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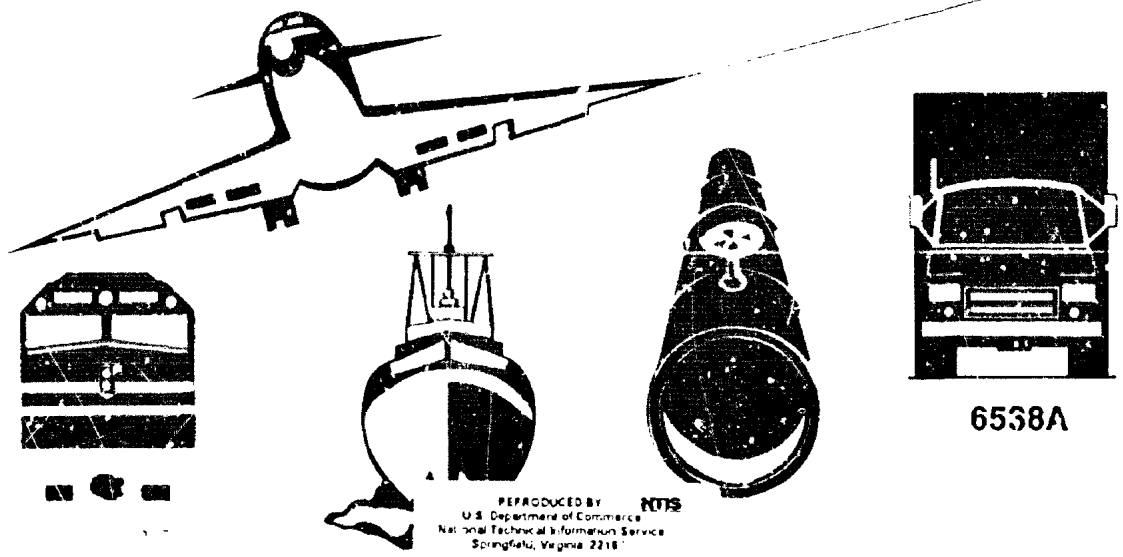
NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

UNCONTROLLED COLLISION WITH TERRAIN
AIR TRANSPORT INTERNATIONAL
DOUGLAS DC-8-63, N782AL
KANSAS CITY INTERNATIONAL AIRPORT
KANSAS CITY, MISSOURI
FEBRUARY 16, 1995



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1. FACTUAL INFORMATION

1.1 History of Flight

On Thursday, February 16, 1995, at 2027 CST[1], a Douglas DC-8-63, N782AL, operated by Air Transport International (ATI), was destroyed by ground impact and fire during an attempted takeoff at the Kansas City International Airport (MCI), Kansas City, Missouri. The three flight crewmembers were fatally injured. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed. The flight was being conducted as a ferry flight under Title 14 Code of Federal Regulations (CFR) Part 91.[2]

N782AL landed at MCI on February 16, 1995, after a regularly scheduled cargo flight from Denver (DEN), Colorado. The airplane was loaded with new cargo and was prepared for a departure to Toledo, Ohio. During the engine starting sequence, the flightcrew was unable to start the No. 1 engine. Local maintenance personnel examined the engine and determined that a No. 1 engine gearbox drive gear had failed and that repairs could not be accomplished at MCI. ATI management decided to schedule a three-engine ferry of N782AL to Westover Municipal Airport (CEF), Chicopee, Massachusetts, where repairs could be accomplished. The cargo was then offloaded from the airplane.

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[1]All times are in central standard time (CST) unless otherwise noted.

[2]Ferry flights are operated under Title 14 CFR Part 91.611, and, under this regulation, do not involve cargo or passengers or produce revenue for the company.

Another DC-8-63, N788AL, was scheduled to be ferried from Dover, Delaware (DOV), to MCI by the captain, first officer and flight engineer, who would later be involved in the accident in N782AL. This flightcrew had completed a regular cargo flight from Germany and were on a off-duty rest break in DOV. ATI flightcrew scheduling personnel later assigned the captain and his crew to the three-engine ferry operation of N782AL to be conducted from MCI to CEF. The ATI chief pilot was consulted about this assignment and gave approval for the flight, although flightcrews more experienced in three-engine takeoffs were available at MCI. According to the chief pilot, he telephoned the captain and discussed with him some of the details for the later three-engine ferry flight, including the weather forecast of possible adverse winds during the landing at CEF. Additional discussions occurred concerning a landing curfew at CEF of 2300 eastern standard time and how this would impact the flight. If the captain was unable to arrive before the landing curfew, it was decided to use Bradley International Airport (BDL), Windsor Locks, Connecticut (about 17 nautical miles southwest of CEF), as an alternate.

The captain and his crew departed DOV on the first ferry flight and arrived in MCI at 1739 on the day of the accident. The block-to-block time for the flight was 3.3 hours. ATI arranged for a qualified airframe and powerplant (A&P) mechanic to fly from DEN to MCI to prepare N782AL for the three-engine ferry. The captain prepared the flight departure papers and discussed fueling requirements with another ATI captain who had flown N782AL to MCI. Both captains agreed that the fuel load should be 75,000 pounds, to include 30,000 pounds of ballast fuel and 45,000 pounds of usable fuel. The computer flight plan provided to the captain estimated an en route time of 2 hours and 7 minutes for the flight from MCI to CEF. Based on this estimated time, N782AL would have had to take off prior to 1953, in order to arrive at CEF before the curfew. The A&P mechanic, who prepared N782AL for departure, stated that he was present in the cockpit when the captain reviewed the three-engine ferry procedures with the other two crewmembers with the aid of the flight manual.

About 1955, the engine start procedure was initiated. The No. 4 engine would not start on the first attempt because an ignition circuit breaker had inadvertently been left open. The circuit breaker was reset, although some pooled fuel in the cowling did momentarily torch, and a successful engine start was eventually accomplished. All three engines were operating by 2004. Following the fuel torching episode, the captain indicated that he was going to continue the start

sequence on that engine until he was reminded by the flight engineer of the starter duty cycle.[3]

At around 2005, the captain stated, "Okay, okay, what we are going to need to do too is, ah, get as much direct as we can that will allow us to fly a little bit better than eight zero if we can." He elaborated on this comment by stating, "yeah, because we got, we got two hours to make it to go over there for flight time...and right now it's past." The next statement by the first officer was "Pushin'."

At 2007:39, the first officer called MCI ground control and requested taxi instructions, indicating that the airplane was "heavy" and that this would be a three-engine departure. Ground control assigned runway 01L via taxiway Bravo. The flightcrew then requested the latest MCI winds, and ground control replied that the wind was from 240 degrees at 4 knots. The flightcrew then requested runway 19R for departure, but due to conflicting inbound traffic, this request could not be approved. During the taxi, the flightcrew of N782AL advised MCI ground control that they would need to hold in position for a "couple of minutes on the runway for a static run-up."

Takeoff data computed by the flightcrew during flight planning (written on the laminated takeoff data card found in the wreckage) included a Vmcg speed [minimum control speed on the ground] of 107 knots, a Vr speed of 123 knots, a V2 speed of 140 knots, a stabilizer trim setting of 5.1 units nose up and a maximum takeoff engine pressure ratio (EPR) setting of 1.9.[4]

Beginning at 2013:28, the CVR recorded the following pretakeoff briefing:

2013:28
CAM-1 okay this will be a left seat takeoff, we got number one engine

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[3]The engine starter duty cycle limitations for the JT3D turbine engine are 1 minute on, 1 minute off, 1 minute on, 5 minutes off. If the operator is only motoring the engine, the cycle limitation is 2 minutes on, 5 minutes off.

[4]According to the ATI DC-8 three-engine takeoff chart, these speeds would be appropriate for a 220,000 pound, 1,000 foot pressure altitude, 12 degree flap setting, 30 degrees Centigrade takeoff. The temperature at the time of the accident takeoff was 31 degrees Fahrenheit, or about zero degrees Centigrade. The correct speeds for a zero degrees Centigrade takeoff, under the same conditions, would be Vr - 121 knots, V2 - 141 knots, and Vmcg - 116 knots.

is inoperative, we reviewed the procedures for three engine takeoff and ever and if nobody has any questions --.

2013:50
CAM-2 no questions.

2013:50
CAM-1 okay just to review one more time what we're going to do is set max power on number two and number three --.

2013:56
CAM-2 right.

2013:56
CAM-3 right.

2013:57
CAM-1 okay and I'll ease in ah number four -.

2014:01
CAM-3 and I'll call increments of point one.

2014:03
CAM-1 yeah absolutely and by ah VMCG we'll have max power on number four.

2014:13
CAM-3 right co-pilot er first officer's going to call airspeed-.

2014:16
CAM-2 airspeed alive eighty knots and ten increment to VMCA, then I'll cail you rotate--.

2014:21
CAM-1 right.

2014:22
CAM-2 positive rate.

2014:23
CAM-1 okay and I'll ah after rotate I'll call for positive gear ah er positive rate gear up within three seconds --.

2014:32
CAM-2 okay.

2014:33
CAM-3 VMCG.

2014:34
CAM-1 yes.

2014:34
CAM-2 yes.

2014:35
CAM-1 I'll lower, I'll lower, oh pardon me.

2014:38
CAM-3 VMCG is minimum ground control speed.

2014:40
CAM-1 right.

2014:41
CAM-2 understood okay.

2014:43
CAM-1 at positive rate I'll call gear up I'll lower the nose slightly to gain two ten but still keep about two hundred to four hundred feet a minute climb.

2014:51
CAM-2 right.

2014:52
CAM-1 okay then ah when we reach two ten I'll call for max continuous

power.

2014:58
CAM-2 okay.

2014:59
CAM-1 okay and then well call ah we'll reduce the flaps like that, we'll climb at V2 all the way up to three thousand feet then we'll call for the climb procedures.

2015:09
CAM-2 okay just to verify, I had V2 to four hundred AGL then two ten.

2015:13
CAM-1 yeah.

2015:14
CAM-2 okay that's true but we'll take it to three thousand before we okay I'll point that --.

2015:18
CAM-3 and we won't start flap retraction until two ten.

2015:20
CAM-2 right.

2015:21
CAM-1 right okay.

2015:22
CAM-1 okay and ah --.

2015:23
CAM-2 I'm going to tower.

2015:24
CAM-1 all right.

2015:27
(sound similar to frequency change).

2015:28
CAM-1 and it'll be the royal three departure -- out of here.

2015:30
CAM-2 that radar vec- runway heading radar vectors -- you got it? I'll read it to you. ah fly assigned heading and altitude for vectors to appropriate route expect filed altitude ten minutes after departure --.

2015:41
CAM-1 okay.

2015:42
CAM-2 then it's got some transitions you don't need to worry about not yet --*.

2015:44
CAM-1 okay.

2015:47
CAM-3 and ah of course we'll all be watching' real close for loss of directional control.

2015:51
CAM-1 yeah and also of any other ah problem that we have okay they said that they had a fire bell on number four okay --.

2015:58
CAM-2 yeah.

2015:59
CAM-1 ah I talked with the engineer and I talked with the captain both he they both said that it was a false indication to their knowledge. The mechanic said that he fixed it --.

2016:10
CAM-3 yeah fire loop lain' on the cowling.

2016:11
CAM-2 you will be running all the throttles right -.

2016:13
CAM-1 yes.

2016:14
CAM-2 I won't even touch the throttles.

2016:15
CAM-1 I ah that is correct you will ah just set them up ah 'til we're ready there.

2016:21
CAM-3 are you ready to go?

2016:22
CAM-2 I'll let him know it's three engine.

At 2018:15, the flight was cleared into position and to hold on runway 01L. The MCI local controller cleared N782AL for takeoff at 2019:07 and provided instructions to turn right to 030 degrees after takeoff. The static run-up was performed while in position at the end of the runway, and the takeoff was commenced. At 2020:31, the flightcrew of N782AL stated, "Air Transport 782 we're aborting the takeoff." The MCI local controller observed the airplane decelerate on the runway and provided instructions to turn right off the runway and contact ground control. In addition, the controller asked if any assistance was needed, to which the flightcrew replied negatively. At 2021:41, the flightcrew contacted MCI ground control and requested clearance to taxi back to runway 01L for another attempted takeoff. This request was approved.

According to the CVR transcript and the sound spectrum analysis, during this first attempted takeoff, the power on the asymmetric engine was advanced so that full power on the asymmetric engine was obtained at around 100 knots, about 7 knots below the stated but incorrect Vmcg speed of 107 knots. The

engine pressure ratio (EPR) of 1.5 was called 1 second before the airspeed alive (about 50 to 60 knots) call was made; followed by a call of 1.6 EPR, 1 second before the 80 knots call. Then, 90 knots was called, followed 1 second later by the 1.8 EPR (the target takeoff EPR was 1.91). One hundred knots was called 1 second later, followed by the sound of decreasing engine power, indicating the start of the rejected takeoff.

Following the rejected takeoff, the flightcrew discussed the problems they encountered during the takeoff roll. The conversations that follow were excerpted from the CVR recording:

2021:02
CAM-1 I couldn't even get dev-

2021:03
CAM-3 well how far were we up close to.

2021:05
CAM-2 we we're about ah --.

2021:06
CAM-3 we were at one six , and then power went all the way up to one ah one nine zero as you ran it up, so it went up real fast.

2021:15
CAM-1 yeah it jerked up.

2021:17
CAM-2 you brought it up too fast? or it jerked up or what?

2021:19
CAM-1 it just came up too fast is what it did.

2021:22
CAM-3 if you want to try it again I can try addin' the power if you like.

2021:24
CAM-1 okay let's do it that way yeah ah tell em' --.

2021:27
CAM-3 *.

2021:29
CAM-2 like to go back and do it again?

2021:29
CAM-1 yeah tell 'em that we ah we just ah stand-by one let me- oh just tell 'em we'd like to taxi back and have another try at it.

2021:39
RDO-2 Kansas City ground Air Transport seven eighty two's clear we'd like to taxi back and depart one left again.

2021:47
GND Air Transport seven eighty two heavy roger taxi one left.

2021:50
RDO-2 one left Air Transport seven eighty two.

2021:52
CAM-1 okay.

2021:55
CAM-3 I'll take off before the line.

2021:57
CAM-2 yes let's back that one up.

2021:58
CAM-3 you want the anti-skid off?

2022:00
CAM-1 no ah let's just ah --.

2022:02
CAM-3 to the line?

2022:03
CAM-1 yeah all the way down to the line.

2022:06
CAM-3 okay, transponder ignition override back to off.

2022:10
CAM-3 how much rudder were you stickin' in?

2022:11
CAM-1 I had it all the way in.

2022:13
CAM-3 I was lookin' *.

2022:14
CAM-1 that's why I ah -.

2022:17
CAM-3 okay when do I have to have max power in on the outboard engine?

2022:21
CAM-1 one hundred and seven.

2022:23
CAM-3 by VMCG.

2022:24
CAM-1 yeah.

2022:24
CAM-3 okay.

2022:26
CAM-1 okay ah we didn't use brakes on that so brake energy ah chart should be okay.

2022:31
CAM-3 no.

2022:36
CAM-1 it seemed what happened, it was goin' up smoothly and then all of a sudden -.

2022:40
CAM-2 it kinda ah --.

2022:40
CAM-1 it jerked and then yeah.

2022:44
CAM-2 a question to consider Captain is ah: when we hit when we get near VMCG or get near Vr or VMCG if we're usin' all our rudder authority you might wanta' consider abort possibly because once we get higher we're gunnar be in be in even worse trouble correct.

2023:01
CAM-1 that's correct absolutely.

2023:07
CAM-3 no actually above VMCG you rudder has more authority it's helping you more.

2023:11
CAM-2 I understand.

2023:14
CAM-3 if we were to lose ah about the time an outboard engine before VMCG -.

2023:18
CAM-2 right.

2023:19
CAM-3 you can't continue the takeoff because you will lose directional control because you other engine is already in.

2023:25
CAM-2 okay yeah you're right you're one hundred percent right.

2023:29
CAM-1 okay do me a favor just write down what time we aborted.

2023:32
CAM-3 okay well we aborted at ah about zero?

2023:34
CAM-2 yeah that's about right.

2023:44
CAM-1 okay.

2023:44
CAM-2 boy it's gettin' tight.

2023:45
CAM-1 yeah I know.

2023:48
CAM-2 hay we did our best you know.

2023:51
CAM-1 yeah.

The airplane taxied to runway 01L in about 6 minutes and, at 2024:28. was again cleared for takeoff, with the same instructions to turn right to 030 degrees upon departure. There were no further radio communications with the flight.

On the accident takeoff, the power on No. 4 engine was increased by the flight engineer at a more rapid rate than on the first takeoff. For instance, on the second takeoff, 1.6 EPR was called 1 second before the "airspeed alive" call (50 to 60 knots), whereas on the first takeoff, 1.6 EPR was called 1 second before 80 knots. See figure 7.

Shortly after the first officer called airspeed alive, there was an abrupt turn to the left, followed quickly by a correction to the right. After the first officer called "90 knots," the airplane started to turn left again. Following the 100 knot call, the FDR revealed a pitch change, indicating that the pilot rotated the airplane about 20 knots before the target rotation speed of 123 knots. The left drift continued, and the first officer was heard calling, "we're off the runway." A directional control correction was initiated, and the pitch attitude increased just as the airplane became airborne. The airspeed reached between 120 and 123 knots. This is just about Vmca (minimum control speed air) and is also about the stall speed for that airplane weight. The impact occurred as the airplane rolled to a nearly 90 degree left bank.

The CVR recorded the following sounds and flightcrew words during approximate 4 minutes prior to the accident:

2024:06
CAM-1 and you can tell 'em that we'll ah be ready for takeoff again at the end.

2024:15
CAM-2 tell them now?

2024:20
RDO-2 Kansas City tower Air Transport seven eighty two we'll be ah ready to go at the end of one left.

2024:26
GND roger contact the tower you'll be number one.

2024:27

RDO-2 okay

2024:28
CAM-2 yeah that might **.

2024:32
(Sounds similar to flight switching frequency).

2024:36
RDO-2 Kansas City tower Air Transport seven eighty two be ready to go at the end ah one left ah three engine takeoff.

2024:42
TWR Air Transport seven eighty two heavy tower one left turn right zero three zero cleared for takeoff.

2024:47
RDO-2 okay cleared to go one left after departure zero three zero on the heading Air Transport seven eighty two.

2024:52
CAM-1 okay and the checklist.

2024:54
CAM-3 we are to the line.

2024:56
CAM-1 okay below the line.

2024:56
CAM-3 transponder?

2024:59
CAM-2 it's on again.

2025:01
CAM-3 ignition override?

2025:02
CAM-2 all engines.

2025:07
CAM-3 exterior lights.

2025:08
CAM-1 to go.

2025:10
CAM-3 ah I'm gunnar need a minute.

2025:11
CAM-1 yeah.

2025:12
CAM-3 I need to balance fuel out a little bit it's heavy on this side.

2025:15
CAM-1 okay.

2025:33
CAM-2 clear left.

2025:43
CAM-3 I'll * I'll let you know when

I have enough there.

2025:46
CAM-1 okay.

2025:54
CAM-1 I'll line up just a little right of the center line here.

2025:58
CAM-2 good idea.

2026:11
CAM-3 okay outboard fuel is balanced.

2026:12
CAM-1 okay and we're cleared for takeoff, lights are extended and on. checklist is complete?

2026:24
CAM-3 checklist is complete.

2026:24
CAM-1 okay.

2026:25
CAM (sound of increasing engine noise).

2026:33
CAM-1 make sure that ah two and three is is ah -.

2026:37
CAM-3 at max power?

2026:37
CAM-1 yeah.

2026:39
CAM-3 okay.

2026:40
CAM-3 I'll set max power.

2026:46
CAM -3 one one.

2026:49
CAM-3 one two.

2026:50
CAM-3 one three.

2026:52
CAM-3 one four.

2026:54
CAM-3 one five.

2026:58
CAM-3 one six.

2026:59
CAM-2 airspeed's alive.

2026:59
CAM-3 one seven.

2027:01
CAM-1 god bless it.

2027:05
CAM-1 keep it goin'.

2027:06
CAM (sound of engine noise increasing).

2027:07
CAM-3 keep it goin'?

2027:07
CAM-1 yeah.

2027:07
CAM-2 eighty knots.

2027:11
CAM-2 ninety knots.

2027:13
CAM-2 one hundred knots.

2027:17
CAM-1 okay.

2027:17
CAM (sound of loud crash).

2027:20
CAM-2 we're off the runway.

2027:21
CAM-1 go max power.

2027:26
CAM-1 max power.

2027:27
CAM-2 get the nose down.

2027:28
CAM-1 max power.

2027:29
CAM-2 you got it.

2027:30
CAM-? we're gunnar' go -.

2027:30
CAM (sound of loud crash).

2027:32
end of recording

The MCI local controller later said, "...something did not look right as the airplane was lifting off...the lights were out of whack...it didn't look right." He thought the airplane became airborne and then observed a "fireball." Airport crash/rescue units, already out of the firehouse on a night exercise, responded to the accident scene.

There were several other witnesses to the accident. One was a commercial pilot who observed N782AL reject the first takeoff and then taxi back for the second attempt. He was on a ramp near the runway midpoint and observed the second takeoff attempt from the start of the takeoff roll. He said that as the airplane rotated, "...the tail dragged and it left quite a lot of sparks. It looked unusually nose high after rotation." He also said that as the airplane passed by him, he could see something like "fire" emanating from the left side of the airplane, about the location of the No. 2 engine. He stated that the airplane became airborne, but "it mushed into the air." He estimated that the airplane reached an altitude of between 50 and 100 feet. At this point there was no more flame from the left side. He saw the airplane enter a slow roll to the left and reach "nearly a 90 degree bank." It then impacted the ground and exploded. The report of another witness was similar, but he added that he heard the "pop of an engine like a compressor stall." He was located on the airport, and also saw the airplane veer to the left and explode upon impact with the ground.

The ATI A&P mechanic who prepared N782AL for the three-engine ferry also observed the takeoff and impact. He was at the north end of the runway and had a head-on view of the takeoff. He said the airplane obtained an "unusually

nose high attitude during rotation," and he observed a "bright yellowish-orange ball of fire from the exhaust of the No. 2 engine." He then saw the airplane enter a "slowly increasing left bank" just before impacting the ground. See figures 1 and 2.

The accident occurred during the hours of darkness at 39°18'50.4" north latitude and 094°43'51.8" west longitude. Field elevation at this location was 978 feet above mean sea level.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others	Total
Fatal	3	0	0	3
Serious	0	0	0	0
Minor/ None	0	0	0	0
Total	3	0	0	3

1.3 Damage to Airplane

The airplane was destroyed during the impact sequence and postcrash fire. The hull loss value of the airplane was $12,000,000.

1.4 Other Damage

The spilled fuel from the airplane caused environmental damage, which cost $474,000 to clean up.

1.5 Personnel Information

1.5.1 The Captain

The captain, age 48, was born on October 18, 1946. The following are the dates on which he obtained Federal Aviation Administration (FAA) certificates and ratings:

Private Pilot Certificate	September 7, 1970
Instrument Rating	October 4, 1977
Commercial Pilot Certificate (with multi-engine rating)	June 11, 1981