NATIONAL TRANSPORTATION SAFETY BOARD

AIRCRAFT ACCIDENT REPORT

EASTERN AIR LINES, INC.

BOEING 727-225

MIAMI, FLORIDA

DECEMBER 29, 1972

File No. 3-0186

AIRCRAFT ACCIDENT REPORT

MACHINERY BUYERS CORPORATION

Learjet Model 24, N454RN

Atlanta, Georgia

February 26, 1973

Adopted: May 30, 1973

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591
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16. Abstract

A Gates Learjet Model 24, N454RN, operated by the Machinery Buyers Corp., crashed st 1012 e.s.t. on February 26, 1973, after takeoff from DeKalb-Peachtree Airport, Atlanta, Georgia. The two crewmembers and five passengers were fatally injured, one person on the ground sustained burns.

The airplane departed from Runway 20L on a flight plan to Miami, Florida. Witnesses observed smoke trailing from the airplane as it crossed the field boundary. The tower controller advised the crew of N454RN that the airplane's left engine appeared to be emitting smoke; the crew of N454RN responded that they had "hit some birds." The tower controller inquired whether N454RN was returning to land, and N454RN responded "Don't believe we're gonna make it."

After the crash, the remains of 15 cowbirds were found within 150 feet of the Runway 2R threshold. A municipal dump is located adjacent to the airport just east of Runway 2R/20L.

The National Transportation Safety Board determines that the probable cause of this accident was the loss of engine thrust during takeoff due to ingestion of birds by the engines, resulting in loss of control of the airplane.

The Federal Aviation Administration and the Airport Authority were aware of the bird hazard at the airport; however, contrary to previous commitments, the airport management did not take positive action to remove the bird hazard from the airport environment.

There were three recommendations made.

17. Key Words

Bird Hazard, Bird Ingestion, Engine Compressor Stall Power Loss, Airport Locations, Trash Disposal Areas, Airport & Airways Development Act, Federal Aid to Airport

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MACHINERY BUYERS CORP.
LEARJET MODEL 24, N454RN
ATLANTA, GEORGIA
FEBRUARY 26, 1973

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SPECIAL NOTICE

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: May 30, 1973

MACHINERY BUYERS CORP.
LEARJET MODEL 24, N454RN
ATLANTA, GEORGIA
FEBRUARY 26, 1973

SYNOPSIS

A Gates Learjet Model 24, N454RN, operated by the Machinery Buyers Corp., crashed at 1012 eastern standard time on February 26, 1973, following takeoff from the DeKalb-Peachtree Airport, Atlanta, Georgia. The two crewmembers and five passengers were fatally injured, and one person on the ground sustained serious burns. The aircraft was destroyed by impact and ground fire. An apartment building was damaged, three parked vehicles were destroyed, and another vehicle was damaged by impact and fire.

The airplane departed from Runway 20L on an Instrument Flight Rules flight plan to Miami, Florida. Ground witnesses observed smoke trailing from the airplane as it crossed the field boundary. The DeKalb-Peachtree Tower controller advised the crew of N454RN that the airplane's left engine appeared to be emitting smoke, whereupon the crew of N454RN responded that they had "hit some birds." The tower controller inquired whether N454RN was returning to land, and N454RN responded "Don't believe we're gonna make it."

The airplane initially collided with the roof of a three-story apartment building approximately 2 miles south-southwest of the airport. The airplane came to rest in a ravine adjacent to a highway, 165 feet southwest of the damaged apartment building.

About 30 minutes after the crash, the remains of 15 cowbirds were found within 150 feet of the Runway 2R (the departure end of Runway 20L) threshold. A municipal dump is located adjacent to the airport just east of Runway 2R/20L. [During the investigation, large flocks of birds were observed on the airport, and birds numbering in the thousands were seen swarming over the dump area.]

The National Transportation Safety Board determines that the probable cause of this accident was the loss of engine thrust during takeoff due to ingestion of birds by the engines, resulting in loss of control of the airplane. The Federal Aviation Administration and the Airport Authority were aware of the bird hazard at the airport; however, contrary to previous commitments, the airport management did not take positive action to remove the bird hazard from the airport environment.

As a result of this accident, the Safety Board is making 2 recommendations to the Federal Aviation Administration and 1 recommendation to 11 aerospace organizations and associations.

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INVESTIGATION

A Gates Learjet Model 24, N454RN, operated as a corporate flight by Machinery Buyers Corp., Atlanta, Georgia, crashed at 1012 eastern standard time 1/ on February 26, 1973, following takeoff from Runway 20L at DeKalb-Peachtree Airport, Atlanta, Georgia. The aircraft was destroyed by impact and fire.

The two crewmembers and five passengers were fatally injured and one person on the ground sustained serious burns. An apartment building was damaged, three parked vehicles were destroyed, and another vehicle was damaged by impact and fire.

The pilot had filed an Instrument Flight Rules (IFR) flight plan from Atlanta, Georgia, to Miami, Florida, with a proposed departure time of 0950 and an en route altitude of 41,000 feet (Flight Level 410). The flight plan listed five passengers on board, an estimated en route flight time of 1 hour and 10 minutes, and fuel on board for 2 hours and 30 minutes. The pilot received the IFR clearance as filed, and the flight was cleared for takeoff from Runway 20L at 1010:40.

The weather at the time of the accident was overcast, with ceiling 500 feet, visibility 4 miles in fog and smoke, wind 060° at 4 knots, altimeter setting 30.20 inches.

Ground witnesses stated that the airplane had made a normal takeoff, but was trailing blue-white or blue-gray smoke when it crossed the airport boundary. The following conversation with the flight was recorded by the airport control tower:

TOWER - "Lear 454RN it appeared the left engine laid a pretty good layer of smoke out of the left side there for approximately 300 or 400 feet."
454RN - "We just hit some birds."
TOWER - "Roger, you turning to land?"
454RN - "Don't believe we're gonna make it." (Last transmission by the crew.)

Ground witnesses southwest of the airport heard two explosive sounds as the aircraft passed overhead. The first occurred as the aircraft crossed the airport boundary and the second when the aircraft was about halfway between the airport and the crash site. Most of the witnesses recalled that they saw no smoke trailing from the aircraft except for the smoke noted immediately after takeoff. Two witnesses near the crash site, however, saw black smoke and one saw flames emanating from the tail section of an engine prior to the impact.

1/ All times used are eastern standard, based on the 24-hour clock.

Most of the witnesses agreed that the aircraft climbed to a height about 250 to 300 feet above the ground before it started to settle in a nose-high attitude. One witness near the crash site said 'chat the aircraft was "wobbling" and another said that it was "in a definite stall."

The airplane collided initially with the roof of a three-story apartment building, approximately 2 miles south-southwest of the airport. The wreckage came to rest in a wooded ravine adjacent to a busy highway, 165 feet southwest of the damaged building. The airplane's takeoff path was over a residential area which contained numerous apartment complexes, shopping centers, and busy thoroughfares. A suitable emergency landing site was not available.

The airplane collided with trees in the ravine; both engines, both wings, and the empennage separated from the fuselage. The occupants of the airplane were found in their seats. The cockpit and cabin were destroyed by fire.

The airplane's windshield and center post contained bird residue and bird feathers. After the accident, the remains of 15 cowbirds were found within 150 feet of the departure end of Runway 20L.

Both engines showed distortion and foreign object damage to the compressor rotor assemblies. Foreign material obstructed approximately 75 percent of the cooling air ports of the first-stage turbine nozzles. Foreign object residue was found on the outside of the combustion liners. A tarlike substance was also found in the compressor of the left engine.

Foreign object damage to the compressor of the right engine was less severe than that to the left engine. Neither engine nor its components showed any mechanical malfunction or failure.

An analysis of the foreign object residue disclosed that the mass contained protein matter. Microscopic examination of several fragments of the residue disclosed structures with the appearance of feather parts.

The blade damage on the left engine showed 14 separate bird strikes, and the right engine showed at least 5 such strikes.

Pathological examination and toxicological analysis determined that the causes of death of the occupants were pulmonary thermal injury and carbon monoxide inhalation. The flightcrew had no pre-existing disease or disability.

The General Electric Model CJ-610 engine was type certificated on May 11, 1964, and conformed with type certification requirements of Civil Air Regulations Part 13 as amended.

Prior to certification, in 1961, the engine manufacturer conducted bird ingestion tests on the General Electric CJ-610 turbojet engine similar to the model installed in N454RN. The test engine had accumulated 300 hours of operating time.

During these tests, chloroformed birds similar to starlings weighing 2 to 4 ounces were fired consecutively into the engine at speeds from 80 to 202 miles per hour. The engine was shut down and inspected after each bird ingestion. With the throttle held at the takeoff position, the engine stalled after ingestion of a single bird at speeds from as low as 57 percent to 69 percent r.p.m., but at least 87 percent speed and 66 percent power was obtained after retarding the throttle to idle and slowly advancing it until stall was again encountered. Time of recovery to 66 percent power was 9.5 seconds. After ingesting four birds, the engine showed slight damage to two first-stage compressor rotor blades and a buildup of foreign object residue on the cooling air ports of the first-stage turbine nozzle and the outside of the combustion liner.

The foreign object residue found on the cooling air ports of the first-stage turbine nozzle and the outside of the combustion liners on the engines installed in N454RN was much heavier than that shown in the test report of these components on the manufacturer's test engine.

The airplane manufacturer's performance data show that 1,140 pounds of total thrust are required for the airplane to maintain level flight at 0.2 Mach on a standard day at 1,000 feet pressure altitude at the computed weight for the accident aircraft. The CJ-610-4 engine is rated at 2,850 pounds of thrust. The required 1,140 pounds of thrust correlate with about 85 to 87 percent engine speed.

DeKalb-Peachtree Airport, formerly a Naval Air Station, was returned to DeKalb County in 1960 under the provisions of Public Law 289 relating to conveyance of surplus military property to local authorities, for use as a civil airport. Included in the transaction was the cancellation of a lease which the Navy had with the County on certain property adjacent to the airport. Since 1960, six Federal grants have been approved for airport improvements, including the construction of Runway 20L which is 5,000 feet long. Upon return of the airport to the County in 1960, and upon approval of each Federal grant for airport improvements, the County gave assurances to the Federal Aviation Administration (FAA) that included the following:

> "[The County] ... will not permit any activity thereon which would interfere with its use for airport purposes ..., and;
> "[The County will] ... take action to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations including landing and takeoff of aircraft.

A sanitary landfill operation was started by the County during the summer of 1962.

The area was used subsequently as a trash and garbage dump which attracted birds. (See Appendix C.) Under the provisions of FAA Order ASP5190.1, entitled "Compliance Requirements for Airports Developed or Improved with Federal Funds," the FAA advised the County in 1970 of the hazard to aviation presented by the dump. In the interim period, numerous communications were exchanged between the FAA and municipal authorities relative to this matter. In February 1971, the FAA was advised by the County that the dump would be closed by August 1972.

ANALYSIS AND CONCLUSIONS

Clearly the primary cause of this accident is related to the engine power loss resulting from the bird ingestion. Immediately after takeoff the pilot reported, "We just hit some birds," and dead birds were found near the Runway 2 threshold. These birds had been killed by collision with the aircraft structure, and other birds had been ingested by the engines. The two explosive sounds reported by the witnesses were probably caused by engine compressor stalls which resulted from the bird ingestion. Apparently, the left engine flamed out as the airplane crossed the airport boundary, and the trail of smoke resulted from unburned fuel passing through the hot combustion and turbine sections. The extensive damage to the left engine compressor was such that the engine could not have produced appreciable thrust. The foreign material found in the compressor was ingested during the takeoff. It is possible that the pilot obtained a relight of the left engine, because the manner in which the tar material was packed in the rear compressor stages indicates rotation above the engine "windmill" speed.

A small amount of dirt and debris was ingested by the right engine during the crash, but most of the debris and damage to the compressor resulted from bird ingestion. With the left engine producing little or no thrust, the right engine would have to produce nearly 1,140 pounds of thrust in order for the airplane to remain airborne. The buildup of the bird-ingested residue on the first-stage turbine nozzle and combustion liner was considerably heavier than the buildup on similar components in the engine used by the manufacturer during the bird-ingestion tests. The test engine showed minor damage to two first-stage compressor blades and produced about 50 percent of rated thrust after ingesting four birds. The comparison of damage to the test engine with the more extensive damage to the right engine compressor of N454RN and the heavier buildup of bird residue in its hot section shows that the right engine was incapable of producing sufficient thrust for the airplane to remain airborne.

There is little doubt that the municipal dump located adjacent to the airport property attracts birds which are a serious hazard to aircraft. Local authorities did not close the dump by August 1972, as previously planned. The airport was returned to DeKalb County under Public Law 289 in 1960, and Federal funds were used for subsequent airport improvements in exchange for binding commitments designed to assure that the public interest would be served. In following-up on the compliance requirements for airports developed or improved with Federal funds, the FAA did not take adequate measures, in accordance with existing statutes, to assure that the hazard was removed from the vicinity of the airport.

The Board is concerned because responsible authorities had not taken due cognizance of the bird hazards to aircraft at the DeKalb-Peachtree Airport. The seriousness of the hazard is exemplified in the Board's files which contain a number of reports of accidents, some catastrophic in nature, that resulted from bird/airplane collisions. Many airports are confronted with perennial or seasonal bird problems, and all such airports should employ methods to minimize the hazard. Public and private studies have shown that the elimination of food and water sources in the vicinity of airports is the most effective means of combating the bird hazard. Open garbage dumps attract birds, and the location of these facilities around airports is not compatible with normal airport operations.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the loss of engine thrust during takeoff due to ingestion of birds by the engines, resulting in loss of control of the airplane. The Federal Aviation Administration and the Airport Authority were aware of the bird hazard at the airport; however, contrary to previous commitments, the airport management did not take positive action to remove the bird hazard from the airport environment.

RECOMMENDATIONS

The Board is aware of the court action taken by the FAA subsequent to the accident of February 6, 1973, at the DeKalb-Peachtree Airport in Atlanta, Georgia. However, in view of the facts developed by the investigation of this accident the Safety Board recommends that the Federal Aviation Administration:

1. Develop and implement a procedure for more stringent and continued surveillance of all facilities subject to the provisions of the "Airports & Airways Development Act" and impose timely sanctions against operators of facilities, which receive Federal aid and do not fully comply with the requirements imposed upon them by the provisions of this Act. (Recommendation No. A-73-36)

2. Disseminate by the widest possible distribution of FAA Advisory Circular 150/5200-3A dated March 2, 1972, subject "Bird Hazards to Aircraft," to ensure that all airport operators, air carriers, air taxi operators, flying schools, fixed-base operators, and airline transport, commercial, and private pilots, and flight instructors are fully aware of the hazards to aviation associated with bird strikes. (Recommendation No. A-73-37)

The Safety Board further recommends that the following organizations:

3. Disseminate the contents of this report in their trade publications to their members to ensure that the possible consequences of bird hazards to aircraft are fully known to all who may be in a position to control this hazard: National Association of State Aviation Officials, American Association of Airport Executives, Airport Operators Council International, Aircraft Owners & Pilots Association, Air Transport Association of America, Air Line Pilots Association, Allied Pilots Association, National Air Carrier Association, National Air Transportation Conferences, National Business Aircraft Association, and National Pilots Association. (Recommendation No. A-73-38)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

Francis H. McAdams, Member, was not present and did not participate in the adoption of this report

May 30, 1973.

CREW INFORMATION

Pilot Ernest F. Sellfors, aged 31, held Airline Transport Pilot Certificate No. 1777452 issued on August 18, 1972, with airplane multiengine land rating and commercial privileges in airplane single-engine land. He was type rated in Learjet Models 23/24 and Hawker Siddeley 125. He had accumulated a total of 5,600 flying hours, including 4,400 hours in multiengine airplanes and 2,150 hours in multiengine jet models. He held a first-class medical certificate dated August 15, 1972, which listed no limitations.

Copilot David E. Phillips, aged 27, held Airline Transport Pilot Certificate No. 1830146 issued on August 31, 1971, with airplane multiengine land rating and commercial privileges in airplane single-engine land. He had accumulated a total of 4,000 flying hours including 3,700 hours in multiengine aircraft. He had accumulated 4.2 hours in the Learjet Model 24 while attending an approved flight school in January 1973. He held a first-class medical certificate dated December 27, 1972, with no limitations

APPENDIX B

AIRCRAFT INFORMATION

Gates Learjet, Model 24, N454RN, serial No. 121 was manufactured in 1966. The aircraft had accumulated 4,041 hours in service at the time of an annual inspection on January 8, 1973. The airplane was powered by two General Electric CJ610-4 axial-flow turbojet engines. The engines had accumulated 691 hours since overhaul at the last inspection on January 8, 1973. A hot section inspection was performed on both engines on May 5, 1972, at 604 hours since major overhaul. The exact airframe and engine times since January 8, 1973, could not be determined.

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C.

TRASH DISPOSAL AREA AND BIRD FLOCKS ADJACENT TO DeKALB-PEACHTREE AIRPORT
Machinery Buyers Corporation
***Learjet Model 24, N454RN**
Atlanta, Georgia
February 26, 1973

*Aircraft shown in photo is an unidentified corporate aircraft and was not involved in this accident.

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APPENDIX C