Aviation Investigation Final Report

Location:	North Las Vegas, Nevada	**Accident Number:**	LAX08LA274
Date & Time:	August 22, 2008, 06:28 Local	**Registration:**	N415MK
Aircraft:	Killgore Velocity	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of engine power (partial)	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Shortly after takeoff from the airport, local air traffic controllers noted that the experimental amateur-built airplane was flying lower than expected, and not gaining altitude. The airplane reached a maximum altitude of about 300 feet above the ground and continued for approximately 30 seconds before descending into a residential area and impacting an occupied residence.

The accident flight was the first time the pilot had flown the airplane, and the first time the airplane took off from this particular airport. The airplane had been flown by the owner/builder for about five hours prior to the accident, and at a different airport in the area. Following the first five hours of flight, the owner/builder decided to disassemble the wings of the airplane and tow it to the accident airport because he noticed that the airplane's ground roll during the initial test flights was longer than he expected, and that oil was observed leaking from the engine cowling. The airplane was not flown again until the accident flight, and after the leaking had been corrected.

Prior to the airplane conducting any flights, it received a special airworthiness certificate as an experimental amateur-built airplane by a Federal Aviation Administration (FAA) designated airworthiness representative (DAR).

The purpose of the accident flight was to test the airplane's performance with engine boost from a noncertified, belt-driven supercharger that is normally used in automotive applications. (The supercharger had been installed by the owner/builder prior to the airplane’s certification

review by the DAR; however, the accident flight was the first flight in which the supercharger control would be fully activated). The pilot had been assisting the owner/builder throughout the certification and flight testing processes.

Postaccident examination did not reveal any preimpact anomalies with the airframe. However, the examination of the engine and accessories revealed that the supercharger belt was found lodged behind the idler pulley. No signatures consistent with rotation during the impact sequence were found during examination of the supercharger, which is indicative of the belt being detached from the supercharger. Typically, supercharger belt tension is maintained through the use of an idler pulley on a sliding adjustable plate that is secured to the supercharger housing by three bolts, designed to be secured with safety wire, in 2-inch-long adjustment slots. No safety wire was found on the bolts, and one of the bolts was observed missing. Additionally,the idler plate was in a position 1/4-inch short of the most slack belt setting (i.e. 1-3/4 inches into the 2-inch adjustment toward slack), with witness marks consistent with it being in that position at impact.

The owner/builder performed a prior flight with the supercharger set to zero boost and he reported that the airplane's performance was poor. The investigation revealed that the supercharger manufacturer, in its instructions and publications, cautioned that the engine should perform like a normally aspirated engine in the event of a belt failure, but advised that ground tests should be done with the belt removed in order to simulate a failure. The manufacturer also noted that a belt failure in flight would result in a richer than normal fuel mixture, and that the pilot should compensate by adjusting the mixture in order to maintain adequate engine power. The investigation revealed that the owner/builder did not test the engine with the supercharger belt removed, and that he also had removed the idler pulley's lips in an attempt to resolve an alignment issue with the belt.

At the time of the accident, the airplane was still flying within the “Phase 1” initial flight testing operating limitations specified by the DAR who certified the airplane as experimental amateur-built. These limitations indicated that, “after a minimum time of five (5) hours” the airplane could be flown for 25 hours of operations “while based at [the accident airport]; OR, a one time flight to the "Airplane Base of Operations" may also be conducted remaining clear of all densely populated areas and congested airways”

At the time of the accident, Phase 1 flight operations for experimental aircraft at the accident airport were permitted by the FAA, after the aircraft had completed a minimum of 5 flight hours at an alternate airport, and after having demonstrated that it had met the minimum controllability requirements set forth in FAA regulations and advisory documents. About four

months after the accident, the local FAA flight standards district office issued a memorandum to its inspectors to no longer permit any Phase 1 flight operations of experimental aircraft at the accident airport, or an adjacent local major airport, because the office deemed that the airports were not suitable for these types of operations, for “safety reasons”, and because they did not meet the policy in FAA Order 8130.2F which specifies that "in the case of the first flight of an aircraft from an airport surrounded by a densely populated area, but with at least one acceptable approach/departure route of flight, the FAA must ensure that the route of flight is selected which subjects the fewest persons and least property to possible hazard". The memorandum also instructed the FAA inspectors to notify their assigned DARs of this revised guidance.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A partial loss of engine power during initial climb due to the detachment of the engine supercharger drive belt. The detachment resulted from the owner/builder's inadequate installation of the supercharger system and belt-tensioning adjustment.

Findings

Aircraft	Recip eng supercharger - Failure
Aircraft	Recip eng supercharger - Incorrect service/maintenance
Personnel issues	Installation - Owner/builder
Organizational issues	(general) - FAA/Regulator

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Initial climb	Loss of engine power (partial) (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On August 22, 2008, at 0628 Pacific daylight time, an experimental Killgore Velocity 173RG, N415MK, collided with a residential building after takeoff in North Las Vegas, Nevada. The airplane was registered to the owner/builder, and was being operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The certificated airline transport pilot and two people on the ground were killed. Post impact fire destroyed the airplane and partially burned the residence. The local flight departed North Las Vegas Airport (VGT) at 0627. Visual meteorological conditions prevailed, and no flight plan had been filed.

Review of voice communications provided by the Federal Aviation Administration (FAA) revealed that the pilot initially made contact with VGT Air Traffic Control (ATC) and requested to taxi the airplane to the active runway. The ground controller asked the pilot to indicate his direction of flight and confirm that he had the current automatic terminal information service (ATIS) information. The pilot responded, stating that he would be staying within the airport traffic pattern. The ground controller proceeded to give the pilot taxi instructions to the hold short line of runway 7. Once at the hold short line the pilot switched to the tower frequency and established communications with the tower controller.

The pilot then requested, "I would like to do a take off, we're ready for takeoff 12 right we'd like to stay in the pattern and right traffic." The controller then gave the pilot taxi instructions to runway 12 right. The pilot proceeded to taxi the airplane to the runway, and during the taxi sequence, the controller cleared the pilot to takeoff and fly in a right-hand traffic pattern.

The airplane then began its takeoff roll and departed. About 1 minute 30 seconds later, the tower controller asked the pilot if he needed any assistance to which the pilot responded, "I'm going in, I'm going in, I'm going in."

The ATC ground and tower controllers reported similar observations of the airplane as it departed the airfield. They stated that after takeoff the airplane appeared to be flying lower than they expected, and not gaining altitude. Both controllers then observed the airplane descend into the residential area.

The airplane collided with a residence 1.1 miles beyond the departure end of runway 12 right.

Radar data provided by the FAA indicated that the airplane reached a maximum altitude of about 300 feet above ground level (agl) and continued for approximately 30 seconds before descending into the residence.

PERSONNEL INFORMATION

The pilot, age 76, held an airline transport pilot certificate and a flight instructor certificate both with ratings for airplane single-engine land, multiengine land, and instrument airplane. He additionally held a flight engineer certificate, and a mechanic certificate with ratings for airframe and powerplant.

He held a third-class airman medical certificate issued in September 7, 2006, with the limitation that he must wear lenses for near and distant vision.

The pilot's logbook was not recovered for inspection. On his latest FAA medical application he stated that he had amassed 6,250 hours of total flight time.

FAA records indicated that the pilot owned a Velocity Elite XL airplane.

The owner/builder reported that this was the first time the pilot had flown the accident airplane. He stated that the pilot had assisted him with readying the airplane throughout the certification and flight testing process.

AIRCRAFT INFORMATION

The canard configuration, four-seat, retractable gear airplane, was issued a Special Airworthiness Certificate by a Designated Airworthiness Representative (DAR) on March 9, 2008. It was powered by a four-cylinder Lycoming IO-360-C1C engine, and equipped with an MT 3-blade wood/composite electrically controlled constant speed propeller; hub model number: MTV-18-B; blade model number: LD168-101B.

Review of the engine logbooks revealed that Textron Lycoming had overhauled the engine in April 1994, 5.1 flight hours prior to the accident. At the time of the overhaul the engine had accrued 3,156.07 hours of total time. The owner/builder stated that the engine had been preserved and kept in storage until installation on the airplane in 2007. Engine records revealed that the pilot had reviewed the Airworthiness Directive (AD) compliance records for the airplane on April 7, 2008.

The owner/builder modified the engine by installing both an uncertified Aero Supercharger Solutions supercharger, and an uncertified Light Speed Engineering (LSE) PLASMA II Plus capacitive discharge ignition system. A conventional magneto remained installed on the right magneto pad. Ignition timing for the LSE ignition system was governed by a Hall Effect module mounted on the left magneto pad.

The supercharger system consisted of an automotive, belt driven, centrifugal type, Vortech Engineering supercharger, model V-1.

According to the owner/builder, the engine boost control pressure was regulated by a butterfly valve located inside the inlet plenum of the supercharger compressor. The pilot controlled the position of the butterfly valve through a push/pull control cable, which terminated at the throttle quadrant. The push/pull cable was configured such that the full forward position corresponded to the butterfly valve being completely open. The diameter of the butterfly valve was constructed to be smaller than the diameter of the inlet plenum. The builder stated that this size difference allowed air to continue to be supplied into the induction system when the butterfly valve was closed.

Additionally an altitude compensating relief valve was fitted to the supercharger outlet manifold, ahead of the fuel injector servo inlet. The supercharger manufacturer stated that this valve was designed to prevent engine inlet manifold pressure from exceeding 32 inches of mercury (inHg).

The supercharger housing contained a gearbox, which drove a forward facing impeller. An automotive type pulley was mounted to the gearbox input shaft. A larger pulley was affixed to the engine crankshaft, and rotational energy was transferred between the pulleys through a ribbed automotive drive belt. Drive belt tension was maintained by the use of an idler pulley, which was attached to the supercharger housing by an idler pulley adjustment plate.

The owner/builder stated that the supercharger and electronic ignition system were already installed on the airplane at the time it was issued the special airworthiness certificate.

Weight and Balance

The National Transportation Safety Board investigator-in-charge (IIC) reviewed the airplane weight and balance documentation provided by the owner. The documentation stated a basic empty weight of 1,740 pounds, with a maximum gross weight of 2,700 pounds.

The, 'Velocity Owner's Flight Manual and Weight and Balance' documentation for the accident airplane type states:

'The normal equipped empty weight is approximately 1,275 pounds. Actual weights for each airplane will vary according to installed equipment and builder workmanship. The maximum allowable gross weight for takeoff is 2,250 pounds. (2,400 pounds for the Long Wing, LW, model) except as noted below. The strake baggage areas are structurally limited to 100 pounds each side. The airplane can structurally accommodate pilots or passengers weighing up to 250 pounds. Actual limitations of each pilot area, each baggage area and fuel load depends on the empty weight and balance of the particular airplane. Nose ballast may be required for light pilots.'

The owner stated that for the accident flight, approximately 90 pounds of ballast was installed on the forward right seat. He further stated that the night prior to the accident he serviced the airplane with the addition of 10 gallons of 100-octane aviation fuel, bringing the total fuel on board to about 35 gallons. FAA medical records indicated that the pilot's weight at the time of his last medical application was 216 pounds.

The owner reported that the accident airplane was the long wing model. He stated that the airplane had a high basic empty weight, which he attributed to the installation of additional equipment. This equipment included electrically operated seats, door seals, and a 5-gallon fuel header tank.

METEOROLOGICAL INFORMATION

The closest aviation weather observation station was located at VGT. An aviation routine weather report (METAR) for VGT was issued at 0632 PDT. It stated: winds from 360 degrees at 3 knots; visibility 10 miles; skies clear; temperature 24 degrees Celsius; dew point 02 degrees Celsius; altimeter 29.84 inHg.

WRECKAGE AND IMPACT INFORMATION

FAA personnel responded to, and documented, the accident site. The airplane came to rest in a 45-degree left wing low attitude, on a heading of about 025 degrees magnetic within the southwest rear portion of a residence. The main wreckage, along with the residence, was extensively fire damaged.

MEDICAL AND PATHOLOGICAL INFORMATION

The Clark County Nevada Medical Examiner conducted an autopsy on the pilot. The cause of death was reported as multiple injuries resulting from the airplane accident.

Toxicological tests on specimens from the pilot were performed by the FAA Civil Aeromedical Institute.

Analysis of the specimens contained the following findings:

>> 48 (%) CARBON MONOXIDE detected in Blood
>> 3.18(ug/ml) CYANIDE detected on Blood

>> NO ETHANOL detected in Vitreous

>> METOPROLOL detected in Blood
>> METOPROLOL detected in Urine

Review of the pilot's medical certificate application revealed that he had indicated the use of

metoprolol for blood pressure control.

TEST AND RESEARCH

The wreckage was recovered from the accident site and moved to a storage facility at North Las Vegas airport where the Safety Board IIC, and representatives from the FAA and Textron Lycoming continued the inspection.

Airframe

The majority of the airplane was constructed with composite materials, and consumed by fire.

Examination confirmed control continuity for the canard from the push-pull tube located at the control stick through to the canard control arm. The control arm eye bolt exhibited a buckling failure with rough granular surface features at the failure point. The torque tubes were observed to continue to the remnants of the burnt canard surfaces and traced through to the canard.

Aileron control continuity was confirmed from the control stick through to the torque tube located within the center tunnel area. Four feet aft of the pilot seat, the torque tube was fractured. The fracture area exhibited buckling, with granulated surface features noted at the failure point. The remaining section of tube was still connected to the aileron center control assembly.

The right rudder cable was attached at the foot pedal. Fifteen feet aft of the attach point the cable was cut by recovery personnel. The cable then continued aft of the cut, and was attached to the thermally damaged control arm in the right winglet.

The left rudder cable was separated at the foot pedal attach point. The attach bolt and bushing were in place. The end of the rudder cable was located within the main wreckage, and was separated in a broomstraw pattern. The remaining section of the rudder cable was cut by recovery personnel and terminated at its associated control arm in the left winglet.

The thermally damaged fuel mixture, throttle, and supercharger controls were attached at the throttle quadrant, and all were observed in the full forward position. The owner/builder stated that these positions corresponded with maximum throttle, maximum supercharger boost, and full rich fuel mixture.

The electrically operated fuel pump was thermally damaged and its operation could not be ascertained.

Approximately 100 pounds of ballast material was located in the forward right foot well area.

All major sections of the airplane were accounted for during the examination.

Engine

The entire engine had sustained fire damage. The underside of the engine, including the oil sump, induction system, intake manifolds, and fuel injection servo were consumed by fire. The sump mounted engine data plate could not be located. The fuel inlet screen was recovered, and was free of contaminants. The engine driven fuel pump, right magneto, and Hall Effect sensor were affixed to their respective mounting pads and exhibited thermal damage. The engine data plate was not located.

Examination of the fuel injectors revealed that their passages were clear. The fuel flow divider and internal diaphragm were thermally damaged.

The top spark plugs were of the automotive type DENSO W27EMR-C, and connected to fire damaged automotive ignition leads. The top spark plug electrodes for cylinders 1 and 3 were sooted and black in color. The top spark plug electrodes for cylinders 2 and 4 were dark grey in color.

The bottom spark plugs were Champion aircraft type REM38E. The bottom spark plug electrodes for cylinders 1 and 3 were oil soaked. The bottom spark plug electrodes for cylinders 2 and 4 were dark grey in color.

Each spark plug was tested utilizing a pressurized spark plug tester. All plugs produced a spark.

The engine was mounted on a stand at the propeller hub. The engine was rotated, and drive train continuity was established through to the accessory case. The valves and rocker arms each moved approximately the same amount of lift. Residual oil was observed within the rocker areas.

The engine cylinders were removed. The cylinder head and piston crown for cylinders 1 and 3 were oil soaked. The cylinder head and piston crown of cylinders number 2 and 4 were dark grey in color. No mechanical deformation of the valves, cylinder walls, or cylinder heads was noted, and according to the Lycoming representative, no indications of detonation were present.

Resistance of the number 3 and 4 connecting rods at the crankshaft was noted when they were moved by hand. Both connecting rods were removed. Visual examination of the main Babbitt metal bearing surfaces of the connecting rods revealed thermal damage, which the Lycoming representative stated was consistent with post accident thermal exposure.

Supercharger

The supercharger system was removed from the engine for disassembly.

The supercharger was attached to the engine by a combination of fabricated steel plates affixed to the forward crankcase thru bolts.

The inlet plenum and outlet manifold were consumed by fire. The altitude compensating relief valve was located, and observed fire damaged; the internal valve and spring were separated from the housing and free within the valve body.

The lower portion of the inlet volute was thermally damaged, exposing the inner section of the volute chamber. The impeller wheel could not be rotated by hand.

Supercharger belt tension was maintained through the use of an idler pulley. The pulley was affixed to a sliding adjustable plate, which contained three, 2-inch-long slots. The adjustable plate was attached to the supercharger housing through the slots by three bolts. The configuration allowed for about 2 inches of adjustment travel for the idler pulley.

The upper left and lower center adjustment bolts were observed firmly in place. The third bolt, located in the upper right corner of the plate, was missing and could not be located in the airplane wreckage. The heads of the two remaining bolts were drilled for safety wire, however, no wire was present.

The idler pulley adjustment plate was observed distorted approximately 3/16 inch away from the supercharger housing in the area adjacent to the missing bolt. The idler pulley was misaligned with the crankshaft and supercharger pulleys by about 3/16 inch in the aft direction.

The two remaining idler pulley adjustment plate bolts were removed. The idler plate was noted in a position 1/4 inch short of the most slack belt setting. Bolt thread marks were noted on the right wall surfaces of the top left, and top right bolt slots. Thread marks were noted on the left slot wall surface of the lower bolt slot. Rust witness marks corresponding to the bolt heads of the left and lower bolts were noted on the adjustment plate. No corresponding marks were observed on the plate in the area of the missing bolt.

A 3-inch-long fragment of drive belt material was lodged behind the lower half of the idler pulley, below the pulley shaft. The belt section was curved in a manner that followed the projected path of the operating belt. The idler pulley was removed and a black discoloration on the adjustment plate consistent with transfer marks was observed.

The volute shroud from the supercharger body was removed. The impeller blades and volute shroud appeared free of rotational scoring. The impeller and pulleys were then rotated by hand; rotation of the pulley produced an appropriate rotation of the impeller via the gearbox.

According to documentation published by Vortech Engineering, the maximum rotational speed of the supercharger impeller is 55,000 rpm.

The owner/builder reported that during initial engine testing he observed chaffing on the edges of the supercharger drive belt, adjacent to the idler pulley lip. He believed this was a result of belt misalignment, and as such, he attempted to make adjustments. He stated that he brought the chaffing to the attention of a representative from Aero Supercharger Solutions. The representative recommended that he resolve the probable misalignment that was causing the chaffing, but that it was acceptable to have the idler pulley modified to remove the lips on either side of the pulley edge. The owner/builder reported that he subsequently removed the idler pulley lips.

Propeller

The propeller hub assembly was extensively fire damaged. All three blade roots were attached at the hub, fire damaged, and reduced to approximately 1/4 of their original length. A fractured propeller blade was located in the garden of a residence adjacent to, and beyond, the wreckage burn area. The blade exhibited lengthwise abrasions and leading edge dents. The wood core of the blade was splintered in an aft direction.

The fire damaged propeller multifunction control unit was located on the instrument panel, and was observed set to the AUTO and HIGH rpm position. Thermal damage prevented determination of the position of the rpm selector button.

The propeller balance weights for all three blades were at about the 33 degrees position relative to the crankshaft. This position corresponded to the approximate low pitch blade angle according to the propeller manufacturer's overhaul manual.

The owner/builder reported that during ground run tests that occurred the week prior to the accident, he was unable to get the engine to attain a sufficiently high rpm. He reported ultimately being able to achieve proper rpm by adjusting the blade end stops located within the propeller hub.

Documentation obtained from the propeller manufacturer revealed that the engine/propeller combination met the propeller vibration airworthiness standards defined in Federal Air Regulation (FAR) 23.907.

ADDITIONAL INFORMATION

The Experimental Amateur-Built Airplane Operating Limitations for the accident airplane dated March 9, 2008 were reviewed. The limitations specified the following compliance under the section: Phase 1 Limitations-Initial Flight Testing,

'After a minimum time of (5) hours, and after controllability, airworthiness, and safety checks required by FAR 90.319(b) and chapter 4 of Advisory Circular 90.89A are established and recorded in the airplane logbook the airplane then may complete the remaining hours required

in Phase 1 while based at North Las Vegas Airport (VGT); OR, a one time flight to the "Airplane Base of Operations" may also be conducted remaining clear of all densely populated areas and congested airways. NOTE: Airplane Base of Operations: Show Low Regional Airport (SOW). This airplane must be operated for at least 25 (Twenty Five) hours in the assigned geographic areas'

Review of the airplane maintenance logbook records revealed that on March 17, 2008, the airplane had amassed a total flight time of 5.1 hours during test flights between Boulder City Municipal Airport (BVU), Boulder, Nevada, and Jean Airport (0L7), Jean, Nevada. A logbook entry for that date stated, 'This airplane meets all the controllability, airworthiness, and safety checks required by FAR 91.319(b) and chapter 4 of advisory circular (AC) 90-89A.'

The last entry on that date noted, "Had a small miss in the engine so I decided to disassemble and tow back to North Las Vegas airport." The owner/builder stated that he made this entry because the airplane's ground roll during test flights was longer than he expected, and he observed oil leaking from the engine cowling. He further stated that the airplane was not flown again until the accident flight.

At the time of the accident, Phase 1 flight operations for experimental aircraft at North Las Vegas airport were permitted by the FAA after the airplane had completed a minimum of 5 flight hours at an alternate airport, and demonstrated that it had met the minimum controllability requirements set forth in AC 90-89A and FAR 91.319(b).

The owner/builder stated that for the test flights following certification, the supercharger butterfly valve was in the closed position, thereby preventing the engine from operating with the aid of boost from the supercharger. He further reported that the performance with the butterfly valve closed was, 'doggy' and lower than he expected. He reported that the intent of the accident flight was to test the engine and airplane's performance with the butterfly valve in the open position. He further stated that he tested the engine performance with the butterfly valve partially open on about six occasions during high speed taxi tests the week prior to the accident. He reported a, "considerable" increase in engine power during these tests.

Supercharger installation instructions, provided by Aero Supercharger Solutions stated the following:

"*****IMPORTANT NOTE*****

THE BOOST CONTROL ACTS THE SAME AS AN EMERGENCY ALTERNATE AIR DOOR. IF FOR ANY REASON THE ENGINE IS NOT GETTING ENOUGH AIR SUPPLY (MANIFOLD PRESSURE), PUSH THE BOOST CONTROL KNOB IN ALL THE WAY OPENING THE BOOST BUTTERFLY. IN THE EVENT OF A BROKEN SUPERCHARGER BELT, OPEN THE BOOST CONTROL BUTTERFLY. WITH A BROKEN BELT AND THE BOOST CONTROL OPEN THE ENGINE SHOULD HAVE APPROXIMATELY THE SAME MANIFOLD PRESSURE AS A NORMALLY ASPIRATED ENGINE. DO SOME GROUND TESTS WITH THE BELT REMOVED FROM THE PULLEYS AND TIED BACK

TO SEE HOW YOUR ENGINE OPERATES WITH THE BOOST CONTROL OPEN, AND THEN WITH IT CLOSED."

Further documentation obtained from Aero Supercharger Solutions revealed that in the event of a supercharger belt failure, the pilot should expect a drop in manifold pressure of between 1 and 2 inches.

The documentation then continued to specifically state:

"This is caused by resistance of the air going thru a stationary impeller in the supercharger. You will need to reset the fuel flow for optimum fuel economy as the engine may be on a much richer setting."

The owner/builder stated that he did not test the engine with the supercharger belt removed.

Since the accident, the FAA has changed its guidelines, and no longer permits Phase 1 flight operations at North Las Vegas or McCarran International Airports.

Pilot Information

Certificate:	Airline transport; Commercial; Flight instructor; Private	**Age:**	76,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):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	September 7, 2006
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	6250 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Killgore	**Registration:**	N415MK
Model/Series:	Velocity 173RG	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	DM0253
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	March 9, 2009 Condition	**Certified Max Gross Wt.:**	2700 lbs
Time Since Last Inspection:	5 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-360-C1C
Registered Owner:	On file	**Rated Power:**	200 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

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:**	2 Nautical Miles
Observation Time:	06:32 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	360°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.84 inches Hg	**Temperature/Dew Point:**	24°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Las Vegas, NV (VGT)	**Type of Flight Plan Filed:**	None
Destination:	Las Vegas, NV (VGT)	**Type of Clearance:**	VFR
Departure Time:	06:28 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 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	2 Fatal	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	36.196945,-115.182502

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	James D Brownell; Federal Aviation Administration FSDO; Las Vegas, NV John Butler; Lycoming Engines; Williamsport, PA
Original Publish Date:	July 14, 2009
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=68780