Aviation Investigation Final Report

Location:	TILLAMOOK, Oregon	**Accident Number:**	SEA97FA130
Date & Time:	June 6, 1997, 18:00 Local	**Registration:**	N7973
Aircraft:	Lockheed P-38L	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation		

Analysis

The aircraft (P-38) had been topped off with full reserve & main fuel tanks (44 US gal/engine reserve tanks & 72 gal/engine main tanks). The pilot took off with about 20 minutes fuel having been already consumed. Operating with another P-38 within the airport area, the 2 aircraft flew about 20 to 25 minutes each. The fuel consumption was reported nominally at 60 gallons/hour/engine (1 gal/minute). With 44 gallons of fuel in each RESERVE tank for the duration of both flights, the engines would have exhausted all available fuel in each RESERVE tank after about 44 minutes. Both fuel selectors were found on the RESERVE setting at the site. No mechanical malfunction was found with either propeller or engine. The flaps & landing gear were retracted. According to the Pilot's Manual (flight manual), if one engine fails below 120 mph (safe single-engine airspeed), the pilot is to 'close both throttles and land straight ahead.' The flight manual did not provide any information for aircraft minimum control speeds with the flaps fully retracted. Several witnesses reported the aircraft was slow while turning base. Since this was a single-seat aircraft, there was no provision for 'dual' instructional training in single-engine procedures or spin recovery. The pilot was reported to have flown 6 or 7 hours in another P-38, which included practice simulated single-engine maneuvers, but no actual in-flight shut down & feathering of an engine.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: failure of the pilot to maintain minimum control speed (VMC), after loss of power in one engine, which resulted in a loss of aircraft control and collision with terrain. Related factors were: the pilot's improper fuel management and failure to change the fuel selector position before a fuel tank had emptied, which led to fuel starvation and loss of power in one engine; and the pilot's lack of familiarity with the aircraft, relative to single-engine minimum airspeeds.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: APPROACH - VFR PATTERN - BASE LEG/BASE TO FINAL

Findings
1. 1 ENGINE
2. (F) FUEL MANAGEMENT - IMPROPER - PILOT IN COMMAND
3. (F) FLUID,FUEL - STARVATION
4. (F) FUEL TANK SELECTOR POSITION - IMPROPER - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: APPROACH - VFR PATTERN - BASE LEG/BASE TO FINAL

Findings
5. (C) AIRSPEED(VMC) - NOT MAINTAINED - PILOT IN COMMAND
6. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
7. (F) LACK OF FAMILIARITY WITH AIRCRAFT - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On June 6, 1997, approximately 1800 Pacific daylight time, a Lockheed P-38L "Lightning," retaining a limited airworthiness registration, N7973, registered to Bruce L. Pruett, and being flown by a commercial pilot, was destroyed during collision with terrain following a loss of control while on visual approach to the Tillamook airport, Tillamook, Oregon. The pilot was fatally injured and a post crash fire destroyed a portion of the aircraft. Visual meteorological conditions existed, and no flight plan had been filed. The flight, which was a practice run for an upcoming P-38 pilot convention (including the pilot's father, a World War II P-38 pilot), was to have been operated under 14CFR91.

The pilot/owner of N2114L, a P-38L sister ship nearly identical to N7973, and which was restored to flying condition several months earlier, was interviewed. He reported that both N2114L and N7973 took off from the Tillamook airport between approximately 1715-1730. He reported logging approximately 20-25 minutes of flight time on the flight (in N2114L). He also reported taking off immediately before N7973 and was ahead of the aircraft during his approach and landing.

An 8 millimeter video recording, made by the manager of the Tillamook Naval Air Station Museum, and showing the takeoff of both P-38's, was reviewed. It was noted that both aircraft started their engines nearly simultaneously and N2114L (the olive green P-38L) departed immediately ahead of N7973 (the silver P-38L). The duration of this tape, which concluded with N2114L taxiing in to the ramp following its flight, was measured on a stopwatch and found to be 9 minutes and 57 seconds in duration. A number or recognizable breaks in the video recording were noted as the operator, who was recording from the ramp at the Tillamook airport, stopped recording and then began again at later times during the flight duration. N7973 was observed to make a number of low passes (with N2114L) over the airport, one of which included an aileron roll. Both aircraft remained within several thousand feet above ground maximum elevation during their flights.

A number of witnesses observed the aircraft during the final moments of flight. The following observations were reported be these witnesses as described in their statements (attached):

Witness Simmons, who was located approximately one-quarter mile northwest of the crash site in a vehicle travelling eastbound on Simmons Creek Road, reported seeing "a wobbling, or wavering of the wings" and that the "last thing I saw was the P-38 in a nose-down position."

Witness Johnston, who was located approximately one mile north of the crash site at his residence (looking south) reported seeing the P-38 "in gentle circles going towards the ground"

and stated that he saw "at least four revolutions counterclockwise (left to right) before it went behind the hill." Additionally, he stated that "I also had the impression that the aircraft was in a flat spin along with the slow revolutions to the earth."

Witness Tone, who was located approximately one mile south of the crash site at her residence (looking north) reported seeing the plane "heading east just behind some trees. It came out into a small clearing and I noticed how low it was flying." Additionally, she stated that "it was going very slow like it was gliding and then it started slowly flipping out of control, not end over end. It went more sideways (and) rolling over slowly."

Witness Nielsen, who was located approximately one mile southwest of the crash site at a residence (looking northeast) reported seeing the plane "going east at a good height flying almost level when (he) heard a pop-pop. The next time (he) looked up it was in a tailspin."

Witness Larsen, who was located approximately one-half mile west of the crash site at a residence (looking east) reported seeing the plane "flying east at an altitude of approximately 400-500 feet, when it began to sputter (and) then pop. It maintained an easterly, level flight pattern for approximately four seconds, then began a series of 2-3 clockwise, flat, wobbly, downward spins. It came out of the last spin, heading north, with the nose at a 45 degree angle as it disappeared into the treetops."

Witness Imhoff, who was located approximately two miles northwest of the crash site in a residential back yard (looking northwest to south) reported seeing the plane during its downwind and turn to base leg. He stated that "the plane continued easterly, straight (and) level for a few (~20) seconds and then turned right, once again a generally flat turn, low speed, ~1500 feet elevation. As the aircraft came to a southeasterly heading, I heard two loud pops about 4 or 5 seconds apart. Immediately after the second one, the aircraft began to roll to the right, going completely over twice, losing altitude, and going behind some tall trees, out of sight." Additionally, he reported that "as the aircraft began to roll, with the left wing coming right, over the right wing, it seemed that the front to back axis of the aircraft was skewed to the right of the direction of travel as if it were flying with the left wing ahead of the right wing. It seemed to maintain this position through both revolutions and out of site."

Witness Biegel, an aircraft mechanic who was driving southbound on South Prairie Road approximately one mile north of the crash reported seeing both P-38's. He reported that "the silver lightning was in a slow turn in my direction" and that "I thought its airspeed was a little slow and the aircraft went into a flat spin." He reported that "ten seconds or less went by between level flight, the flat spin and (the) crash" and that "the aircraft was approximately 500 feet (in) altitude."

Witness Ryder, who was located approximately three miles north-northwest of the crash site at the Tillamook airport (looking southeast) reported seeing a silver plane "falling out of the sky; not (in a) nose dive, just falling."

The pilot's father, who reported 10,000 hours of flight experience, of which approximately 3,000 hours of flight experience was in the P-38, also observed the aircraft during the accident sequence. Witness Ervin Ethell, who was located approximately three miles north-northwest of the crash site at the Tillamook airport (looking south) reported seeing the aircraft "3 to 4 miles from the end of the runway" and "about 3 to 4 hundred feet (in) height." He further reported that "It seem(ed) to me to be much slower than what the normal approach speed should be" and that "I also saw the left wing drop pretty quick and the pilot immediately raise(d) the left wing up to level flight. Some 2 to 3 seconds later the aircraft made a slight right turn (approximately 5 or 6 degrees) and started down."

A private pilot flying into the Tillamook airport also witnessed the accident. Witness Felley, who was flying a Cessna 172, announced via radio his intention to "perform a cross-field entry into the downwind leg for runway 31." He reported that "coming up to the airport's east side approaching hangar "B," I was descending through approximately 1,500 feet to get to pattern altitude and I noticed the P-38 a few miles to my left, heading south." He further reported observing the aircraft transition from a descent to a climb "combined with what appeared to be a hard bank to the right, a nearly 180 degree change in heading - perhaps the beginning of a roll (I believe it was to the right), then it appeared to regain level attitude and proceeded immediately into a spin." He further reported that he believed that "the P-38 might have spun 4 to 5 times in a slight nose-down attitude before it disappeared from sight" and that "it went in with little or no perceptible horizontal speed."

Witness Felley then diverted to the accident site, circling overhead at 1,500 feet for 10 to 15 minutes and coordinated via cellular telephone with 911 providing instructions as to the location of the site before returning to land at Tillamook airport.

According to Tillamook County Sheriff's Dispatch records, the first telephonic notification of the accident was received at 1800 hours and the first notification of a deputy on site was at 1825.

PERSONNEL INFORMATION

Copies of six flight logbooks belonging to the pilot were reviewed. These logs spanned a time period which began in early spring of 1966, and concluded with a last entry of November 11, 1996. While reviewing these logs it was noted that the pilot showed no logged flights in the P-38. The flight times reported in the "flight time matrix" boxes (page 3, NTSB Form 6120.4) are based upon these six logbooks. These flight time tallies do not include any flight beyond November 11, 1996, up through the date of the accident. They do, however, include approximately 6-7 hours of reported P-38 flight time, all acquired within the 90 day period prior to the accident.

Additionally, there was no recorded biannual flight review (BFR) noted within the sixth logbook forward of June 1995. Without the pilot's seventh logbook, BFR action could not be determined. Additionally, the pilot held a second class Airman Medical Certificate dated June

25, 1996, with the restriction that "holder shall wear correcting lenses while exercising the privileges of his/her airman certificate." The pilot also held a Statement of Demonstrated Ability, dated September 29, 1994, for distant visual acuity in the left eye and for lens replacement following cataract removal in the right eye."

According to the owner of N2114L (the olive green P-38 which was nearly identical to the accident aircraft), the pilot flew his aircraft (N2114L) for a total of six to seven hours during which (according to the owner) the pilot practiced simulated single engine maneuvers. This was not, however, to include the actual in flight shut down and feathering of an engine, but only the reduction in power necessary to simulate an engine out condition with a feathered propeller. During a portion of the flight time accrued on one or more of these flights, the accident pilot (flying N2114L) was videotaped both externally and with an "in cockpit" video recorder. These sequences of recordings were compiled into a recording titled "Flying the P-38" lasting approximately 30 minutes duration.

The pilot did not have a type rating in the P-38 series aircraft and his total experience in the P-38 aircraft was estimated up to but not including the accident flight (all in N2114L). The first time he flew N7973 was on the accident flight. The pilot possessed a letter of authorization (LOA) provided by the Federal Aviation Administration (FAA) and dated July 21, 1987, (refer to ATTACHMENT L-I). The LOA opens by stating that "this letter authorizes you to act as pilot-in-command in the following experimental category aircraft."

"ALL MAKES AND MODELS OF HIGH PERFORMANCE PISTON POWERED AIRCRAFT."

According to a letter to the wife of the owner of the accident aircraft, and signed by Mr. Robert M. Barton, Manager, FAA Operations and Safety, Program Support Branch; any authorization to serve as pilot-in-command of the single seat P-38 aircraft registered under "limited" rather than "experimental" category would require a type rating in the aircraft (refer to ATTACHMENT FAA-I).

AIRCRAFT INFORMATION

The aircraft, a model F-5G (photo reconnaissance version of the P-38) serial number 8006, was originally manufactured by Lockheed Aircraft Corporation in the early 1940's. According to records maintained by the FAA, the first indication of civilian registration of the aircraft was documented via a bill of sale on March 7, 1946, and the aircraft (model F-5G) was registered as NX53753. The registration was subsequently changed to N503MH when the aircraft was sold on February 4, 1949. The next and final record of sale (to the current owner) was dated January 4, 1967. On June 6, 1970, the current owner declared the aircraft un-airworthy and requested de-registration. The aircraft was subsequently reregistered on November 27, 1996, as a P-38L by the current owner, and was issued a new registration number of N7973. FAA records showed that the aircraft received a Standard Airworthiness Certificate dated "R" 05-07-58 as a P-38L for a "Limited" category.

According to the current owner, N7973 was being reconditioned to flying status by Erickson Sky Crane of Tillamook, Oregon, and the intent was to place the aircraft in the Smithsonian Museum. One of the alterations to the aircraft as part of this process was the removal of all of the bladder fuel tanks and their replacement with aluminum main and reserve tanks.

Three aircraft logbooks (airframe logs s/n 8006) were examined. The first log opened on May 16, 1946, with a total of 28 hours 50 minutes brought forward from army records. The log closed with a final entry of April 19, 1950, with a total time of 834 hours 15 minutes. The second log opened on April 20, 1950, and closed with a final entry of March 12, 1954, with a total of 1,697 hours 10 minutes. The third and final logbook opened on March 13, 1954. The last recorded flight in the log was dated January 2, 1959, and closed out with 2,183 hours and 40 minutes of total flight time. The next entry in this log was dated November 4, 1996, and documented the installation of the new left and right Allison engines. The next logbook entry was an annual inspection which was dated January 8, 1997, and unsigned. The next logbook entry documented the installation of Winchester radiators and a commensurate revision to the aircraft's weight and center of gravity (CG), followed by a test run. This entry was dated May 30, 1997, but did not show the aircraft's total empty weight or corrected CG. The next and final logbook entry was another annual inspection which was dated June 2, 1997, and signed off by Gary Austin, certified repair station number JYDR439F. The total aircraft time at this last entry was recorded as 2,188.7 hours. Total aircraft time at the time of the accident (4 days following the annual signoff) was unknown but estimated to be approximately 2,190 hours.

A single aircraft engine logbook for each Allison V1710 engine was examined. The right engine, model V1710-111, was opened April 24, 1996, with a statement of major overhaul and a time since overhaul (TSO) of 6.0 hours. The last entry of the logbook (same page) reflected an annual inspection conducted on June 2, 1997, with a total time of 11.0 hours. This engine's propeller rotated clockwise when viewed from behind. The left engine, model V1710-113, was opened October 13, 1995, with a statement of major overhaul and a time since overhaul (TSO) of 6.0 hours. The last entry of the logbook (same page) reflected an annual inspection conducted on June 2, 1997, with a total time of 11.0 hours. This engine's propeller rotated counter-clockwise when viewed from behind.

Additionally, the Pilot's Manual (PM) states under "ENGINE FAILURE DURING TAKEOFF" that:

"If one engine fails after the airplane leaves the ground, but before the safe single-engine airspeed (120 mph) has been reached, close both throttles and LAND STRAIGHT AHEAD."

And under "SINGLE ENGINE APPROACH AND LANDING" that:

"(8) Continue approach at not less than 120 mph."

The PM did not provide any information for aircraft minimum control speeds with the flaps fully retracted (refer to ATTACHMENT POH, pages 1-3).

AIRCRAFT FUEL SYSTEM

The aircraft's original reserve, main, and outboard wing bullet-proof, bladder, fuel tanks were removed during the reconditioning process. The left and right 55 (US) gallon outboard wing tanks were not replaced and the fuel selectors had small vertical pins installed to prevent the inadvertent selection of the unusable outboard wing tanks. The left and right reserve and main tanks were replaced with aluminum tanks. The capacity of the new metal reserve tanks was 44 (US) gallons each, and for the two new metal main tanks was 72 (US) gallons each. The aircraft's left and right metal drop tanks were left in place, however, the plumbing to route fuel from these tanks to their respective engines was not connected, thus the tanks were unusable. Refer to SCHEMATIC I which depicts the aircraft's fuel system as modified during the reconditioning process.

The pilot/owner of N2114L, the olive green sister ship P-38 reconstructed earlier in 1997, reported that the fuel consumption of his P-38 was nominally 60-62 US gallons/hour with a minimum fuel consumption of 48 US gallons/hour best case and 120 US gallons/hour worst case for each engine. The specific engine flight chart (refer to TABLE I) for the P-38L equipped with Allison V-1710-111/113 engines showed a fuel consumption of 113 gallons/hour (2,600 RPM normal rated maximum continuous power) and 63 gallons/hour (2,300 RPM maximum cruise power).

Applying the 2,300 RPM cruise fuel consumption rate of 63 gallons/hour to the 44 gallon reserve tank capacity, yields a total fuel consumption time of approximately 42 minutes per engine from a full reserve (44 gal) tank. If the 2,600 RPM maximum continuous fuel consumption rate of 113 gallons/hour is utilized, this yields a total fuel consumption time of approximately 23.5 minutes per engine from a full reserve (44 gal) tank.

According to the pilot/owner of N2114L, who was telephonically interviewed June 24, 1997, both the left and right reserve and left and right main tanks of N7973 were topped off between 1000-1100 hours on June 6, 1997. He reported flying the accident aircraft for approximately 20 minutes on the afternoon of June 6, and before the accident flight. He reported that no fuel was added following this flight. He also reported that the normal procedure for the operation of the aircraft was to takeoff with the individual engine selected to its respective reserve tank. Once established at altitude/cruise the left and right fuel selectors would then be set to main tanks. This procedure is described in the "Pilots Manual for Lockheed P-38 Lightning" which states under "Normal Use:"

"(1) Warm up, take off and fly for the first 15 minutes on RESERVE tanks. This is to provide space in the reserve tanks for the vapor return from the carburetors."

and

"Use up the fuel in the outer wing tanks (if installed); then use main tanks, and switch back to RESERVE for the remainder of the flight."

It is not known whether the pilot/owner of N2114L, flew N7973 utilizing the reserve tanks exclusively, or switched in flight to MAINS and then returned to RESERVE for the short intermediate duration of the total flight (0.4 hours)

METEOROLOGICAL INFORMATION

Aviation surface weather observations taken at Astoria (AST), Hillsboro (HIO), and Newport (ONP), Oregon, near the time of the accident reported the following conditions:

AST at 1756 hours PDT: Ceiling 4,900 foot broken, 5,500 foot broken, visibility 10 statute miles, temperature 61 degrees F., dew point 52 degrees F., winds 250 degrees magnetic at 8 knots, altimeter 30.00 inches of mercury.

HIO at 1747 hours PDT: Sky cover 8,500 foot scattered, ceiling 12,000 foot broken, visibility 30 statute miles, temperature 72 degrees F., dew point 52 degrees F., winds 300 degrees magnetic at 7 knots, altimeter 29.94 inches of mercury.

ONP at 1753 hours PDT: Ceiling 6,000 foot broken, visibility 10 statute miles, temperature 70 degrees F., dew point 54 degrees F., winds 220 degrees magnetic at 4 knots, altimeter 29.93 inches of mercury.

These observations were consistent with the description of weather conditions provided by the witnesses.

WRECKAGE AND IMPACT INFORMATION

On site examination was conducted by an inspector from the FAA's Flight Standards District Office (Hillsboro, Oregon). The aircraft was determined to have crashed approximately 50 feet east of the east side of a logging road in slightly up-sloping terrain. The latitude and longitude of the site was determined by plotting the site on a chart, and was found to be 45 degrees 22.449 minutes north and 123 degrees 47.349 minutes west (refer to CHART I).

The FAA inspector reported that the aircraft came to rest in an upright position with no lateral or longitudinal ground slide marks visible. The aircraft's longitudinal axis was oriented along an east/west bearing (nose east). Additionally, he reported that a small conifer was observed with minimal branch damage growing upright in an area bounded by the trailing edge of the main wing and the leading edge of the horizontal stabilizer (fore and aft) and the left and right tail booms. Additionally, a taller conifer with its limbs sheared off and displaying substantial bark scraping was observed standing upright alongside the right side of the right tail boom just aft of the wing. The rudder and elevator trim tabs were observed in a near neutral position (refer to photograph 1). A small (2 inch diameter) tree was observed penetrating the right wing approximately six feet inboard of the wingtip, and a larger tree with considerable bark scraping along its trunk was noted at the outboard trailing edge of the right aileron (refer to photograph

2). Both the right reserve and main tank gas caps were found secured at the site.

The inspector also reported that the aircraft's canopy was observed a short distance from the cockpit area and that the right propeller had separated from its engine. One blade was observed to be impaled vertically into the soil. The remaining two blades displayed minimal deformation or scratching (refer to photograph 3). The cockpit had been destroyed by fire, including the nose wheel tire and magnesium rim (refer to photograph 4). The left propeller had separated from its engine with the hub's longitudinal axis oriented approximately south. One blade was separated from the hub and impaled in the soil. The two remaining blades (one of which displayed extensive twisting and bending deformation) remained attached to the hub (refer to photograph 5). The left wing displayed a slight downward bend at a point approximately midway between the engine and tip and both the left reserve and main gas caps were found secured (refer to photograph 6). The fuel selectors, located in the aft left portion of the cockpit were readable at the site and both the left and right engines were observed to be set on "RES ON 44 GAL" (refer to photograph 7).

The FAA inspector also reported that all three landing gear appeared to be in a retracted position and that the Fowler flaps were retracted at the accident site.

MEDICAL AND PATHOLOGICAL INFORMATION

Post mortem examination of the pilot was conducted by Karen Gunson, M.D., at the facilities of the Oregon State Medical Examiner, 301 NE Knott Street, Portland, Oregon, 97212, on the morning of June 8, 1997. The report stated in part "Gastrointestinal Tract: The stomach contains approximately 200 cc's of partially digested, unidentifiable food material--."

Toxicological evaluation of samples from the pilot was conducted by the FAA's Toxicology and Accident Research Laboratory and all results were negative (refer to attached Toxicology report).

FIRE

The fire at the site was observed to be primarily focused within the cockpit area (photograph 4). Cockpit instrumentation, controls and switches were heavily damaged, therefore, the majority of Supplement "B" could not be completed. Combustibles within the cockpit area were hydraulic fluid in tanks located directly behind the pilot and the magnesium nose landing gear wheel rim, which, when the nose gear is retracted, is located directly beneath the pilot.

Additional areas of less intense fire were observed within each engine's carburetor areas as well as the engine's turbo-supercharger units. Combustibles within these areas are characteristically, fuel, oil and hydraulic fluid.

The only other area of prominent fire damage to the aircraft was observed at the center point trailing edge of the wing directly aft of the cockpit. A small semi-circular portion of the trailing

edge of the wing and flap was burned away in this area. Combustibles within this area are characteristically, fuel (from the main tanks) and hydraulic fluid from behind the cockpit (refer to photographs 8 and 9).

The soil beneath the aircraft, which sloped downhill from the wing trailing edge towards the horizontal stabilizer and the road, consisted of dry porous dirt (refer to photograph 10).

SURVIVAL ASPECTS

The Fire Chief who responded to the accident site reported that the pilot was observed a short distance south and east of the nose of the aircraft in a face down attitude and with no evidence of thermal injury. The pilot's seat restraint system, including the shoulder harness and lap belt, as well as fragments of the seat pan and back, were observed in the same area. The pilot was still wearing his parachute and the aircraft's canopy was observed on the ground near the pilot.

TESTS AND RESEARCH

The wreckage was re-examined on December 16/17, 1997. The entire horizontal and vertical stabilizer assembly was placed in a flat (fore and aft) attitude. When looking forward from behind the surfaces both the left and right upper vertical stabilizers were observed to be bent towards the left (refer to photograph 11). When the entire horizontal and vertical stabilizer assembly was placed in a 90 degree nose down (vertical axis) attitude and examined, both the left and right lower (ventral) stabilizers were observed to be bent towards the right (refer to photograph 12).

During the recovery procedure, the left wing was cut free from the airframe just outboard of the fuselage. The inboard edges of both the reserve and main left wing fuel tanks were examined. The reserve tank (forward of the spar and painted primer green) was observed to be generally deformed but displayed little fire damage. The main tank (aft of the spar and painted primer green) was observed to display some prominent damage at the inboard aft edge but displayed little fire damage. The tank also displayed a noticeable outward deformation (hydraulic effect) and the seams along the top and bottom where found to be split open (refer to photograph 13).

The outboard magneto of each engine was observed to have sustained fire damage and there was some crushing deformation to the under side of each engine. The inboard magneto of each engine appeared to be in good condition. The carburetors and fuel filter screens from both engines were observed to have sustained some fire damage. Both the left and right engine fuel screens were removed an examined. Aside from a small amount of combustion byproducts, the filters were clear. The rocker box covers were removed from each engine and all rocker arms and push rods appeared to be in new condition. Air pressure was applied to a cylinder on each engine via a single spark plug socket. During this application, the crankshaft of each engine was observed to rotate along with commensurate rotation of the cam shaft and

accessory gears. There was no observed evidence of any mechanical malfunction with either engine.

The right propeller was examined and all three blades were attached to the hub assembly. One blade was smeared with dirt and the other two were relatively clean. The soiled blade displayed an approximate 20 degree sharp aftward bend from the plane of rotation (refer to photograph 14). The right propeller spinner was observed to display nearly equilateral upward (vertical axis) deformation on either side of the soiled blade, along with tensile type rivet separations toward the vertical axis (refer to photograph 15).

The left propeller was examined and two of the three blades were attached to the hub assembly. One of the two retained blades displayed minimal deformation and was smeared with dirt, while the other displayed "S" bending and blade twist. The detached third blade, which was also soiled, displayed some bending deformation (refer to photograph 16). The left propeller spinner was observed to display deformation on opposing sides of the deformed and soiled blade, along with twisting diagonal pinch like deformation at some of its attach rivets (refer to photograph 17). The spinner of this propeller was completely detached from the propeller hub.

The right Curtis electric propeller blade pitch drive motor was tested by applying 24 volts of battery power to its drive motor leads. The unit remained attached to the propeller mechanism and all three blades displayed a pitch change movement when power was applied. The blades were determined from the test to be in an intermediate pitch setting and not at the low (flat) or high (feather) stops. The left Curtis propeller blade pitch electric drive motor was damaged to an extent that prevented testing.

ADDITIONAL INFORMATION

Subsequent to the initial on-site examination, the wreckage was released to the insurance representative for the purposes of recovery and storage. Recovery commenced approximately 1400 hours on June 7, 1997, and was conducted by Mr. Harry Malette, H.L.M. Air Services, Inc. The wreckage was stored at the salvor's facility in Independence, Oregon. Written wreckage release was executed on December 20, 1997 (refer to attached NTSB Form 6120.15).

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	49,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	June 25, 1996
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	4810 hours (Total, all aircraft), 6 hours (Total, this make and model), 4537 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Lockheed	**Registration:**	N7973
Model/Series:	P-38L P-38L	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Limited (Special)	**Serial Number:**	8006
Landing Gear Type:	Retractable - Tricycle	**Seats:**	1
Date/Type of Last Inspection:	June 2, 1997 Annual	**Certified Max Gross Wt.:**	18500 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Allison
ELT:	Not installed	**Engine Model/Series:**	V1710
Registered Owner:	PRUETT, BRUCE, L.	**Rated Power:**	1425 Horsepower
Operator:	ETHELL, JEFFREY, L.	**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MMV ,159 ft msl	**Distance from Accident Site:**	29 Nautical Miles
Observation Time:	17:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Unknown	**Visibility**	10 miles
Lowest Ceiling:	Broken / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	21°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(S47)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	17:35 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	TILLAMOOK S47	**Runway Surface Type:**	Asphalt
Airport Elevation:	35 ft msl	**Runway Surface Condition:**	
Runway Used:	31	**IFR Approach:**	None
Runway Length/Width:	4990 ft / 100 ft	**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	45.459472,-123.709861(est)

Administrative Information

Investigator In Charge (IIC):	Mccreary, Steven
Additional Participating Persons:	LARRY WILLIAMS; HILLSBORO , OR
Original Publish Date:	October 30, 1998
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=42504