Aviation Investigation Final Report

Location:	Upland, California	**Accident Number:**	LAX07LA186
Date & Time:	June 4, 2007, 10:22 Local	**Registration:**	N4463T
Aircraft:	Piper PA-34-200	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 2 Minor
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

A Certified Flight Instructor (CFI) was providing multiengine instruction to the pilot. They were in the traffic pattern, approximately 800 feet above ground level (agl), after completing several touch-and-go landings. The CFI stated that his regular method for setting up practice engine-out landings for a student was to close the mixture, allow the student to go through the process of controlling the airplane, and simulating the procedures to feather the inoperative engine's propeller. The instructor would then return the mixture to full rich, and verify engine operation. This would occur on downwind, and then the landing would be completed with the simulated inoperative engine at idle. On downwind, the instructor closed the mixture on the left engine. During this maneuver, the pilot turned the airplane left from base to final and the airspeed decreased. The airplane rolled sharply to the left and lost altitude. The instructor reduced both throttles and regained control of the airplane just as it collided with the roof of one house, bounced across another roof, and came to rest on top of a third house. The Federal Aviation Administration recommends that in-flight simulated engine failures at altitudes below 3,000 feet agl be introduced only by reduction of the throttle. Post-crash inspection of the engine and airframe found no anomalies that would have prevented normal operation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Failure of the pilot under instruction to maintain the minimum single engine control airspeed (air) and directional control while turning to final approach. Also causal was the flight instructor's inadequate supervision and delayed remedial actions.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - BASE LEG/BASE TO FINAL

Findings
1. (F) PROCEDURES/DIRECTIVES - INADEQUATE - PILOT IN COMMAND(CFI)
2. (C) AIRSPEED(VMC) - NOT MAINTAINED - DUAL STUDENT
3. (C) DIRECTIONAL CONTROL - NOT MAINTAINED - DUAL STUDENT
4. (C) SUPERVISION - INADEQUATE - PILOT IN COMMAND(CFI)
5. (C) REMEDIAL ACTION - DELAYED - PILOT IN COMMAND(CFI)

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. OBJECT - RESIDENCE

Factual Information

HISTORY OF FLIGHT

On June 4, 2007, about 1022 Pacific daylight time, a Piper PA-34-200, N4463T, collided with houses on final approach to Cable Airport, Upland, California. Roxy Corporation was operating the airplane under the provisions of 14 Code of Federal Regulations (CFR) Part 91. The certified flight instructor (CFI) pilot, the commercial pilot undergoing instruction (PUI), and one passenger sustained minor injuries; the airplane sustained substantial damage. The cross-country instructional flight departed Van Nuys, California, at an undetermined time en route to Upland. Instrument meteorological conditions prevailed at the nearest official reporting station, and an instrument flight plan had been filed.

The PUI was receiving instruction to prepare for a reexamination of a portion of the commercial pilot multiengine practical examination. The Designated Pilot Examiner (DPE) noted that, during the initial examination 2 days prior to the accident, the PUI failed to maintain minimum best single-engine rate of climb speed (Vyse) when simulating a loss of engine power on takeoff. After restoring controls to the PUI, the DPE noted that the approach to landing was high and fast. They did a go-around. On the second approach to landing, the PUI lined up on the left side of the runway and in a 30-degree bank. The PUI's instructor indicated that he had not seen this type of performance.

A Federal Aviation Administration (FAA) inspector interviewed the PUI. He was receiving multiengine instruction from the CFI. They were in the landing pattern, and completed several touch-and-go landings. On downwind, the CFI reduced power on one engine. As they turned left from base to final, the bank angle got steep. The airplane lost altitude, and collided with the roof of one house, bounced across another roof, and came to rest on top of a third house.

In a written statement, the CFI reported that they had departed Van Nuys under instrument flight rules (IFR). Upon arrival at Cable Airport, the PUI executed an instrument approach to the runway. The CFI noted that visual meteorological conditions prevailed at the airport, and they cancelled IFR with air traffic control and continued the flight under visual flight rules at a traffic pattern altitude of about 800 feet above ground level (agl).

The CFI reported that he wanted to perform engine-out landing practice with the PUI. He listed the following as his own procedure for the maneuver, which he stated he had performed hundreds of times:

1. At pattern altitude, close the mixture of one engine
2. Wait until the student goes through the immediate procedure of: controlling the airplane, adding full power, cleaning up flaps and gear, identifying the dead engine, verifying the dead

engine with the throttle (by closing the dead engine throttle), feather (touch the correct propeller control to simulate feather).
3. Open the dead engine mixture to full.
4. Verify that the engine is working by advancing the closed throttle a little, and then close it again.

The CFI noted that all the above is done while the airplane is still on downwind. The simulated engine-out practice continues with the engine at idle and not really out.

The PUI performed one such maneuver, which the CFI reported was marginal, and the PUI initiated a touch-and-go on the runway in order to perform the engine-out procedure again. The CFI reported that he initiated the same maneuver with the steps listed above for the left engine, while on the downwind leg for the pattern. The CFI noted that due to the tight traffic pattern, the PUI initiated a 180-degree turn from the downwind leg to the final approach leg. During the turn, the CFI noticed the airspeed decrease to 100 miles per hour (mph), and notified the PUI not to slow below the blue line. The CFI stated that the blue line (Vyse) is 105 mph for the airplane. The airplane then rolled abruptly to the left, and the CFI took over control of the airplane. The CFI stated that he recovered from the sharp turn, and then attempted to recover from the descent by advancing both engine throttles. The CFI felt an asymmetrical thrust, closed both throttles, and flared the airplane as it collided with the roofs below.

The CFI also commented that he was puzzled as to why the airplane lost control at 100 mph, when the recommended safe speed (Vsse) for engine-out procedures in the airplane is 90 mph, with a red line (minimum controllable single-engine speed (Vmc)) of 80 mph.

ON-SCENE OBSERVATIONS

The National Transportation Safety Board investigator that examined the wreckage on scene reported the following information.

The debris path from the first identified point of contact (FIPC) to final resting place was 100 feet in length along a 220-degree magnetic heading. Pieces of airplane were distributed over several adjacent residential rooftops. The elevation of the main wreckage was 1,450 feet. Cable Airport was a distance of 0.61 nautical miles (nm) on a magnetic bearing of 237 degrees.

The FIPC consisted of the landing gear and other exterior airplane parts. These pieces were on the roof of the first struck residence. Imbedded in the roof and east-facing wall of the next residence was the right engine with the propeller still attached. On top of this residence was the portion of the left wing that was aft of the spar with the aileron and flap attached. On top of a third residence was the main wreckage consisting of the fuselage, right wing, forward portion of the left wing, and empennage. The left wing remained attached at the wing root area. The right wing remained attached at its front fitting, but the rear fitting was detached. The left engine remained with the main wreckage, but was detached from the wing. The front right seat

separated from the airframe, and was on the south side of this residence in the grass along with some minor airframe parts. Investigators found a spar embedded in the grass near the seat.

First responders moved several switches prior to the investigator's arrival. They moved the magneto switches to the OFF position, the electric boost pump to the OFF position. They did not touch the fuel valves. The MASTER switch was still on when investigators arrived.

The airframe investigator found the fuel valves in the cross-feed position. He noted that it was possible that they could have been moved due to displacement of the wings. He noted that for landing, only one should be in the cross-feed mode.

The engine controls for both engines were at their respective stops. The propeller was at low pitch (high revolutions per minute) stop. The mixture control was at idle cutoff.

FOLLOW UP EXAMINATION

Investigators examined the wreckage at Aircraft Recovery Service, Littlerock, California, on November 13, 2007.

Left Engine

Investigators slung the engine from a hoist, and removed the top spark plugs. All spark plugs were clean with no mechanical deformation. The spark plug electrodes were gray, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart.

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

Investigators manually rotated the crankshaft with the propeller. The crankshaft rotated freely, and the valves moved approximately the same amount of lift in firing order. The gears in the accessory case turned freely. Investigators obtained thumb compression on all cylinders in firing order.

Investigators manually rotated the magnetos, and both magnetos produced spark at all posts.

The vacuum pump drive gear remained unbroken, and the vacuum pump turned freely. All vacuum pump vanes were whole, in position, and moved freely.

The oil sump screen was clean and open; the oil filter was clean.

The fuel injection servo remained undamaged and securely attached at the mounting flange. The throttle and mixture controls were securely attached at their respective control arms of the

servo. All engine compartment fuel lines were in place, and secure at their respective fitting of each fuel system component. The fuel injection servo and induction system appeared free of obstruction. The foam filter element remained securely attached to the airbox bracket. The filter element remained intact and exhibited no evidence of pre-impact obstruction to airflow. The fuel flow divider remained secure at the mounting bracket situated at the top of the engine. Disassembly of the flow divider revealed no evidence of internal mechanical malfunction or obstruction to fuel flow. The diaphragm remained intact and undamaged.

The fuel injection nozzles remained secure at each cylinder with the respective fuel line attached. The nozzles remained free of visible contamination or obstruction to flow. The fuel pump remained free of internal mechanical malfunction and obstruction to flow. The diaphragm remained intact. Investigators found a fluid with the appearance and odor of aviation fuel at several locations about the engine during the removal of various fuel system components.

Left Propeller

The propeller remained attached to the crankshaft flange. Both blades bent aft about 20 degrees. Examination of the governor revealed that the drive was intact and rotated freely. Investigators observed no contamination in the gasket screen.

Right Engine

Investigators slung the engine from a hoist, and removed the top spark plugs. All spark plugs were clean with no mechanical deformation. The spark plug electrodes were gray, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart.

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

Investigators manually rotated the crankshaft with a tool in an accessory drive gear. The crankshaft rotated freely, and the valves moved approximately the same amount of lift in firing order. The gears in the accessory case turned freely. Investigators obtained thumb compression on all cylinders in firing order.

Both magnetos separated from their mounting pad; the fracture surfaces were jagged and angular. Mounting pad fragments remained attached to the engine. Investigators manually rotated the magnetos, and both magnetos produced spark at all posts for the cylinders.

The vacuum pump drive gear remained unbroken, and the vacuum pump turned freely.

The oil suction screen was clean and open. The oil filter separated, and sustained mechanical crush damage.

The fuel injection servo remained undamaged and securely attached at the mounting flange. The throttle and mixture controls were securely attached at their respective control arms of the servo.

The fuel injection servo and induction system were free of obstruction. The foam filter element remained securely attached to the airbox bracket. The filter element remained intact and exhibited no evidence of pre-impact obstruction to airflow. The fuel flow divider remained secure at the mounting bracket situated at the top of the engine. The fuel lines remained secure at each flow divider fitting and fuel injector at each cylinder. Disassembly of the flow divider revealed no evidence of internal mechanical malfunction or obstruction to fuel flow. The diaphragm remained intact and undamaged. The fuel injection nozzles remained secure at each cylinder with the respective fuel line attached. Examination of the nozzles revealed no visible contamination or obstruction to flow. The fuel pump was attached to the engine at the mounting pad. The fuel lines remained secure at their respective fittings. Investigators observed no internal mechanical malfunction and obstruction to flow in the fuel pump. The diaphragm remained intact.

Right Propeller

The propeller remained attached to the engine. Both blades exhibited leading edge gouging, torsional twist, chordwise striations across the cambered surface, and trailing edge S-bending. The propeller governor was securely attached at the mounting pad with the pitch control rod securely attached at the control wheel. Examination of the governor revealed that the drive was intact and free to manually rotate. The gasket screen was free of visible contamination.

Airframe

Control continuity for the right aileron, horizontal stabilators and rudder were established. The left aileron's control cables fractured and separated in a broomstraw pattern. The landing gear was extended.

ADDITIONAL INFORMATION

The Airplane Flying Handbook (FAA-H-8083-3A) states, "The FAA recommends that all in-flight simulated engine failures below 3,000 feet AGL be introduced with a smooth reduction of the throttle. Thus, the engine is kept running and is available for instant use, if necessary. Throttle reduction should be smooth rather than abrupt to avoid abusing the engine and possibly causing damage. All in-flight engine failures must be conducted at VSSE or above."

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	52,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Helicopter; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2	**Last FAA Medical Exam:**	April 1, 2007
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 1, 2005
Flight Time:	4219 hours (Total, all aircraft), 270 hours (Total, this make and model), 4116 hours (Pilot In Command, all aircraft), 125 hours (Last 90 days, all aircraft), 62 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Student pilot Information

Certificate:	Commercial	**Age:**	18,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1	**Last FAA Medical Exam:**	
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	212 hours (Total, all aircraft), 10 hours (Total, this make and model), 135 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N4463T
Model/Series:	PA-34-200	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	34-7250102
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 1, 2007 100 hour	**Certified Max Gross Wt.:**	4000 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	5704 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	IO-360-C1E6
Registered Owner:	Roxy Corp	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ONT,944 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	2.5 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	18°C / 13°C
Precipitation and Obscuration:	N/A - None - Haze		
Departure Point:	Van Nuys, CA (VNY)	**Type of Flight Plan Filed:**	None
Destination:	Upland, CA (CCB)	**Type of Clearance:**	IFR
Departure Time:	09:30 Local	**Type of Airspace:**	

Airport Information

Airport:	CABLE CCB	**Runway Surface Type:**	Asphalt
Airport Elevation:		**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	3864 ft / 75 ft	**VFR Approach/Landing:**	Touch and go;Traffic pattern

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Plagens, Howard
Additional Participating Persons:	Jim Coughran; Federal Aviation Administration; Riverside, CA Charles Little; Piper Aircraft Corporation; Lakeland, FL Mark Platt; Textron Lycoming; Williamsport , PA
Original Publish Date:	September 26, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=65928