National Transportation Safety Board
Aviation Accident Final Report

Location:	SAINT JOHNS, AZ	**Accident Number:**	LAX96FA106
Date & Time:	02/05/1996, 0950 MST	**Registration:**	N131T
Aircraft:	Convair C-131E	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	4 Fatal
Flight Conducted Under:	Part 91: General Aviation - Ferry		

Analysis

Witnesses observed the aircraft departing from runway 14 with a rolling start. They said the aircraft rotated at the departure end of the runway and remained in ground effect with an excessive, nose high attitude. It then struck the airport perimeter fence, a barrier wall, and power lines. Power line wires were dragged through a residentual area, resulting in additional damage. The airplane then crashed in a pasture and burned. Investigation revealed the airplane had been loaded to a gross weight (GW) of 50,870 lbs. Its maximum GW was limited to 48,000 lbs at sea level with the use of antidetonation injection (ADI) fluid and 40,900 lbs without ADI. Density altitude at the airport was 6200 feet. For conditions at the airport, maximum GW for takeoff with ADI and 15 degrees of flaps was 43,205 lbs; without ADI and with 13 degrees of flaps, maximum GW was 38,909 lbs. The airplane flaps were found in the retracted position, but there was no performance data for takeoff with the flaps retracted. No ADI fluid was found in the line to the right engine, although it was intact; the ADI tank was destroyed; the ADI line to the left engine was damaged. The airplane was being flown under provision of a ferry permit, which did not provide for the cargo or the two passengers that were aboard. The first pilot (PIC) had accrued about 8 hours of flight experience in the make and model of airplane.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: inadequate preflight planning and preparation by the first pilot (PIC), his failure to ensure the aircraft was properly loaded within limitations, his failure to use proper flaps for takeoff, his failure to use ADI assisted takeoff, and his resultant failure to attain sufficient airspeed to climb after takeoff. Factors relating to the accident were: the high density altitude, and the PIC's lack of experience in the make and model of airplane.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) PREFLIGHT PLANNING/PREPARATION - INADEQUATE - PILOT IN COMMAND
2. (F) LACK OF TOTAL EXPERIENCE IN TYPE OF AIRCRAFT - PILOT IN COMMAND
3. (C) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED - PILOT IN COMMAND
4. (C) FLAPS - NOT USED - PILOT IN COMMAND
5. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE
6. (C) AIRSPEED - NOT ATTAINED - PILOT IN COMMAND
7. OBJECT - WALL/BARRICADE
8. OBJECT - WIRE,TRANSMISSION

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

On February 5, 1996, at 0950 hours mountain standard time, a Convair C-131E, N131T, collided with wires at the departure end of runway 14 and crashed in a residential area of Saint Johns, Arizona. The airplane was destroyed by impact forces and postimpact fire. Both pilots and two passengers were fatally injured. The airplane was operated by Business Air Connection of the Netherlands Antilles as a ferry flight under 14 CFR Part 91. The flight originated in Saint Johns, and was destined for Brownsville, Texas. Visual meteorological conditions prevailed at the time and a VFR flight plan was filed.

According to witnesses, the pilot executed a rolling takeoff from the 5,323-foot-long runway. The airplane used the full length of the runway, and did not climb high enough to clear obstacles located below the obstacle free clear zone at the departure end of runway 14. The terrain off the end of the runway slopes down. Witnesses reported the airplane's altitude along the flight path appeared to contour the terrain.

The airplane first struck the top of the airport perimeter fence and a barrier wall for three 10,000 gallon diesel fuel storage tanks. The airplane continued to fly at a low altitude and struck a tree with the right propeller. The airplane then struck residential power transmission wires with the left propeller. The wires became entangled in the airplane's landing gear and were pulled off their poles and dragged through a residential neighborhood to the accident scene.

The airplane eventually struck the ground with the left wing tip and cartwheeled into a horse pasture damaging the pasture fence.

Other Damage

In addition to the damage to the fences, barrier wall, trees, and wires, there was damage to residences. One home was struck by tree branches that penetrated into the interior and another home had minor roof damage from the dragged cables.

The damage to the home that was struck by the penetrating tree branches was limited to the bathroom and living room window. The resident of the home said he was sitting in the living room at the time. He told Safety Board investigators that the tree branches had punched a hole in the bathroom sink, shattered the toilet tank, and cracked the bathtub. There was also water damage in the bathroom as a result of the toilet being shattered.

Crew Information

First Pilot

The first pilot held an airline transport pilot certificate which was issued on April 4, 1979. At the time of the accident the pilot held 18 different type ratings, none of which were for Convair aircraft.

The most recent first-class medical certificate was issued to the pilot on December 21, 1995, and contained the limitation that correcting lenses for near vision be worn while exercising the privileges of his airman certificate. The pilot also held an existing non-disqualifying waiver for defective color vision.

No personal flight records were found for the pilot and the aeronautical experience listed in this report was estimated from a review of the airmen FAA records on file in the Airman and

Medical Records Center located in Oklahoma City, Oklahoma. In addition, information was obtained from a review of letters of authorization held by the pilot.

On February 2, 1996, the Federal Aviation Administration's (FAA) Sacramento Flight Standards District Office (FSDO), Sacramento, California, issued the first pilot a Letter of Authorization (LOA) to act as pilot-in-command in lieu of a type rating in Convair C-131E (CV-440), N131T, on a ferry flight from Hollister, California, to Aruba, Netherlands Antilles. The LOA limited operations to day visual flight rules (VFR) with fuel or maintenance stopover points. The LOA specified, " No other person other than the pilot and necessary crew shall be carried." The authorization expired at the completion of the ferry flight, or no later than February 17, 1996.

According to the FAA, "Vintage/surplus military aircraft are those aircraft which are operated solely under Title 14 of the Code of Federal Regulations (14 CFR) part 91 and for which the FAA does not have sufficient qualified inspector staff to conduct either the initial qualifications or proficiency tests required under existing regulations." FAA Order 8700.1 states circumstances may arise that require an aircraft be flown by a pilot who does not hold a type rating for that aircraft. An operations inspector may issue an LOA provided the flight can be accomplished safely.

The order describes to FAA Aviation Safety Inspectors (Operations) the method to determine eligibility of pilot to be issued an LOA. The order indicates regulatory provisions of 14 CFR Part 61.58 (Pilot-in-command proficiency check: Operation of aircraft requiring more than one required pilot), permits a pilot to serve as pilot-in-command provided no persons or property are carried, and the flights are conducted under day VFR conditions.

The FAA operations inspector, who granted the authorization for the first pilot, indicated to the Safety Board that he already knew of the first pilot's qualifications. The operations inspector indicated the first pilot was National Designated Pilot Examiner (NDPER) active in vintage aircraft, that the first pilot held a Letter of Operational Authority for numerous makes and models of high performance piston airplanes, and that the first pilot had been issued three previous authorizations to ferry this specific type aircraft.

On August 29, 1995, the first pilot applied for a LOA to ferry the accident airplane from Tucson, Arizona, to San Luis Obispo, California. The first pilot indicated in his application that he had two previous letters authorizing him to act as pilot-in-command, and had accumulated about 200 hours in various models of twin piston engine Convair aircraft. The FAA subsequently issued the LOA for the ferry flight on August 31, 1995.

The second pilot on the ferry flight from Tucson indicated the flight was flown without incident, except the destination was changed to Hollister, California, because San Luis Obispo was not VFR due to low visibility and fog.

On September 26, 1989, the FAA issued the first pilot a LOA to ferry a Convair 240 from Oakland, California, to Eagles Nest Airport, Ione, California.

On December 27, 1977, the FAA issued the first pilot a LOA to ferry a Convair 240 from Frankfurt, West Germany, to Kingman, Arizona.

Second Pilot

The second pilot held airline transport pilot certificate which was issued on October 20, 1995, with a multiengine airplane rating and commercial privileges for single engine airplanes.

The most recent first-class medical certificate was issued to the second pilot on January 8, 1996, and contained the limitation that correcting lenses be worn while exercising the privileges of his airman certificate.

The second pilot's total aeronautical experience consists of about 1,905 flight hours, of which about 487 were accrued in multiengine airplanes. There were no records found indicating the pilot had flown large aircraft over 12,500 pounds.

Aircraft Information

The airplane, a vintage/surplus military Convair C-131E (Civil Designation Convair 440-72), military serial number 55-4751(Civil serial number 338), was manufactured on July 20, 1956, and was delivered to the United States Air Force (USAF).

The airplane had accumulated a total time in service of 18,715 hours. Examination of copies of the maintenance records filed with the FAA before the accident revealed that the most recent annual inspection was accomplished on January 25, 1996, about 4 flight hours before the accident.

A minimum flight crew of pilot and copilot is required for all operations.

Aircraft Certification and Registration

The airplane remained in the possession of the USAF until January 13, 1994, at which time the USAF Museum Program sold the airplane to the Lan-Dale Company, Reno, Nevada. The Lan-Dale Company ferried the airplane from Wright-Patterson AFB, Dayton, Ohio, to Tucson, Arizona.

On August 28, 1995, the Lan-Dale Company, sold the airplane to the second pilot, DBA Business Air Connection N.V., Curacao. A revised lease agreement, dated December 4, 1995, found in the airplane's wreckage indicated the airplane was to be leased to Air Caribbean N.V. Curacao, a Netherlands Antilles Corporation by Business Air Connection. The agreement was to commence after the airplane was delivered to Curacao. The lease agreement specified the aircraft owner/LESSOR shall at its own expense, procure and maintain in full force and effect liability insurance. Another document found in the airplane disclosed the second pilot had contacted an insurance broker and received an estimate. However, there has been no evidence found by the Safety Board indicating that the airplane was insured at the time of the accident.

On October 23, 1995, the second pilot sold the airplane to a United States citizen who listed an address in Sweethome, Oregon. The FAA issued a Certificate of Aircraft Registration to the U.S. citizen on November 17, 1995. The citizen applied for a export certificate of airworthiness on January 22, 1996, and listed Business Air Freight as the purchaser. The address listed for Business Air Freight was the same as the second pilot's address. On January 23, 1996, the U.S. citizen sold the airplane to Business Air Freight.

On January 25, 1996, the FAA San Jose FSDO issued a Standard Airworthiness Certificate for the airplane in the transport category. On January 26, 1996, the San Jose FSDO issued a Special Airworthiness Certificate. The Special Airworthiness Certificate was designated a special flight permit for the purpose of export.

Powerplants

Two Pratt & Whitney Double Wasp R-2800-CB16-103 engines were installed in the airframe. The engines are twin row 18 cylinder air cooled radial type with single stage two speed

electrically controlled integral superchargers, and equipped with a pressure injection carburetor and an antidetonation injection system. The engines are capable of producing 2,400 horsepower at sea level.

Antidetonation Injection (ADI) System

The ADI system, often referred to as water injection, is provided to permit power increase for a limited period of time at takeoff. The ADI fluid used is a mixture of 50 percent alcohol and 50 percent water. The fluid is injected into the cylinders through the carburetor. The fluid evaporates in the cylinders, cooling the incoming charge of fuel and preventing detonation. Engines not using ADI are cooled by a rich fuel mixture. The rich mixture is usually too rich for best power. Use of ADI allows for a best power mixture. According to the airplane's operation manual, use of ADI at takeoff permits development of approximately 350 more horsepower from the engines.

The system is supplied from a 22-gallon usable rubberized fabric tank located in the right wing to fuselage fairing. An electrical water pump is installed in the sump of the tank. The pump is energized by a switch in the cockpit. The pump supplies pressurized ADI fluid to both engines.

Shutoff valves operated by engine oil pressure are mounted on the ADI fluid supply line to each engine. When engine oil pressure drops below 30 psi the shutoff valves close and no ADI fluid would flow to the engine. The ADI fluid then flows to a regulator which allows excessive ADI fluid to bypass at low power settings. A spring loaded ADI fluid inlet check valve in the regulator is opened by fuel pressure from the derichment valve on the carburetor.

If the system is energized a loss of engine oil and fuel pressures would close the shutoff valves and the inlet check valve in the regulator, trapping ADI fluid in the supply line between the two valves. ADI supply lines can be identified by the red-gray-red piping color code on the lines.

If the ADI system is not energized or not functioning a "Dry" takeoff may be made. However, the fuel mixture would be enriched to cool the cylinders to prevent detonation and less power would be produced.

Flap System

The airplane is equipped with Fowler type flaps that are used for takeoff as well as landing. The flaps are hydraulically actuated by two hydraulic motors which drive torque tubes through gear boxes. The system includes a flap synchronizing torque tube. The flap system moves in unison with the maximum extension of 45 degrees. Full extension requires 16 to 20 seconds.

The flap system is controlled by a spring loaded three position electrical toggle switch located on the pilot pedestal. The flaps may be lowered to any degree as shown on a flap position indicator. The switch is spring loaded to the center position which hydraulically locks the flaps in the last selected position, thus preventing them from retracting due to air loads. The takeoff flap setting will normally be 11 or 15 degrees depending upon the airplane's weight and airport runway, taking into consideration temperature, winds, and airport elevation.

Aircraft Loading

The Convair 440 aircraft utilizes a Weight and Balance Control System based on aircraft weight and index. The index system simplifies the center of gravity computations by labeling areas along the airplane's datum line with an index number.

Weight and balance records found in the airplane indicated the airplane was last weighed at

the USAF Museum at Wright-Patterson AFB on January 26, 1966. The DD Form 365C, "Basic Weight and Balance Record," indicated the airplane's basic weight was 35,315 pounds, the moment was 13,227-inch pounds, and the index 54.1.

The Safety Board reviewed a photograph taken by a local newspaper of the accident airplane before it departed on the ferry flight. The photograph displayed the amount of cargo in the airplane, but the Safety Board was unable to index the cargo from the photograph. The information from the photograph was compared to photographs taken at the accident scene and a general inventory list was developed. The weight of the cargo was compiled using the actual equipment weights obtained by knowledgeable persons, or as estimated by the investigative group.

2 rollaway tool boxes 160 lbs. 6-55 gallon drums (2 empty and 4 filled with engine oil) 1,740 lbs. Lumber, burnt furniture, medical supplies and equipment 260 lbs. Firefighting equipment 1,350 lbs. Portable air compressor 75 lbs. Ground power unit 75 lbs. Battery charger 63 lbs. 2 batteries 150 lbs. Manual fork lift for lifting palettes 200 lbs. Crew and passenger baggage 280 lbs. TOTAL 4,353 lbs.

The two pilot weights and the two passenger weights were obtained from airman medical records on file with the FAA in Oklahoma City, Oklahoma. The combined weight of the four occupants was determined to be 822 pounds.

Fueling records at the Saint Johns Industrial Air Park established that the airplane was last fueled on February 4, 1996, with the addition of 1,538.7 gallons of 100 octane low lead aviation fuel. According to servicing personnel, this filled the wing tanks to their capacity of 1,730 gallons. The weight of the fuel onboard was calculated at 6 pounds per gallon or 10,380 pounds.

The approximate ramp weight of the airplane, excluding lumber and furniture, was calculated to be 50,870 pounds, about 2,870 pounds above the airplane maximum certified gross weight of 48,000 pounds.

Aircraft Performance

The airplane left Hollister, California, on February 4, 1996, at 1330 hours, loaded in the same manner as the accident flight. The Hollister Airport elevation is 230 feet above sea level and the runway is 6,350 feet long. According to witnesses, the airplane used most of the runway and climbed very slowly.

Later in the day, the airplane arrived at the Ernest A. Love Field, Prescott, Arizona. The airplane was serviced with 250 gallons of 100 octane low lead aviation fuel. According to servicing personnel this did not fill the fuel tanks, and fuel quantity upon departure from Prescott could not be determined. Additionally, there was no record of the ADI system being serviced with fluid.

The field elevation at Prescott is 5,042 feet above sea level and the runway length is 7,616 feet long. Witnesses who observed the airplane takeoff from Prescott stated the airplane was slow

to climb and flew up a valley northeast of the airport. One witness also indicated the airplane did not climb above the horizon before he lost sight of the airplane.

The maximum gross takeoff weight for the airplane at sea level using ADI fluid is 48,000 pounds, and without using ADI is 40,900 pounds. The Safety Board obtained takeoff data from Renown Aviation, Santa Maria, California. Renown Aviation maintains computerized performance data for the Convair 440 and is able to electronically compute takeoff data corrected for field elevation, temperature, gross weight, and runway length.

According to the data provided, the maximum gross takeoff weight from runway 14 at Saint Johns Industrial Airpark at a temperature of 46 degrees Fahrenheit using the ADI system and 15 degrees of flaps is 43,205 pounds. The maximum gross takeoff weight under the same conditions without using ADI and 13 degrees of flaps is 38,909 pounds.

Meteorological Information

The closest official weather observation station is the Show Low Municipal Airport, Show Low, Arizona, which is located 34.6 nautical miles southwest of the accident site. The elevation of the weather observation station is 6,411 feet msl. At 0750 hours, a record surface observation was reporting in part: Sky condition and ceiling, 18,000 foot thin scattered; visibility, 40 statute miles: temperature, 46 degrees Fahrenheit; dew point, 22 degrees Fahrenheit; winds; 190 degrees, at 4 knots; and altimeter, 30.40" inHg. The density altitude at the Saint Johns Industrial Airpark was computed to be about 6,200 feet msl.

Airport Information

The Saint Johns Industrial Airpark is owned and operated by the City of Saint Johns, Arizona. The published elevation of the airport 5,733 feet msl. The airport has two intersecting hard surfaced runways. Runway 14 is 5,323 feet long by 75 feet wide.

Wreckage and Impact Information

The airplane was witnessed striking the ground with the left wing tip while in a left turn. The airplane came to rest in a horse pasture across the street from several residences, and within a block of the Apache County Annex Building which houses the local Head Start Day Care program.

The airplane's fuselage separated from the wings and came to rest with the cockpit area on top of the trailing edge of the right wing. Both engines were separated from their nacelle mounts and both propellers separated from the engines through fractures in the reduction gear boxes. All three landing gear were separated from the fuselage.

The fuselage was split aft of the front door at the leading edge of the wing. The forward cabin and the cockpit were destroyed by impact and postimpact fire. The instrument panel was destroyed. The flap and ADI switches and flap indicator were destroyed.

Cargo consisting of fire and medical equipment and tools were spread throughout the area of the fuselage split. The cargo was exposed to the postimpact fire and the combustible portions were burned, leaving those parts made of metal. About three rows of seats were removed from the right side of the airplane in the area of the cargo door. The removed seats were found stacked in the aft end of the fuselage on top of the last two rows of passenger seating.

The left wing was destroyed. Five left wing flap tracks, two inboard and three outboard, were found with the flap roller bearing carriers near the top of the track. The right wing was intact

and the flap roller bearings were found in the same position as the left. A measurement of the right flap extension was taken from a seam at the wing spar and found to be 68 inches.

Flap measurements made from the same seam as another Convair aircraft were as follows; flaps up 67 inches, flaps 11 degrees 76.75 inches, and flaps 15 degrees 80 inches.

An electrical service transmission cable was found wrapped around the nose gear and left main landing gear struts. The left propeller was embedded in the ground after the accident. The blades exhibited chordwise scoring, "S-bending" and were twisted. One blade from the left propeller was broken at the hub and at midspan. Both pieces of the broken propeller were found within 50 feet of the propeller hub.

The ADI fluid tank was destroyed. Examination of the ADI lines revealed fluid in the supply lines attached to the right wing spar. The left engine ADI lines were damaged by impact. The ADI line on the right engine between the shutoff valve and the inlet check valve was intact. There was no ADI fluid found in this line.

Medical and Pathological Information

All occupants sustained fatal injuries in the accident and post mortem examinations were conducted by the Apache County Coroner's Office. Specimens from the occupants were retained for toxicological examination by the FAA Civil Aeromedical Institute (CAMI). The results of the test were negative for alcohol and all screened drug substances.

Additional Information

Wreckage Release

The Safety Board did not retain any wreckage for further examination. The wreckage was recovered at the accident site by Air Transport, Phoenix, Arizona.

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	61, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	12/21/1995
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	18400 hours (Total, all aircraft), 8 hours (Total, this make and model), 12000 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Convair	**Registration:**	N131T
Model/Series:	C-131E C-131E	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Special Flight; Transport	**Serial Number:**	338(55-4751)
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	01/25/1996, Annual	**Certified Max Gross Wt.:**	48000 lbs
Time Since Last Inspection:	4 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	18715 Hours	**Engine Manufacturer:**	P&W
ELT:		**Engine Model/Series:**	R-2800-CB16
Registered Owner:	ROBERTUS S. KELDER	**Rated Power:**	2400 hp
Operator:	ROBERTUS S. KELDER	**Operating Certificate(s) Held:**	None
Operator Does Business As:	BUSINESS AIR CONNECTION	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	SOW, 6412 ft msl	**Distance from Accident Site:**	35 Nautical Miles
Observation Time:	1050 MST	**Direction from Accident Site:**	245°
Lowest Cloud Condition:	Scattered / 20000 ft agl	**Visibility**	40 Miles
Lowest Ceiling:	Broken / 0 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	12°C / -1°C
Precipitation and Obscuration:			
Departure Point:	(SJN)	**Type of Flight Plan Filed:**	VFR
Destination:	BROWNSVILLE, TX (BRO)	**Type of Clearance:**	None
Departure Time:	0949 PST	**Type of Airspace:**	Class E

Airport Information

Airport:	ST JOHNS IND AIRPARK (SJN)	**Runway Surface Type:**	Asphalt
Airport Elevation:	5733 ft	**Runway Surface Condition:**	Dry
Runway Used:	14	**IFR Approach:**	None
Runway Length/Width:	5323 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	THOMAS H WILCOX	**Report Date:**	10/04/1996
Additional Participating Persons:	GEORGE W BEAN; SCOTTSDALE, AZ		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		