus); the third was classified as serious because of the length of time the patient was

hospitalized for a knee laceration. There were no injuries in the cockpit. The more serious injuries and the more extensive damage to the aircraft interior occurred in the center and aft section of the cabin. Shattered plastic cups caused several lacerations.

After American 182 arrived in Detroit, American Airlines maintenance personnel inspected the aircraft to determine if any structural damage had resulted. No evidence of damage to primary structures or controls was found. The aircraft was then ferried to a maintenance facility for repair of the cabin interior. Damaged cabin furnishings included overhead panels, light fixtures, seats, seat tray tables, and oxygen panel covers. Seatbelts did not fail. The mounting and support structures of all seats retained their integrity.

Other Information

Both aircraft were certificated and maintained according to regulations. Both were equipped with high intensity discharge lights. The lights on TWA 37 were on and operating; those on American 182 were off since the aircraft was climbing through clouds.

No problems with the navigational aids or air-to-ground communications were reported.

The NAS Stage A automated system was functioning as programmed while American 182 and TWA 37 were operating in Cleveland Center airspace. There were three computer malfunctions on the day of the accident, two of which required the transfer to the older, standby equipment (broad-band radar). The Cleveland Center log of facility operations showed that the malfunctions occurred at 0935, at 1835, and at 1955; the last two involved the transfer to broad band-radar and lasted 9 and 5 minutes, respectively. The log did not contain an explanation of the malfunctions. The assistant chief in charge during the shift that the accident occurred stated that computer problems require the transfer to broad-band radar about once a shift.

No developmental controller training was being conducted at the Wayne sector during the duty shift involved.

The minimum required separation for aircraft operating above FL 290 is 2,000 feet vertically, or 5 miles, when using narrow-band radar. These criteria are specified in FAA Handbook 7110.9D, En Route Air Traffic Control.

Two days after the accident, the Chief of Cleveland Center sent a letter to all Center personnel, on the subject of "Control Technique, Converging Transitional Traffic." The letter stressed the need to maintain vertical separation between converging aircraft when

there is no positive assurance that the required vertical or lateral separation will exist when they pass each other. The letter also stated that the Cleveland Center had 20 system errors in 1975 and that 10 of the errors pertained to inadequate separation between en route aircraft.

According to FAA, an ATC system error is defined as a human, equipment, or procedural failure that results in less than the required separation between aircraft. Preliminary data obtained from the FAA summarize the system errors as follows:

Year	Total System Errors	Near Midair Collisions
1972	313	19
1973	288	39
1974	340	26
1975 (Jan. Nov.)	278	21

The FAA supplied the following breakdown of system errors by causal factors:

HUMAN:	Percent
Judgments	55
Communications	22
Attention	19
Procedures	0.6
Operations Management	0.6
	97.2
MACHINE:	2.7
	99.9

On December 16, 1975, the Chief of the FAA's ATC Operations and Procedures Division distributed a general notice (GENOT) to all ATC facility chiefs, stressing the human failure aspects of system errors and outlining methods for more positive control techniques.

On December 8, 1975, the Administrator, FAA, ordered all ARTCC's to program the NAS Stage A computers with the conflict alert system as rapidly as possible. This system employs the computer to project the radar position of any controlled aircraft on a possible collision course with another controlled aircraft. In that case, visual indications of the two aircraft will flash to alert the controller that action may be needed. This system is now operational in all centers.

2. ANALYSIS AND CONCLUSIONS

Analysis

A potential traffic conflict between American 182 and TWA 37 was evident when American 182 was handed off to Wayne sector of the Cleveland Center. Although the radar controller was aware of a potential conflict, he assumed that American 182 would have climbed to FL 370 before passing TWA 37, which was cruising at FL 350. In addition, he assumed that, by keeping an eye on the situation, he would be able to take timely steps if the anticipated separation did not materialize.

Both of these assumptions were not compatible with safe and positive traffic control practices and procedures. By the time the radar controller's first assumption was invalidated, his second assumption, intended as a safeguard, did not work as planned because other activities distracted him. The fact that he consented to be relieved from his position about 2 minutes before the near-collision proves that he had become preoccupied with secondary duties to the extent that he had failed to see the impending conflict that was clearly displayed on his radarscope by that time. The Safety Board believes that the principle lesson in this near disaster is that intent to separate traffic can never be a substitute for positive action at the first opportunity to insure separation.

During the briefing associated with the transfer of duties to radar controller No. 2, the first controller did not mention American 182, undoubtedly because he was no longer thinking about the flight as an unresolved problem. Since radar controller No. 2 had no reason to expect that the responsibility he accepted included an acute problem, it is fortunate that he noticed the problem within 50 seconds after taking over the position. However, this timely discovery does not exonerate both controllers from their failure to notice the conflict during the transfer of duties. The Safety Board concludes that the briefing was incomplete because neither controller reviewed the actual situation as depicted on the PVD.

The general discussion about the cloud tops and other traffic that took place on the Wayne sector frequency probably prompted the captain of American 182 to look outside and observe the weather. His remark, "There he is", 1 second before the controller issued the descent clearance, was undoubtedly prompted by aircraft lights he saw. Although the captain's recollection is vague, his remark probably referred to the presumed sighting of the aircraft that, according to a prior statement by the controller, was flying at FL 370. Considering the darkness, the climbing attitude of his aircraft, the restricted visibility conditions, the high altitude, and the closing speed, it would have been difficult

for the captain to determine if a traffic conflict existed and, if so, what corrective action to take when he first sighted the lights. However, the sighting alerted him so that, when the controller issued the clearance, he was ready to execute the evasive maneuver with the necessary urgency.

The circumstances of this accident indicate that automation technology can lead to complacency when it takes the controller "out of the loop" by reducing the need for his interaction with a flightcrew and deemphasizing the cooperative aspects of the air traffic system. Had the radar controller been working with the broad-band radar, he would have been forced to take positive steps to insure separation as soon as American 182 was handed off to him. Of the several steps he could have taken, we mention only two: (1) He could have stopped American 182's climb at FL 330, or (2) he could have asked the flight to report at FL 310 or 330. However, the automatic altitude readouts on the flight's alpha-numeric block induced him to rely solely on his own observation of the PVD data. He did not consider the possibility that he might become distracted or that the computer might fail, and thereby deprive him of his direct readout capability.

The Safety Board is concerned that despite the advantages of narrow-band radar, the ATC system failed to provide the intended safeguards and endangered the lives of 319 persons. Advances in technology do not necessarily insure greater reliability and safety. The new conflict-alert system can serve its intended purpose only when it is not treated as a substitute for timely, positive separation measures which continue to protect air traffic even when the computer fails.

Based on the high percentage of human failures in the ATC system, the Safety Board believes that, as long as the human element is part of the total system, an individual's level of competence, the quality of his performance, and his understanding of his primary responsibilities must be given as much managerial attention as the equipment he operates.

The serious injuries sustained by the passengers were the result of their not having their seatbelts fastened, or properly fastened, although the seatbelt sign was on. Therefore, this accident is another reminder to encourage passengers to keep their seatbelts fastened, not only when the seatbelt sign is on but also when it is off and flight conditions are smooth.

Conclusions

(a) Findings

1. American 182 and TWA 37 were operating under control of the Wayne sector of the Cleveland Center.

2. Both flights were on the same jet route and approaching each other head-on; TWA 37 was maintaining FL 350, American 182 was cleared to climb through FL 350 to FL 370.

3. The radar controller was aware that a potential traffic conflict existed between the two flights but assumed that the required separation would exist when the two aircraft passed each other.

4. The radar controller intended to provide separation if the anticipated separation between the two flights did not materialize.

5. The radar controller became preoccupied with secondary duties and failed to see the impending traffic conflict displayed on his radarscope.

6. About 1 minute before the near collision, the radar controller was relieved and he failed to brief the relieving controller adequately. Both controllers failed to notice the unresolved conflict during the transfer of duties.

7. About 50 seconds after taking over the position, the second controller detected the conflict and cleared American 182 to descend immediately to FL 330.

8. The two aircraft came within 100 feet of each other.

9. As a result of the abrupt evasive maneuver, 24 occupants of the aircraft were injured, 3 of them seriously; the latter injuries were associated with failure to make proper use of the seatbelt.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this near-collision was the failure of the radar controller to apply prescribed separation criteria when he first became aware of a potential traffic conflict, which necessitated an abrupt collision avoidance maneuver. He also allowed secondary duties to interfere with the timely detection of the impending traffic conflict when it was displayed clearly on his radarscope. Contributing to the accident was an incomplete sector briefing during the change of controller personnel--about 1 minute before the accident.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Acting Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

January 28, 1975

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APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The Safety Board was notified of the accident at 2000 e.s.t. on November 26, 1975. Investigators proceeded immediately to Cleveland, Ohio, Detroit, Michigan, New York, New York, and Los Angeles, California. Parties to the investigation included the Federal Aviation Administration, American Airlines, Inc., Allied Pilots Association, Air Line Pilots Association, Trans World Airlines, Inc., and the Professional Air Traffic Controllers Organization.

2. Hearing

There was no public hearing. Depositions were taken on December 12, 1975.

APPENDIX B

CREW AND CONTROLLER INFORMATION

Captain Guy Eby (American Airlines)

Captain Eby, 47, holds Airline Transport Pilot Certificate No. 261304 with type ratings in DC-3,6,7,10, L-188, CV-240,340,440,880,990 and B-707,720. At the time of the accident he had accumulated about 21,600 flight-hours, 670 of which had been in the DC-10. His last proficiency check in the DC-10 was completed satisfactorily on June 30, 1975. He possessed a current first-class medical certificate dated October 7, 1975, with no limitations.

First Officer David Narins (American Airlines)

First Officer Narins, 43, holds Airline Transport Pilot Certificate No. 1447244 with type ratings in B-707, B-720, and DC-3. At the time of the accident he had accumulated about 7,500 flight-hours, about 300 hours of which had been in the DC-10. His last proficiency check in the DC-10 was completed satisfactorily on July 16, 1975. He possessed a current second-class medical certificate, dated December 30, 1974, with no limitations.

Flight Engineer Bruce A. Hopkins (American Airlines)

Flight Engineer Hopkins, 53, holds Flight Engineer Certificate No. 718201. At the time of the accident, he had accumulated about 22,350 flight-hours, about 1,450 of which had been in the DC-10. His last check in the DC-10 was completed satisfactorily on June 11, 1975. He possessed a current second-class medical certificate, dated June 3, 1975, with no limitations.

Flight Attendants

The 10 flight attendants were qualified.

Air Traffic Control Specialist Drew Parker (Radar Controller)

ATC Specialist Parker, 31, holds an Air Traffic Control Certificate and a second-class medical certificate without limitations. He has served as an air traffic controller in the United States Air Force (USAF) for 4 years. He has been employed by the FAA for about 7 years and has been a fully qualified journeyman controller at Cleveland Center for 4 years. He has no aviation experience as a pilot or other crewmember.

APPENDIX B

Air Traffic Control Specialist Charles Hewitt (Radar Controller)

ATC Specialist Hewitt, 40, holds an Air Traffic Control Certificate and a second-class medical certificate without limitations. He has been employed by the FAA as an air traffic controller for 18 years. For the last 11 years he has been a fully qualified journeyman controller at the Cleveland Center. He has no previous military, ATC experience and no aviation experience as pilot or other crewmember.

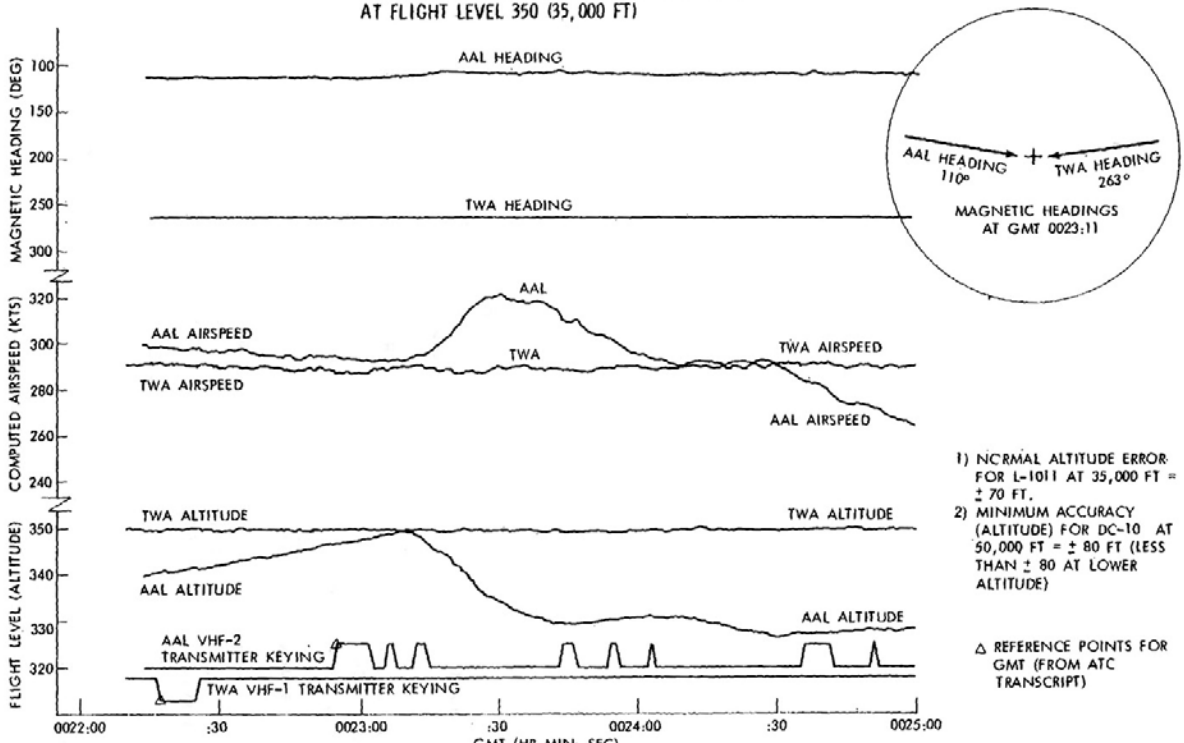
Air Traffic Control Specialist Leroy M. Wade (Manual Controller)

ATC Specialist Wade, 47, holds an Air Traffic Control Certificate and a second-class medical certificate with a waiver pertaining to the wearing of glasses. He has served as an air traffic controller in the USAF for 11 years. Since 1967 he has been employed by the FAA as a fully qualified journeyman controller at the Cleveland Center. He holds commercial pilot and instrument ground instructor certificates. He has a total of about 500 flight-hours.

APPENDIX C

NOVEMBER 26, 1973

23 NMI W OF CARLETON VORTAC, MICHIGAN
AT FLIGHT LEVEL 350 (35,000 FT)



1) NORMAL ALTITUDE ERROR FOR L-1011 AT 35,000 FT = ± 70 FT.
2) MINIMUM ACCURACY (ALTITUDE) FOR DC-10 AT 50,000 FT = ± 80 FT (LESS THAN ± 80 AT LOWER ALTITUDE)

△ REFERENCE POINTS FOR GMT (FROM ATC TRANSCRIPT)

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