National Transportation Safety Board
Aviation Accident Final Report

Location:	CARLSBAD, CA	**Accident Number:**	LAX94FA257
Date & Time:	06/15/1994, 1434 PDT	**Registration:**	N421AG
Aircraft:	CESSNA 421C	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General Aviation - Business		

Analysis

ABOUT 2 MINUTES AFTER TAKEOFF, THE PILOT DECLARED AN EMERGENCY, STATING THAT HE HAD LOST AN ENGINE AND NEEDED TO RETURN TO THE AIRPORT. THE AIRPLANE DESCENDED INTO ROUGH, BRUSH-COVERED TERRAIN AND THEN STRUCK A LARGE DIRT BERM, ABOUT 1-1/2 MILES NORTHEAST OF THE DEPARTURE AIRPORT. EXAMINATION OF THE ENGINES DID NOT REVEAL ANY OBVIOUS MECHANICAL MALFUNCTION. THE FUEL WAS CORRECT. COMBUSTION CHAMBER SIGNATURES INDICATED THAT THE ENGINES WERE OPERATED AT A LEAN OR MILD DETONATION CONDITION. THE FLAPS WERE EXTENDED ABOUT 30 DEGREES AND THE LANDING GEAR WAS RETRACTED. THE SURVIVING PASSENGER COULD NOT RECALL ANY DRAMATIC ENGINE PROBLEMS, ONLY THAT THE AIRPLANE COULD NOT MAINTAIN ALTITUDE. THE PILOT AND FRONT SEAT PASSENGER WERE NOT WEARING SHOULDER HARNESSES.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A LOSS OF ENGINE POWER FOR UNDETERMINED REASONS. THE PILOT'S FAILURE TO RAISE THE FLAPS AND MAINTAIN ALTITUDE WERE FACTORS IN THE ACCIDENT.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. 1 ENGINE
2. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF

Findings
3. (F) RAISING OF FLAPS - NOT PERFORMED - PILOT IN COMMAND
4. (F) ALTITUDE - NOT MAINTAINED - PILOT IN COMMAND

Factual Information

HISTORY OF THE FLIGHT

On June 15, 1994, about 1434 hours Pacific daylight time, a Cessna 421C, N421AG, crashed during a forced landing, about 1 1/2 miles northeast of the McClellan-Palomar Airport, Carlsbad, California. The airplane was being operated as a visual flight rules (VFR) cross-country business flight to Las Vegas, Nevada, when the accident occurred. The airplane, operated by the pilot, was destroyed. The certificated commercial pilot and one pilot-rated passenger received fatal injuries. A second passenger received serious injuries. Visual meteorological conditions prevailed. The flight originated at the McClellan-Palomar airport about 1431 hours.

A Federal Aviation Administration (FAA) air traffic controller at the McClellan-Palomar airport reported that he was working the local control position and cleared the pilot for takeoff. The takeoff roll and rotation appeared normal. About 2 minutes after departure, the controller again noticed the aircraft on a right downwind and it appeared lower than the standard pattern altitude and appeared slower than normal with a slight nose up attitude. About midfield, the pilot made a radio call and stated: "...palomar golden eagle...(unintelligible)...return for landing, i've just lost an engine." The controller cleared the airplane to land on runway 24. There was no further communication from the pilot.

The airplane appeared to make a gentle right turn about 1,000 to 1,500 feet above the ground, and began a gradual descent. The landing gear appeared up and the controller observed the airplane for about 35 seconds. The pilot turned toward the airport and the airplane was observed to descend into rolling brush covered terrain northeast of the airport.

The surviving passenger reported that while he was seated in an aft-facing seat, he heard the pilot declare an emergency; however, he did not recall any dramatic engine problems. He indicated that he felt some type of bump and heard some sort of a "bang" sound. The airplane began descending and he heard a beeping sound from the cockpit that continued throughout the descent to impact. He described the sound as similar to that when the altitude alert tone sounded on previous flights. The airplane did not yaw adversely one direction or the other and he did not recall hearing any obvious change in the pitch or synchronization of the sound of the engines.

The accident occurred during the hours of daylight at latitude 33 degrees 08.56 minutes north and longitude 117 degrees 15.10 minutes west.

CREW INFORMATION

The pilot held a commercial pilot certificate with airplane single-engine land, airplane single-engine sea, airplane multiengine land, instrument airplane, and rotorcraft helicopter ratings. The most recent second-class medical certificate was issued to the pilot on March 1, 1994, and contained the restriction that his medical certificate was not valid for night flying or by color signal control.

According to the pilot's logbook, his total aeronautical experience consisted of about 3,340.2 hours, of which 1,240.2 were accrued in multiengine aircraft. In the preceding 90 and 30 days prior to the accident, the logbook lists a total of 58.6 and 22.6 hours respectively flown.

AIRCRAFT INFORMATION

The aircraft had accumulated a total time in service of 2,943.2 flight hours. Examination of the maintenance records revealed that the most recent annual inspection was accomplished on September 13, 1993, 98.1 flight hours before the accident. The airplane had received an oil change on both engines prior to the accident flight and, in addition, all of the spark plugs on the left engine were replaced. The recording hobbs meter indicated that 1.5 hours had elapsed from the oil change to the accident. The engines had accrued 2,943.2 hours of operation. A major overhaul was accomplished on the left engine on March 11, 1988, 1,140.9 hours of operation before the accident. The right engine received a major overhaul on November 11, 1992, 239.7 hours of operation before the accident.

Fueling records at Gibbs Aviation, Carlsbad airport, established that the aircraft was last fueled before the accident flight with the addition of 116.4 gallons of 100LL octane aviation fuel from truck No. 974 before the truck ran out of fuel. Truck 974 had previously provided fuel to three aircraft before being utilized to fuel the accident airplane. An additional 35 gallons were added from truck No. 971. Truck 971 provided fuel to twelve additional aircraft after fueling the accident airplane. Both fuel trucks were inspected by FAA personnel with no reported discrepancies. The airplane is equipped with fuel filler restrictor collars that preclude fueling from flared style (Jet A) fuel nozzles. Gibbs Aviation personnel reported that their Jet A fuel truck is equipped with flared fuel nozzles. FAA inspectors reported that the Jet A fuel truck was not equipped with flared fuel nozzles.

The fuel supply for both fuel trucks is from a storage tank that last received 9,000 gallons of 100LL on June 6, 1994. On the date of delivery, an American Petroleum Institute (API) specific gravity test, corrected for temperature, indicated 70.7 degrees. Following the accident, Gibbs personnel reported that API specific gravity tests on contents of the storage tank and the fuel trucks 971 and 974, corrected for temperature, were 70.1, 71.1, and 70.5 degrees, respectively.

According to the engine service manual, fuel lines from the fuel manifold carry metered fuel to each cylinder's fuel discharge nozzles. An air bleed and nozzle pressurization system consisting of tubes and sleeve fittings provides pressurized air around the fuel nozzle. The pressurized air (upper deck air) is supplied by turbocharger discharge air and aids in vaporization of the fuel.

The aircraft is equipped with auxiliary fuel pumps that have OFF, LOW, and HIGH settings. The switches are a toggle-type, lever lock design that prevents the HIGH setting from being selected unless the switch is pulled up and over a locking detent. The aircraft's flight manual supplement pertaining to the operation of the three-position switch indicted that the LOW position can be used, when required, to provide supplementary fuel pressure for all normal operations. The HIGH position is reserved for emergency operation to sustain partial engine power in the event on an engine-driven fuel pump failure. The flight manual contains a caution that states: "...If the auxiliary fuel pump switches are placed in the HIGH position with the engine-driven fuel pump(s) operating normally, total loss of engine power may occur."

The aircraft flight manual indicated that the airplane has a single-engine rate of climb of 350 feet per minute. The flight manual also contains a warning that states:"...The propeller on the inoperative engine must be feathered, landing gear retracted and wing flaps up or continued flight may be impossible."

METEOROLOGICAL INFORMATION

The closest official weather observation station is the McClellen-Palomar airport, which is

located 1 1/2 nautical miles southwest of the accident site. At 1434 hours, a surface observation was reporting in part: Sky condition and ceiling, scattered clouds at 1,800 feet, estimated ceiling, 3,000 feet broken; visibility, 30 miles; wind, 210 degrees at 10 knots; altimeter, 29.97 inHg.

AERODROME AND GROUND FACILITIES

The McClellan-Palomar airport has a published elevation of 328 feet mean sea level. The airport is equipped with one hard- surfaced runway oriented on 060/240 degrees. Runway 24 is 4,700 feet long by 150 feet wide.

WRECKAGE AND IMPACT INFORMATION

National Transportation Safety Board investigators examined the airplane wreckage at the accident site on June 16 and June 17, 1994. A subsequent examination of the wreckage occurred on June 23, 1994, after the airplane was recovered to Ramona, California. Ground scars and wreckage debris were oriented on about a 100 degrees heading on about eight degree upsloping brush-covered terrain. About 120 feet after initial ground contact, the nose of the airplane struck a 20-foot-high, 45-degree upsloping ridgeline. The airplane came to rest on top of the ridgeline with the nose of the airplane oriented on about a 180-degree heading. (All heading/bearings noted in this report are oriented toward magnetic north.)

All of the airplane's major components were found at the main wreckage area. The nose and baggage compartment of the airplane were crushed and folded in an aft direction. Upward crushing of the bottom of the aircraft was evident from the nose to the instrument panel. The radar antenna separated from the airplane and was located about 20 feet forward of the fuselage.

The cockpit floor was crushed upward to the rudder pedals. The lower left side of the instrument panel was crushed and bent in a forward direction. The right side of the panel was similarly bent forward. The instrument panel glare shield was crushed downward over the top of the panel. Both of the control yokes were removed by rescue personnel by cutting of the control columns near the instrument panel. The entire windshield and overhead roof of the cockpit was removed by rescue personnel. The right wing exhibited minor leading edge aft crushing about 2 feet inboard from the tip with chordwise scratching along the underside of the wing. The left wing displayed minor leading edge wrinkling and aft crushing of the leading edge at the outboard tip. The underside of both wings and fuselage exhibited upward crushing and buckling.

The flight control surfaces remained connected to their respective attach points and flight control system cable continuity was established. The landing gear was retracted. The manufacturer reported that the flap chain travel corresponded to about a 30-degree flap setting.

The tail assembly separated from the fuselage at the rear pressure bulkhead and was only attached to the fuselage by the empennage flight control cables. It was twisted to the right about 90 degrees and was lying flat on the ridgeline, downslope of the fuselage. The trailing edge of the rudder was deflected to the left. The trailing edge of the rudder trim tab was deflected to the right and the actuator was extended about 2.625 inches. The manufacturer reported that the actuator extension corresponds to 6-degrees tab right setting. The rudder trim tab range is from 17 degrees left to 12 degrees right.

The elevator trim tab actuator was found extended beyond the tab down limit. The elevator trim cable was not attached to the empennage pulley. The aileron trim actuator on the left wing aileron was extended about 0.75 inch which corresponded to about 3 degrees tab up.

Fuel was present in each tank and the fuel selectors were positioned on the left and right main tanks. Samples of fuel obtained from each tank were free of contaminants. The fuel tank float valves were removed and examined. Each functioned properly.

The left engine sustained impact damage to the underside and front portion of the engine. It was canted slightly to the left with buckling of the left side of the engine cowling. The crankshaft could be rotated 360 degrees. Gear and valve train continuity was established and thumb compression in each cylinder was noted when the crankshaft was rotated by hand. At the engine, the mixture and propeller controls were about midrange. The turbocharger compressor blades could be rotated by hand. The compressor blades exhibited leading edge nicking and gouging. A small amount of sand and dirt was found in the turbocharger filter.

Fuel was present to the fuel divider and the screen was free of contaminants. The engine-driven fuel pump rotated freely and the shear pin was intact. The fuel control inlet screen contained a slight amount of lint, otherwise was free of any contaminants. The throttle butterfly valve was open.

The magnetos produced spark at all terminals upon hand rotation. They were both timed at 25 degrees before top dead center. The sparks plugs exhibited no unusual combustion signatures. The left propeller blades separated from the hub assembly. One propeller blade exhibited about 20 degrees aft bending about midspan, and torsional twisting. A second blade exhibited torsional twisting, aft curling and bending about midspan, a forward curl and slight "S" bending at the trailing edge about 1 inch inboard from the tip. The third blade retained a portion of the separated hub and was practically straight with a slight torsional twist and slight aft bend about 8 inches inboard from the tip. All of the blades exhibited chordwise scratching at the blade tips.

The right engine remained attached to the wing and sustained impact damage to the underside and front portion of the engine. The crankshaft could be rotated 360 degrees. Gear and valve train continuity was established. Thumb compression in each cylinder was noted, when the crankshaft was rotated by hand. At the engine, mixture and propeller controls were about midrange. An oil breather line that connects the turbocharger to the oil filler and engine case was found loose from its attach point to the turbocharger. Oil and discoloration was noted at the point where it was resting on the turbocharger housing. The engine air inlet scoop on the left side of the engine was clogged by twigs and leaves. The turbocharger compressor blades could be rotated by hand without binding or rubbing and did not contain any foreign material. The compressor blades were not damaged. Fuel was present to the flow divider and the screen was free of contaminants. The engine driven fuel pump rotated freely and the shear pin was intact. The fuel control inlet screen contained a slight amount of lint, otherwise was free of any contaminants. The throttle butterfly valve was closed. The connecting arm from the butterfly valve to the fuel control was sheared and exhibited 45-degree angle fracture planes. The fuel lines to the front of the fuel control and the upper deck fitting on the throttle body were fractured and displayed similar fracture planes. The mixture arm was midrange. The upper deck reference line sleeve fitting around the right engine's No. 5 cylinder injector nozzle was found broken. Blue staining was noted on the sides of the fitting at the point of separation.

The magnetos produced spark at all terminals upon hand rotation. They were both timed at 23 degrees before top dead center. The sparks plugs exhibited no unusual combustion signatures except for the No. 5 cylinder. The bottom No. 5 plug exhibited an accumulation of a soft grey material on the insulator.

Two of the right propeller blades separated from the hub assembly. One blade remained attached to the hub and remained attached to the crankshaft. It was practically straight with an aft bend about 8 inches inboard from the tip. A second blade was also almost straight with a slight torsional twist at the trailing edge. The third blade was broken from the hub and located under the engine. It exhibited an aft curvature of about 15 degrees, and torsional twisting of the trailing edge at the tip. All of the blades exhibited chordwise scratching at the tips. The propeller spinner was crushed aft over the hub dome and exhibited slight clockwise curling.

MEDICAL AND PATHOLOGICAL INFORMATION

A post mortem examination of the pilot was conducted by the San Diego County Office of the Medical Examiner, 5555 Overland Ave., Building 14, San Diego, California, on June 16, 1994. A toxicological examination of the pilot was conducted by the FAA Civil Aeromedical Institute (CAMI) on November 1, 1994, and was negative for alcohol. Pseudoephedrine was detected in the blood and urine. Phenylpropanolamine was detected in the urine; 0.025 (ug/ml) diphenhydramine was detected in the blood; 0.139 (ug/ml) doxylamine was detected in the blood; 0.027 (ug/ml) of dextromethorphan was detected in the blood; 0.185 (ug/ml) of diphenhydramine was detected in the urine; 2.362 (ug/ml) of doxylamine was detected in the urine; 0.128 (ug/ml) of dextromethorphan was detected in the urine; and 105.000 (ug/ml) acetaminophen was detected in the urine.

SURVIVAL ASPECTS

The cockpit seats separated from their respective seat tracks. Rescue personnel and the surviving passenger reported that the front seat occupants did not have their shoulder harnesses fastened when the accident occurred. The passenger noted that the pilot routinely did not wear the shoulder portion of the seatbelt system. The surviving passenger was seated in an aft facing seat.

TESTS AND RESEARCH

The airplane's annunciator panel was sent to the National Transportation Safety Board Materials Laboratory for examination. The examination revealed that the filament coils of all light bulbs were not stretched.

The separated upper deck reference sleeve fitting from the right engine's No. 5 cylinder injector nozzle was also sent to the Safety Board Materials Laboratory. The examination revealed that the sleeve's tubing had separated from the sleeve fitting at the point of brazing (weld). A metallographic specimen of the fitting revealed that the tube was canted at a slight angle and not inserted fully into the fitting when brazed. About a 2/3 radius section of the fitting had no evidence of a definable fracture and consisted of the brazing material. Another 2/3 radius section of the fitting displayed fracture features consistent with overstress separations.

On July 14, 1994, Safety Board investigators conducted an examination of the airplane's engines at Teledyne Continental Motors, Mobile, Alabama. The parties noted in this report participated in the examination. The manufacturer's report stated, in part, that the left engine "...exhibited normal operational signatures throughout except for the following discrepancies.

The engine crankcase exhibited fretting at number two and three main bearings, movement of the number three main bearing in the left crankcase and the number three piston pin aluminum plug was broken. These conditions were not causing an operational problem at the time of this teardown....Piston crown and combustion deposits were very light. The number five was almost completely clean of any deposits. This would indicate either very lean operation or mild detonation was cleaning off the deposits. No combustion chamber or piston crown damage was observed."

The manufacturer's report stated, in part, that the right engine: "...This engine exhibited normal operational signatures throughout. The piston and combustion chambers deposits were light and may indicate this engine was operated lean or into mild detonation. No damage to the combustion chambers or pistons were observed."

The manufacturer simulated a fracture of the upper deck air reference sleeve at the No. 5 cylinder by cutting the air tube at the point of assembly into the sleeve fitting. These components were installed on a production GTSIO-520-L engine while it was mounted in an engine test cell. The engine was run to full power and performed to specification. The manufacturer reported that the readings were not documented; however, they were within test specification parameters.

On July 14, 1994, Safety Board investigators conducted an examination of the aircraft's turbochargers and wastegates at Teledyne Continental Motors in Mobile, Alabama. The turbochargers were disassembled for inspection the the wastegates were functionally checked.

On August 24, 1994, Safety Board investigators conducted an examination of the turbocharger controllers and overboost valves at Allied Signal Inc., Torrance, California. The examination revealed that the overboost valves were within the inspection tolerances. The controllers functioned within limits.

ADDITIONAL INFORMATION

Detonation is described in The Sky Ranch Engineering Manual, Piston Aircraft Engines, in chapter 3, Engine Performance. The description is included as part of this report.

Additional party representatives to the investigation not listed on page 5 of this report were:

Armond V. Edwards Owner's representative, 7932 Bal Harbour Court, Fort Worth, TX., 76179

Dick Davy Owners' representative, 3129 Brookhill, La Crescenta, CA., 91214

WRECKAGE RELEASE

The Safety Board released the wreckage, located at Ramona Aircraft Salvage, Ramona, California, to the owner's representatives on July 8, 1994. The engines and annunciator panel were retained by the Safety Board for examination until their release on September 23, 1994.

Pilot Information

Certificate:	Commercial	**Age:**	51, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	03/01/1994
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	3340 hours (Total, all aircraft), 59 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N421AG
Model/Series:	421C 421C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	421C-0843
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	09/13/1993, Annual	**Certified Max Gross Wt.:**	7450 lbs
Time Since Last Inspection:	98 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	2943 Hours	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	GTSIO-520-L
Registered Owner:	ALEXANDER GRECO, TRUSTEE	**Rated Power:**	375 hp
Operator:	ALEXANDER GRECO, TRUSTEE	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	CRQ, 328 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	1434 PDT	**Direction from Accident Site:**	225°
Lowest Cloud Condition:	Scattered / 1800 ft agl	**Visibility**	30 Miles
Lowest Ceiling:	Broken / 3000 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	
Precipitation and Obscuration:			
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:	LAS VEGAS, NV (LAS)	**Type of Clearance:**	VFR
Departure Time:	1431 PDT	**Type of Airspace:**	Class D

Airport Information

Airport:	MCCLELLAN-PALOMAR (CRQ)	**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced Landing

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	SCOTT R ERICKSON,	**Report Date:**	04/25/1995
Additional Participating Persons:	KEITH BALLENGER; SAN DIEGO, CA WILLIAM B WELCH; WICHITA, KA SCOTT BOYLE; ARVADA, CO STEVE G MACON; PHOENIX, 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/.		