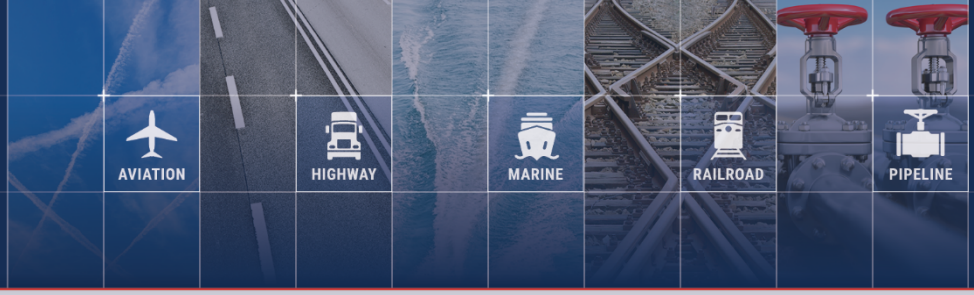

Aviation Investigation Final Report

Location:	Las Vegas, Nevada	**Accident Number:**	LAX05GA243
Date & Time:	July 21, 2005, 17:07 Local	**Registration:**	N7UP
Aircraft:	Aero Commander 680 FL	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Public aircraft		

Analysis

The airplane descended into the ground during takeoff-initial climb on a local fire reconnaissance flight. Witnesses reported that airplane became airborne, but was not climbing, and it continued down the runway in a nose-up attitude in ground effect until impacting terrain about 600 feet southeast from the departure end of the runway. The ambient temperature was about 107 degrees Fahrenheit, and the density altitude was calculated at 5,878 feet mean sea level. On scene examination found the flaps in the 30-degree position, which also corresponded to the flap actuator position. The cockpit indicator for the flaps also showed a 30-degree extension. A subsequent bench test of the combined flap/gear selector valve was conducted. During the initial inspection, both the gear selector and the flap selector valves were bent, but otherwise operational. The "stop-pin" on the flap selector lever was missing. There was no leakage of fluid during this test. Examination of both engines revealed no abnormalities, which would prevent normal operations. The aircraft flight manual specifies that the flaps should be set at 1/4 down (10 degrees) for normal takeoff.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's excessive selection of flaps prior to takeoff, which resulted in a failure to obtain/maintain an appropriate climb airspeed, and an inadvertent stall/mush during takeoff-initial climb. A factor contributing to the accident was a high density altitude.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE
2. (C) FLAPS - EXCESSIVE - PILOT IN COMMAND
3. (C) AIRSPEED(VS) - NOT OBTAINED/MAINTAINED - PILOT IN COMMAND
4. (C) STALL - INADVERTENT - PILOT IN COMMAND

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

Findings
5. TERRAIN CONDITION - LOOSE GRAVEL/SANDY

Factual Information

1.1 HISTORY OF FLIGHT

On July 21, 2005, about 1707 Pacific daylight time, an Aero Commander 680 FL, N7UP, impacted terrain during takeoff at North Las Vegas Airport (VGT), Las Vegas, Nevada. Commander Northwest LTD was operating the airplane under contract for the United States Department of Agriculture (USDA) - Forest Service under the provisions of 14 CFR Part 91 as a public-use aircraft. The airline transport pilot and one passenger sustained serious injuries; the second passenger sustained minor injuries. The airplane was destroyed. The local fire reconnaissance flight was departing VGT at the time. Visual meteorological conditions prevailed, and a company flight plan had been filed. The primary wreckage was at 36 degrees 12.233 minutes north latitude and 115 degrees 11.289 minutes west longitude.

During takeoff from runway 12R, witnesses reported seeing the airplane airborne but not climbing. The airplane continued down the runway in a nose up attitude and remained in ground effect until impacting terrain about 600 feet southeast from the departure end of runway 12R. The airplane impacted in a 30-degree nose down attitude. During the accident sequence, the airplane rotated about 270 degrees around the vertical axis. The cockpit section of the airplane was destroyed during the accident sequence.

The operator submitted a Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2) on August 9, 2005.

1.5 PERSONNEL INFORMATION

A review of Federal Aviation Administration (FAA) airman records revealed that the pilot held a commercial certificate with ratings for airplane single engine land and an airline transport pilot certificate with ratings for airplane multiengine land.

The pilot held a second-class medical certificate that was issued on March 11, 2005. It had the limitation that the pilot must possess glasses, which correct for near vision.

According to employment records, the pilot was employed as a pilot by Commander Northwest LTD beginning in March 2005.

Employer records indicated that the pilot had an estimated total flight time of 5,285 hours. He logged 65 hours in the last 90 days, and 58 hours in the last 30 days. He had an estimated 75 hours in this make and model. He was the standby pilot for the accident airplane. He flew the accident airplane for 0.5 hours on July 17, 2005, 6.08 hours on July 19, 2005, and 5.73 hours on July 20, 2006. He completed a biennial flight review on March 15, 2005.

1.6 AIRCRAFT INFORMATION

The airplane was an Aero Commander 680 FL, N7UP, serial number 134929. A review of the airplane's logbooks revealed an annual inspection dated February 7, 2005, at an airframe total time of 8,659.8 hours, and a Hobbs hour meter reading of 1,783.5. The logbooks had an entry for a 100-hour inspection dated June 30, 2005, at which time the Hobbs hour meter read 2,066.3. The Hobbs hour meter read 2,105.7 at the accident scene. The total time of the airplane at the time of accident was 8,982.0.

The left engine was a Textron Lycoming IO-720-B1BD engine, serial number 1288-54A. The engine had 332.3 hours since the last overhaul, which was accomplished on December 3, 2004. The logbooks had an entry for a 100-hour inspection dated June 30, 2005, and the Hobbs hour meter read 2,066.3.

The right engine was a Textron Lycoming IO-720-B1BD engine, serial number 1211-54A. The engine had 715.5 hours since the last overhaul, which was accomplished on October 27, 2003. The logbooks had an entry for a 100-hour inspection dated June 30, 2005, at which time the Hobbs hour meter read 2,066.3.

On the morning of the accident, maintenance was performed on the left engine due to a hard starting problem. The on-site mechanic reported cleaning the spark plugs and verifying ignition timing. A maintenance test run was performed on the engine with satisfactory results. The aircraft was released for service and scheduled for the accident flight.

Examination of the maintenance and flight department records revealed no unresolved maintenance discrepancies against the airplane prior to departure.

Fueling records at North Las Vegas Air Terminal established that the airplane was last fueled to capacity on July 20, 2005, at 2016, with the addition of 118 gallons of 100 low lead aviation fuel. The aircraft flight manual indicates maximum fuel capacity of 223 gallons.

1.6.4 AIRCRAFT OPERATING WEIGHT & BALANCE

A weight and balance form was completed prior to the date of the accident by the pilot. Investigators weighed the baggage post accident. Weight and balance calculations placed the airplane at a takeoff weight of 7,769 pounds. The maximum gross weight for the airplane was 8,000 pounds. The center of gravity (CG) was computed as 209.09 inches. The CG envelope for the computed takeoff weight was between 206 and 218 inches.

1.7 METEOROLOGICAL INFORMATION

An aviation routine weather report (METAR) for VGT was issued at 1653. It stated: winds from 170 degrees at 05 knots; visibility 10 miles; skies clear; temperature 42 degrees Celsius; dew

point 09 degrees Celsius; altimeter 29.79 inHg. The density altitude was calculated at 5,878 feet mean sea level. The pressure altitude was 2,361 feet.

1.9 COMMUNICATIONS

The airplane was in contact with VGT airport traffic control tower (ATCT) on frequency 125.70. After the takeoff clearance, the pilot made no further radio transmissions.

1.10 AIRPORT INFORMATION

The Airport/Facility Directory, Southwest U. S., indicated that runway 12R was 5,000 feet long with a 300-foot overrun at the departure end, and 75 feet wide. The runway surface was composed of asphalt.

Tower records indicate that the accident occurred at 1707. The Las Vegas Fire Department records indicate that they received notification of the accident at 1708. The first fire department vehicle arrived on scene at 1715.

1.12 WRECKAGE AND IMPACT INFORMATION

1.12.1 GENERAL INFORMATION

Investigators from the National Transportation Safety Board, FAA, Twin Commander Aircraft LLC, and Textron Lycoming examined the wreckage at the accident scene.

The first identified point of contact (FIPC) was a ground scar. The debris path was along a magnetic bearing of 104 degrees. The FIPC was 100 yards southeast of the departure end of runway 12R. The fuselage came to rest 88 yards southeast of the FIPC.

The representative from Twin Commander identified the debris found at the beginning of the debris field starting from the FIPC as forward fuselage and cockpit structures. Pieces of the left wing tip were found in the middle of the debris field.

1.12.2 AIRFRAME STRUCTURES

The fuselage came to rest on a heading of 215 degrees magnetic.

The left side of the fuselage was wrinkled along its full length. About 1 foot aft of the inboard left wing flap, there was a vertical length of buckling, which started on the top side and went down to the underside, and was about 5 inches at its deepest point. Underneath the vertical stabilizer on the left side of the fuselage, there was a length of buckling, which started from the underside and went upward and aft about 20 degrees, and was about 2 feet long. Aft of the buckling, the fuselage showed upward crushing angled left. The tail cone was bent to the right.

1.12.2.1 WINGS

LEFT WING

The left forward inboard portion of the wing had no impact damage until the outboard 1/3 of the wing, where it curled upward about 120 degrees past horizontal and was twisted aft. The signatures on the underside of the outboard 1/3 of the wing were crushed and wrinkled along the length and width.

The outboard flap on the left wing was undamaged. The inboard flap showed no impact damage. The left inboard flap was documented trapped against the fuselage in the 30-degree extended position.

RIGHT WING

The right wing was found resting on the ground. It showed wrinkling and buckling starting from about 4 feet from the outboard side of the engine nacelle then out to the wing tip. Starting from the leading edge, where the stall warning horn was situated, going outboard to the tip, and then moving aft at an angle to the trailing outboard tip, the wing was crushed upward, with the greatest angle being about 50 degrees above the longitudinal axis. Starting from about the middle leading edge portion and angling aft toward the inboard edge of the aileron, the wing was buckled. The portion of the wing inboard of the engine nacelle showed no impact damage.

The right wing inboard flap showed no impact damage. The outboard flap trailing edge was crushed and curled forward starting from about 1 foot from the inboard trailing corner and angling about 30 degrees toward the outboard forward corner.

Both the left and right flaps were in the 30-degree position; the flap actuator was measured at 1 15/16 inches, which the manufacturer stated corresponded to a 30-degree position. The flap indicator was damaged in the impact sequence, but indicated the flaps were in the 30-degree position.

1.12.3 ENGINES

LEFT ENGINE

The left engine nacelle was undamaged.

RIGHT ENGINE

The right engine nacelle was crushed on the trailing end in a forward direction.

The left horizontal stabilizer was broken away from the fuselage from the leading edge and back about 1 foot. The remainder of the horizontal stabilizer and the elevator showed no impact damage.

The right horizontal stabilizer was severed on the underside where it connected to the tail. It was bent upward from about 2 feet from the root and angled about 10 degrees from the latitudinal axis. The right elevator was undamaged.

The vertical stabilizer showed no impact damage above the horizontal stabilizer.

The rudder showed no impact damage. The rudder trim was in line with the vertical stabilizer.

1.12.4 PROPELLERS

LEFT PROPELLER

For photo and documentation purposes, the propeller blades of the left engine were labeled A, B, and C. None of the blades were bent or twisted. They had minor nicks. The blades were not in the feathered position.

RIGHT PROPELLER

For photo and documentation purposes, the propeller blades of the right engine were labeled A, B, and C. Investigators found all blades in the feathered position at the accident site. They were all curled in the opposite direction of rotation with chordwise scratches. Blade A was curled up to about a 90-degree angle; the tip was curled back in an "S" shaped bend. Blade B was curled into itself starting mid-blade. Blade C was curled up about 110 degrees and twisted aft.

A video recording obtained from a local news station showed the propeller blades rotating in the unfeathered position shortly after impact. Later in the video recording, it shows the blades in the feathered position.

1.16 TESTS AND RESEARCH

The FAA, Twin Commander Aircraft LLC, Textron Lycoming, and the USDA Forest Service were parties to the investigation.

Investigators examined the wreckage on July 23 and 24, 2005, at Lone Mountain Aviation, Las Vegas, Nevada.

LEFT ENGINE

The left engine was removed from the airframe. Upon inspection, it was determined that the

engine could possibly be test run. It was returned to the Lycoming facilities for an inspection and test run.

Prior to shipment the following inspections were performed and the results noted:

The top spark plugs were removed and inspected. All spark plugs were clean with no mechanical deformation. The spark plug electrodes were gray in color, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart. The spark plugs were reinstalled and hand tightened.

A borescope inspection revealed no mechanical deformation on the valves, cylinder walls, or internal cylinder head.

Investigators manually rotated the left engine with the propeller. The engines rotated freely, and the valves moved approximately the same amount of lift in firing order. The fuel pump plungers moved up and down, and the gears in the accessory cases turned freely. Investigators obtained thumb compression on all cylinders on both engines in firing order.

The magnetos were undamaged. They were not removed or tested. The vacuum pump drive gear remained unbroken. It was not removed or tested.

The oil sump screen was clean and open. The governor screen was clean. The oil screen filter was clean. The oil sump contained 12 quarts of oil.

None of the fuel system components were removed or tested other than the inlet fuel screen, which was removed and inspected before being returned to the fuel injector and hand tightened. The carburetor/injector inlet screen was clean. No damage was noted.

The manufacturer's representative stated there were no discrepancies observed on the left engine during the examination or engine removal. Nothing was observed that would have precluded the engine from making power prior to impact.

RIGHT ENGINE

The right engine was removed from the airframe. Upon inspection it was determined that the engine could possibly be test run. It was returned to the Lycoming facilities for an inspection and test run.

Prior to shipment the following inspections were performed and the results noted:

The top spark plugs were removed and inspected. All spark plugs were clean with no mechanical deformation. The spark plug electrodes were gray in color, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart. The spark plugs were reinstalled and hand tightened.

A borescope inspection revealed no mechanical deformation on the valves, cylinder walls, or internal cylinder head.

Investigators manually rotated the right engine with the propeller. The engines rotated freely, and the valves moved approximately the same amount of lift in firing order. The fuel pump plungers moved up and down, and the gears in the accessory cases turned freely. Investigators obtained thumb compression on all cylinders on both engines in firing order.

The magnetos were undamaged. They were not removed or tested. The vacuum pump drive gear remained unbroken. It was not removed or tested.

The oil sump screen was clean and open. The governor screen was clean. The oil screen filter was clean. The oil sump contained 12 quarts of oil.

No fuel accessories were removed or tested. All fuel lines were observed to be tight and not leaking. The carburetor/injector inlet screen was clean.

Both turbo chargers were observed to rotate, and both waist gates were observed in the full open position. The right engine left waist gate would not close completely. The actuator arm return spring was observed broken. Both turbo charger exhaust bypass valves were in the full open position.

The manufacturer's representative stated there were no discrepancies observed on the right engine during the examination or engine removal. Nothing was observed that would have precluded the engine from making power prior to impact.

Investigators performed further engine testing on September 15 and 19, 2005, at Lycoming Engines, Williamsport, Pennsylvania.

LEFT ENGINE

During the testing of the left engine at the Lycoming facility, the engine was installed on a test cell and started. During the warm-up period, the number eight cylinder head temperature was observed low. The engine was shut down, and the number eight cylinder head was examined. The lower spark plug was removed and observed to contain a large amount of carbon debris. The injector nozzle was observed to contain debris. Both the spark plug and injector nozzle were cleaned and reinstalled.

The engine was reinstalled and ran at various rpm settings with acceptable results. A full throttle rpm value of 2,600 was recorded.

RIGHT ENGINE

During the testing of the right engine at the Lycoming facility, the engine was installed on a test cell and started. The engine obtained a full throttle rpm value of 2,481. The engine was shut down and examined further. The duel magneto timing was checked as follows: Left side 19 degrees BTDC; and right side 18 degrees BTDC. All harness leads were tested. The number eight top harness lead tested bad and was repaired. According to the manufacturer, the damage to the number eight top lead was consistent with impact damage. The bottom spark plugs from cylinder numbers two, three, four, five, six, and eight were observed to contain heavy deposits. Slave spark plugs were installed at the following positions: One bottom; two top and bottom; three bottom; four top and bottom; five bottom; six top and bottom; seven bottom; and eight top and bottom. The top spark plugs for cylinder numbers two, four, six, and eight were tested with a spark plug tester and were observed to fire. The injector nozzles from cylinder numbers two, three, four, six and eight were removed. The number six nozzle contained light debris. The injector nozzles from cylinder numbers one, three, five, and seven were removed, and no debris was observed. Each bank of injector nozzles one, three, five and seven, and then two, four, six, and eight, were flowed separately. No abnormalities were observed.

The right engine was restarted and ran at various rpm settings with acceptable results. A full throttle rpm value of 2,607 was recorded.

FLAP SELECTOR VALVE

On December 7, 2005, Jet Services Enterprises, Inc., performed a bench test of a flap/gear selector valve. The USDA Forest Service representative was also present.

During the inspection, both the gear selector and the flap selector of the valve were observed to be bent. The "stop-pin" on the flap selector lever was missing. All relevant procedures were followed from the "Test Procedure Chart," as contained in the general controls overhaul manual. There was no leakage of fluid or any abnormalities noted during this test.

ADDITIONAL INFORMATION

A review of the aircraft flight manual (AFM) for the Aero Commander, 680 FL, indicated in Section 2, under the "NORMAL OPERATING PROCEDURES" section in the "BEFORE TAKEOFF CHECK" item number 8 specifies wing flaps are to be set at 1/4 down. The wing flap setting of 1/4 down is equal to 10 degrees.

The engines and the flap/gear selector valve were returned to the storage facility after testing.

The IIC released the wreckage to the owner's representative on November 8, 2005.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	47,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	March 1, 2005
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 1, 2005
Flight Time:	5285 hours (Total, all aircraft), 75 hours (Total, this make and model), 4405 hours (Pilot In Command, all aircraft), 65 hours (Last 90 days, all aircraft), 59 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Commander	**Registration:**	N7UP
Model/Series:	680 FL	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	134929
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	June 1, 2005 100 hour	**Certified Max Gross Wt.:**	8000 lbs
Time Since Last Inspection:	39.4 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	8942.6 Hrs as of last inspection	**Engine Manufacturer:**	Textron Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-720-B1BD
Registered Owner:	Commander Northwest LTD	**Rated Power:**	400 Horsepower
Operator:	US Dept of Agriculture - Forest Service	**Operating Certificate(s) Held:**	None
Operator Does Business As:	US Forest Service	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	VGT,2205 ft msl	**Distance from Accident Site:**	
Observation Time:	16:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.79 inches Hg	**Temperature/Dew Point:**	42°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Las Vegas, NV (VGT)	**Type of Flight Plan Filed:**	Company VFR
Destination:	(VGT)	**Type of Clearance:**	VFR
Departure Time:	17:05 Local	**Type of Airspace:**	

Airport Information

Airport:	North Las Vegas VGT	**Runway Surface Type:**	Asphalt
Airport Elevation:	2205 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	12R	**IFR Approach:**	None
Runway Length/Width:	5000 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Serious, 1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious, 1 Minor	**Latitude, Longitude:**	36.203887,-115.188056

Administrative Information

Investigator In Charge (IIC):	Jones, Patrick
Additional Participating Persons:	Ronald Williams; Federal Aviation Administration; Las Vegas, NV Geoffrey Pence; Twin Commander Aircraft LLC; Arlington, WA John B Butler; Textron Lycoming; Williamsport, PA James Morrison; USDA Forest Service; Ogden, UT
Original Publish Date:	September 14, 2007
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=62029