National Transportation Safety Board
Aviation Accident Final Report

Location:	Modesto, CA	**Accident Number:**	LAX07LA263
Date & Time:	09/01/2007, 1748 PDT	**Registration:**	N13WA
Aircraft:	Piper PA-22-150	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The pilot reported that within minutes following takeoff on each of the two flights that preceded the accident flight, he had experienced smoke in the cockpit and promptly landed. The accident occurred following the pilot's attempted repairs to his airplane and during the third attempted flight. The pilot reported that within minutes after takeoff, he observed smoke in the cabin and saw flames near his feet. With diminishing visibility due to smoke filling the cockpit, the pilot returned to the airport and landed. The passenger exited the airplane before it rolled to a stop, and the pilot followed shortly thereafter. The airplane was consumed by the fire. The pilot had attempted to investigate the first and second smoke in the cockpit events, with the assistance of personnel from a local fixed base operator, and found a loose hose. The pilot opted to purchase a hose attachment clamp from a neighborhood consumer supply store, and thereafter proceeded with its installation. No maintenance entry was accomplished for the work. The subsequent investigation revealed that the precipitating smoke event was not related to the hose, but rather was due to a burn through of the airplane's exhaust muffler. FAA inspectors examined the airplane and found that the engine exhaust muffler had burned through at the bottom left end and the hole permitted engine exhaust gasses and flames to be directed into the engine compartment and toward the firewall. The exhaust heat had also ruptured an aluminum hydraulic brake line, mounted on the firewall, which added to the fire. An examination of the airplane's maintenance records revealed that an annual inspection had been performed on July 6, 2007, 2.5 operating hours prior to the accident. The airplane's listed time in service was 3,104.3 hours. The logbook signoff included the statement that the airplane was found to be in an airworthy condition, and airworthiness directive 68-05-01 (exhaust inspection) had been complied with. Airworthiness Directive 68-05-01 became effective in 1968, and it requires inspections of exhaust mufflers installed in specific models of airplanes, including the accident airplane. The inspection directs that muffler assemblies (with over 950 hours in service) be examined for signs of cracks, corrosion, burn-throughs, heat damage, collapsed stack, or weld separations. According to Piper Service Letter number 324C, which was incorporated in the airworthiness directive, an exhaust and heat exchange system, which has been permitted to deteriorate due to age, poor inspection and maintenance, can conceivably cause "engine compartment originated fires in flight."

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the airplane's exhaust muffler during takeoff that was due to an inadequate annual inspection. Contributing to the accident were the pilot's inadequate inspection to isolate the smoke source, and the pilot's decision to continue flight with an unresolved maintenance problem.

Findings

Occurrence #1: FIRE
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) EXHAUST SYSTEM,MUFFLER - FAILURE
2. (C) MAINTENANCE,ANNUAL INSPECTION - INADEQUATE - OTHER MAINTENANCE PERSONNEL
3. (F) MAINTENANCE,COMPLIANCE WITH AD - NOT PERFORMED - OTHER MAINTENANCE PERSONNEL
4. (F) REMEDIAL ACTION - IMPROPER - PILOT IN COMMAND
5. (F) IMPROPER DECISION - PILOT IN COMMAND
6. (F) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - CONTINUED - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On September 1, 2007, about 1748 Pacific daylight time, a Piper PA-22-150, N13WA, was consumed by fire and destroyed after landing at the Modesto City Airport, Modesto, California. The airplane was owned and operated by the pilot. Visual meteorological conditions prevailed at the time of the personal flight, and no flight plan had been filed. The private pilot received minor injuries, and the passenger received serious injuries. The flight was performed under the provisions of 14 Code of Federal Regulations Part 91, and it originated from Modesto about 1745.

The pilot reported to the National Transportation Safety Board investigator that earlier during the day he refueled his airplane at the Modesto Airport in preparation for a return flight to Livermore, California. Then, the pilot and passenger boarded the airplane. In preparation for takeoff, the pilot performed an engine run-up. During the run-up the engine backfired. The pretakeoff checks were concluded, and the pilot took off.

The pilot stated a few minutes after departure that he smelled smoke in the cockpit. The pilot stated he advised the air traffic controller of his situation and requested to immediately land. The pilot's landing was uneventful, and he parked his airplane.

Airport based fire department personnel responded to the event, but no fire suppression activities were undertaken. There was no externally visible evidence of fire, and the firemen returned to their station.

The pilot reported that he looked under the engine's cowling to see if he could locate the source of the problem. The pilot stated to the Safety Board investigator that he observed an orange colored hose (SCAT tubing) had become detached from the muffler, and a clamp was missing. The pilot stated to the Safety Board investigator that he believed the hose had routed air between the air intake and the exhaust, but he was not certain. He stated that he then acquired assistance from an unidentified person who was on the tarmac.

The person on the ramp possessed a Leatherman tool. The person cut a wire in the engine compartment. The pilot stated he did not know if the person who was assisting was an FAA certified airplane mechanic. After working on the airplane the person went into an "employee only" area of the nearby fixed base operator's (FBO) establishment. The FBO did not have a clamp to secure the hose.

The pilot borrowed a motor vehicle, drove to a nearby Wal-Mart, purchased a clamp, and returned to the airport. According to the pilot, the FBO's personnel assisted in attaching the hose and the newly purchased clamp that he had acquired. Upon completion of the attachment project, no logbook maintenance entries were made, and no work order for the maintenance was generated. The pilot and passenger then attempted to fly back to Livermore.

Minutes after take off, during initial climb out, the pilot noticed that the engine was smoking again. The pilot advised the air traffic controller of his situation, and he landed.

Fire department personnel responded to the event, but no fire suppression activities were undertaken. There was no externally visible evidence of fire.

The pilot stated he again looked beneath the engine cowling. At this time he observed that the

same hose had partially unraveled and was detached at one end. The pilot opined that he had observed the source of the fumes. Upon consulting with an employee of the FBO, the pilot acquired another hose that was a "bit longer." The reconnection project was completed, and the pilot indicated to the Safety Board investigator his belief that the problem had been solved. Again, no logbook maintenance entry or work order was generated.

According to the pilot, he performed another run-up and, finding everything in order, he took off. During initial climb a "small amount of exhaust appeared." The pilot turned the airplane onto the downwind leg and advised the air traffic controller that he would be returning for landing. By the time the airplane progressed to midfield, the conditions had deteriorated and a small visible flame appeared forward of his left foot. The pilot reportedly immediately aimed for the runway, turned final, and landed as smoke was filling the cockpit.

The pilot stated that on approach it became difficult to see, and during the landing rollout he could see only inches ahead. So, he opened a window to look outside. The airplane's brakes became totally dysfunctional. As the smoke intensity further increased and the fire spread, the passenger exited the rolling airplane via the right cabin door. The pilot followed the passenger's exit from the airplane. The airplane came to rest and was consumed by fire.

PERSONNEL INFORMATION

The pilot holds a private pilot certificate, with an airplane single engine land rating. He does not possess any mechanic certificates.

WRECKAGE AND RECORDS EXAMINATION

Federal Aviation Administration (FAA) personnel examined the airplane. According to the FAA, it found that the engine exhaust muffler had failed in a manner that permitted engine exhaust (flame) to be directed into the engine compartment and toward the firewall. An approximate 2-inch diameter hole was observed burned through the muffler at its bottom left end. The FAA personnel opined that after repeated departures the exhaust heat also ruptured an aluminum hydraulic brake line, mounted on the firewall, which added "fuel to the fire."

An examination of the airplane's maintenance records revealed that an annual inspection had been performed on July 6, 2007. The airplane's listed time in service was 3,104.3 hours. The logbook signoff included the statement that the airplane was found to be in an airworthy condition, and airworthiness directive 68-05-01 (exhaust inspection) had been complied with.

The FAA further reported that the pilot-owner's logbook and interviews evidenced the fact that the airplane had been operated about 2.5 hours since the annual inspection.

TESTS AND RESEARCH

Airworthiness Directive 68-05-01 became effective in 1968. In pertinent part, it requires inspections of exhaust mufflers installed in specific models of airplanes, including the accident airplane. The inspection directs that muffler assemblies (with over 950 hours in service) be examined for signs of cracks, corrosion, burn-throughs, heat damage, collapsed stack, or weld separations.

According to Piper Service Letter number 324C, which was incorporated in the airworthiness directive, an exhaust and heat exchange system which has been permitted to deteriorate due to age, poor inspection and maintenance, can conceivably cause "engine compartment originated fires in flight."

ADDITIONAL INFORMATION

Modesto City Fire Department records and FAA interviews with a responding fireman indicate that the first alert call occurred at 1447. The call was for smoke/fumes in the cabin, and the fire department responded to the airplane.

At 1644, the second alert call was received, and the responding fireman noted it involved the same airplane, for the same reason. A fireman approached the pilot and, according to the fireman's report, advised the pilot that "he should not fly anymore today the way his luck was going." The fireman's report further states that the pilot "just laughed" and walked back to his airplane. The pilot had also stated to the fireman that he did not need any help from the fire department. During a subsequent interview with FAA personnel, the fireman recalled that he also had informed the pilot that "...this isn't a good day to be flying. You need to come up with a new plan to get home."

At 1748, the third alert call was received. The same fireman returned to the runway, attended to the injured occupants of the airplane, and commenced extinguishing the flames.

Pilot Information

Certificate:	Private	**Age:**	52, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With Waivers/Limitations	**Last FAA Medical Exam:**	04/01/2007
Occupational Pilot:		**Last Flight Review or Equivalent:**	05/01/2007
Flight Time:	350 hours (Total, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N13WA
Model/Series:	PA-22-150	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	22-6912
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	07/01/2007, Annual	**Certified Max Gross Wt.:**	1950 lbs
Time Since Last Inspection:	2.5 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	3106.8 Hours at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-320-A1A
Registered Owner:	William A. Supan	**Rated Power:**	150 hp
Operator:	William A. Supan	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	MOD, 97 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	1753 PDT	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.76 inches Hg	**Temperature/Dew Point:**	39°C / 3°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Modesto, CA (MOD)	**Type of Flight Plan Filed:**	None
Destination:	(MOD)	**Type of Clearance:**	VFR
Departure Time:	1745 PDT	**Type of Airspace:**	

Airport Information

Airport:	Modesto City (MOD)	**Runway Surface Type:**	Asphalt
Airport Elevation:	97 ft	**Runway Surface Condition:**	Dry
Runway Used:	28R	**IFR Approach:**	None
Runway Length/Width:	5911 ft / 150 ft	**VFR Approach/Landing:**	Forced Landing; Full Stop; Traffic Pattern

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Serious	**Aircraft Fire:**	In-Flight
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 1 Minor	**Latitude, Longitude:**	37.625833, -120.954444

Administrative Information

Investigator In Charge (IIC):	Wayne Pollack	**Report Date:**	07/30/2008
Additional Participating Persons:	Gene Schmidt; Federal Aviation Administration; Fresno, CA		
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/.		