



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Western Pacific Region

May 17, 2018

Onsite Examination

WPR18FA139

This document contains 7 embedded photos.

ACCIDENT:

Location: Julian, CA

Date: 05/10/2018

Aircraft: Beech BE76, Registration Number: N803FC, Serial #: ME-150

NTSB IIC: Jack Vanover

EXAMINATION PARTICIPANTS:

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HISTORY OF FLIGHT

On May 10, 2018, about 2031 Pacific daylight time, a Beech BE76 twin-engine airplane, N803FC, collided with mountainous terrain while maneuvering in the vicinity of Julian, California. The certificated flight instructor, pilot receiving instruction, and student pilot rated passenger were fatally injured. The airplane was destroyed by a post impact fire. The airplane was registered to and operated by Scandinavian Aviation Academy as an instructional cross-country flight under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed. The flight originated from

Apple Valley Airport (APV), Apple Valley, California, at an undetermined time and was destined for Gillespie Field Airport (SEE), El Cajon, California.

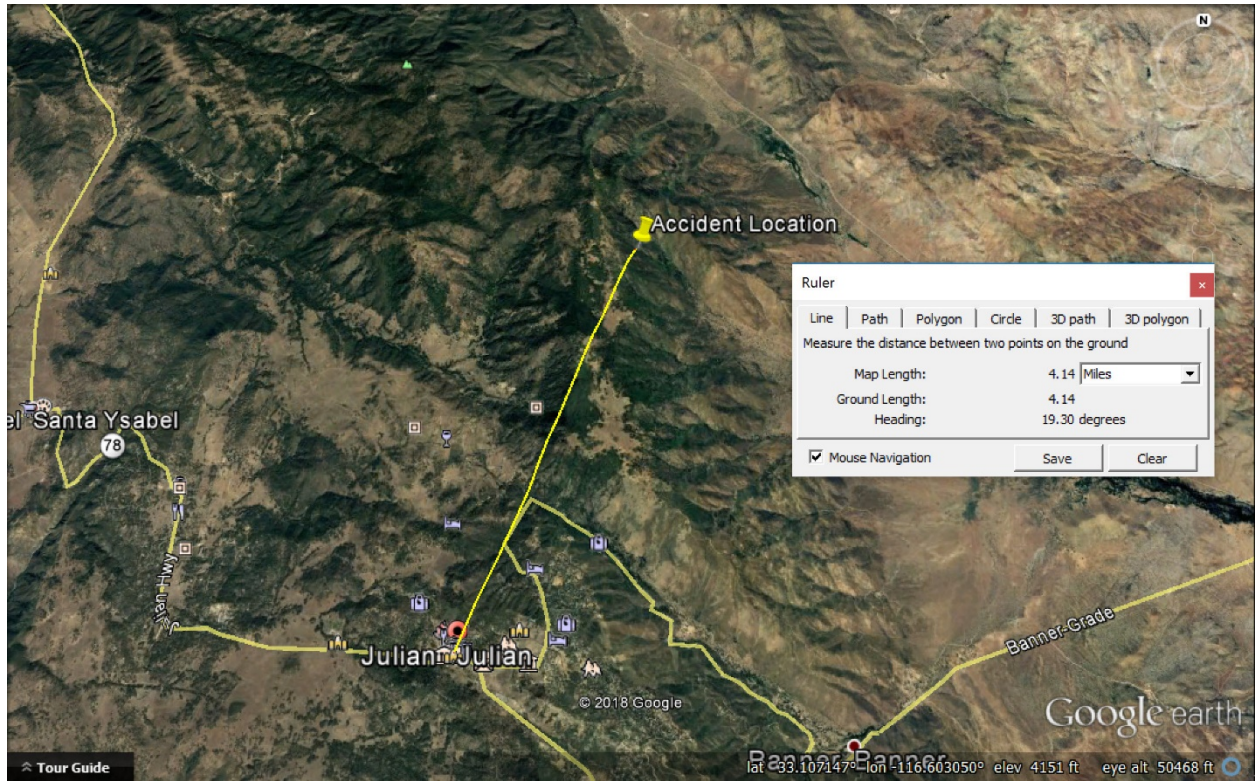


Figure 1: Distance from Julian, CA to accident site.

Fuel receipts show that about two hours prior to departure, the accident airplane received 58.2 gallons of AvGas. According to the flight school, the purpose of the flight was a day/night 100 NM cross country. The flight to APV was conducted during the day, and the flight from APV back to SEE was supposed to be conducted at night.

According to the operator the airplane departed SEE about 1700 and landed at APV uneventfully at an undetermined time. The flight departed AVP en-route to SEE at an undetermined time, however, radar data shows the airplane near the Ramona Airport (RMD) about 2003.

Review of preliminary radar data provided by the Federal Aviation Administration (FAA) identified the airplane near the Ramona Airport (RMN) about 2003. Radar tracking showed that the airplane traveled east from RMN, climbed to about 5,600 ft mean sea level (msl), with the groundspeed varying from 116 knots to 133 knots for about 14 miles. The airplane then began to slow and it made a left turn from about a 48° course heading to about a 176° course heading. Throughout the turn, the altitude remained about 5,600 ft msl, and the groundspeed decreased to 55 knots. At the completion of the turn, the groundspeed increased to about 67 knots, and a climb

was initiated to 6,600 ft msl while continuing on a southwestern course of about 195°. The airplane then made a right turn to an easterly heading for about 10 miles.

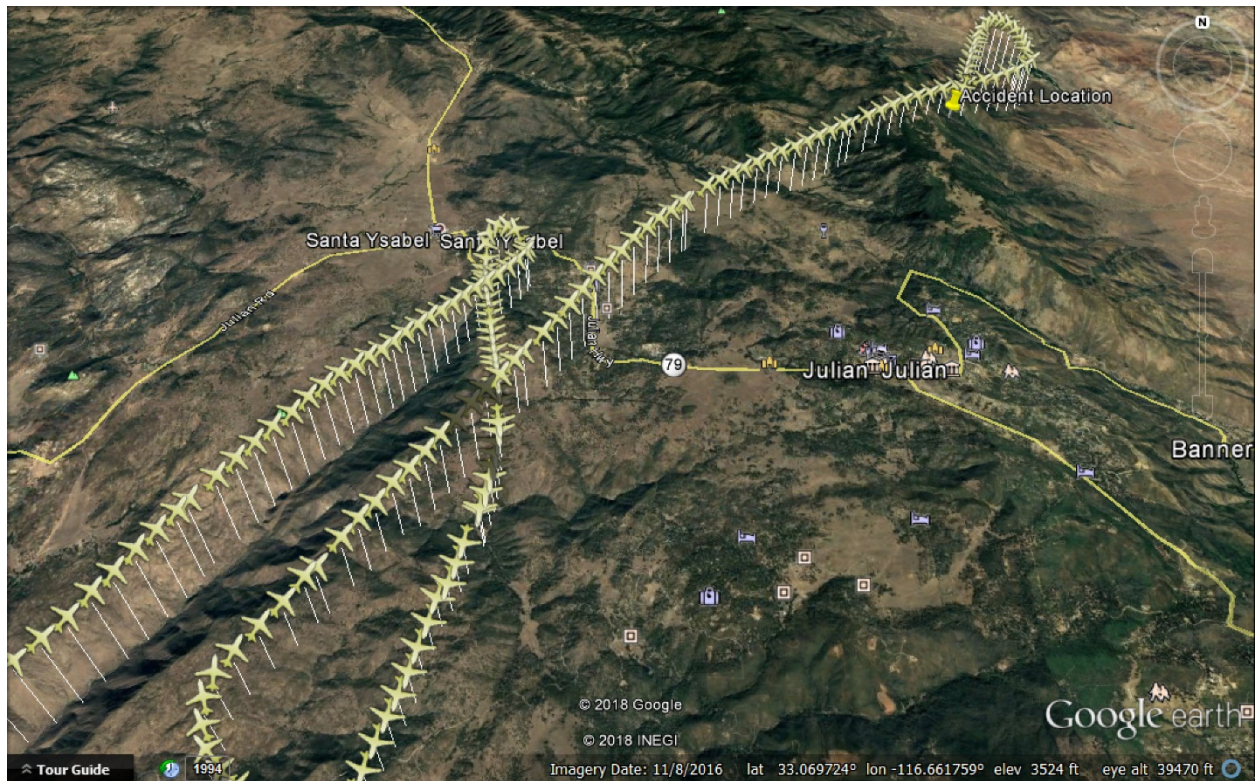


Figure 2: View of radar picked up from primary returns.

The radar data further depicted a left 180° turn was initiated at an altitude of 6,200 ft msl and a groundspeed of about 121 knots. At what appears to be the apex of the turn, the airplane was at 6,100 ft msl and a groundspeed of 50 knots. The airplane then began to descend, and groundspeed increased to 74 knots, then decreased to 50 knots. The last radar return was

recorded at 2031, with the airplane at an altitude of 5,700 ft msl and a groundspeed of 67 knots in the vicinity of the accident site.

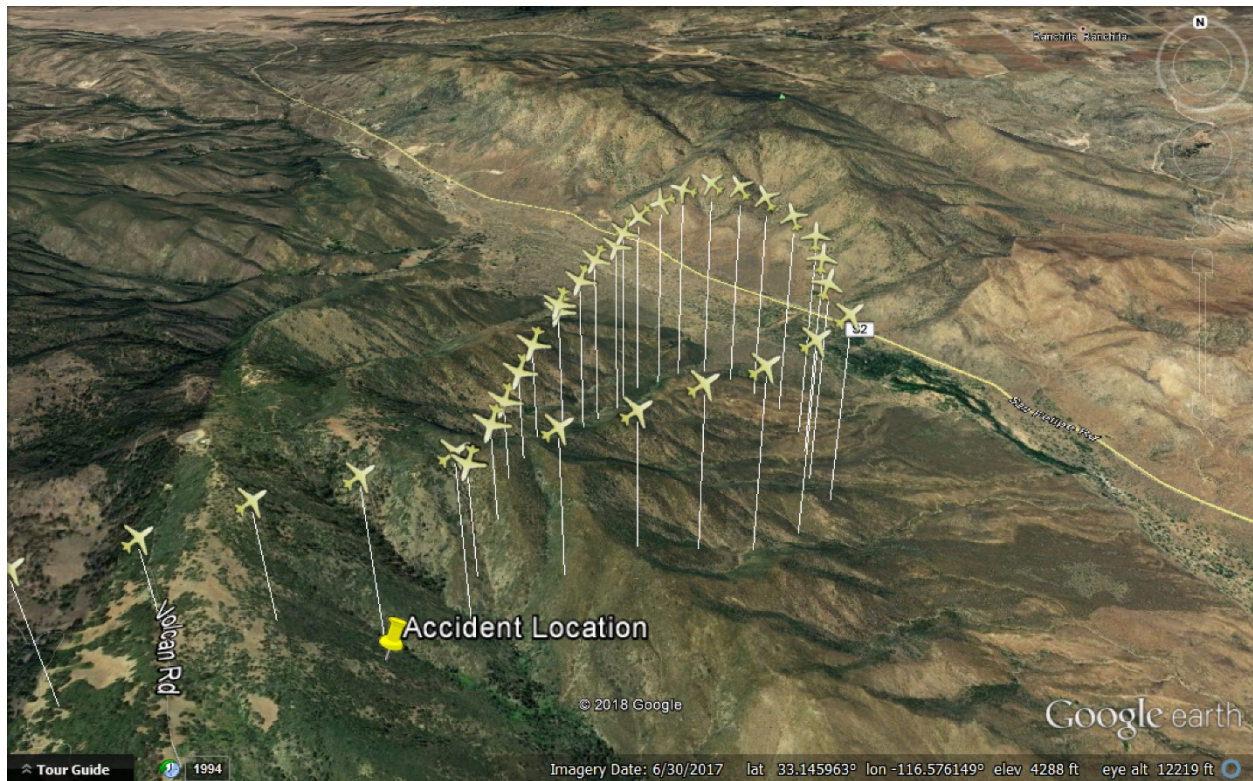


Figure 3: View of accident maneuver.

Fire crews responded to reports of a fire within the vicinity of the Julian VOR.

EYEWITNESS REPORTS

A witness located about 3 miles southeast of the accident site called 911 at 2037 and reported seeing the airplane crash and two explosions. I have attempted to contact the witness but the phone rings and says that a voice mail is not set up. The witnesses were hiking along the Pacific Mountain Trail. The contact information for the witness is as follows:

Mitchell Brennen [REDACTED]

PERSONNEL INFORMATION

Flight Instructor

Zuo, Qinyang – Instructor

Certificate Number: [REDACTED]

The pilot, age 28, held an airline transport pilot certificate with ratings for airplane multi-engine land and a commercial certificate for single-engine land. He also held a flight instructor certificate with ratings for airplane multi-engine, and instrument airplane. The pilot was issued an FAA first-class airman medical certificate on May 10, 2018, with no limitations.

According to a resume provided by the operator, the flight instructor reported total time of 2,000 hours, 1,500 PIC, 150 multi-engine, 170 instrument, and 125 nights. The flight records have not been obtained. The operator reported that they had recently hired the flight instructor and that the accident flight was his first instructional flight with the school.

141 Checkout Flight – Qinyang Zuo – 05/09/2018

Instructor: Peeters An-Katrien

Flight duration: 1.4 Hobbs + Pre and Post Briefing

The checkout instructor reported that “On this flight we covered all the required items according to SAA Standards. Following SAA Standard Operating Procedures”.

Items covered:

- Preflight Briefing
- Weight and Balance, Performance Calculations
- Preflight Inspection
- Before Engine Start Check List
- After Engine Start Check List
- Normal Taxi
- Before Take Off Check
- Before Take Off Briefing
- Emergency Briefing
- Normal Take Off and Climb

- After Take Off Check List
- Short Field Take Off and Climb
- Engine failure On Take Off Roll
- Normal Climb/ En route Climb
- Engine Failure After Take Off
- Cruise Checklist
- Clearing Turns
- Slowflight
- Stalls
- Steep Turns
- VMC Demo
- Emergency Operations
- Engine Failure During Flight
- Descend and Before Landing Checklist
- OEI Operations
- Short Field Landing
- Balked Landing/Go-Around
- OEI Landing
- Navigation (GPS, VOR usage)
- Spin Awareness
- Post Flight Inspection
- Post Flight Debriefing

According to the operator, Qinyang Zuo performed within FAA (ACS CPL) and SAA Standards.

Student Pilot Receiving Instruction

Name: Zhang, Zehe

Certificate Number: [REDACTED]

The pilot receiving instruction, age 24, held a private pilot certificate with airplane single-engine land and instrument airplane ratings. The pilot was issued his instrument rating on April 9, 2018. An FAA second-class airman medical certificate issued February 24, 2017, with no limitations. According to the accident report form that was filled out by the operator, the student pilot had a total time of 190 flight hours, 7 hours in multiengine, 7 hours in make and model, and 13 hours at night. In the last 90 days the pilot flew 50 total hours, 7 hours in make and model and 2 hours at night.

Flight Time (Enter appropriate number of hours in each box)	All Aircraft	This Make & Model	Airplane Single Engine	Airplane Multiengine	Night	Instrument	
						Actual	Simulated
Total Time	190	7	183	7	13		43
Pilot in Command (PIC)	87	0	87	0	9		35
Time as Instructor							
This Make/Model							
Last 90 Days	50	7	43	7	2		17
Last 30 Days	8	7	1	7	0		1
Last 24 Hours							

Figure 4: Flight time per 6120.1 for Zehe Zhang

Passenger/Student Rated Pilot (Back Seat)

Name: Zhang, Rongwei

Certificate Number: [REDACTED]

The pilot, age 23, held a student pilot certificate issued on February 20, 2018, and a second-class airman medical certificate issued October 14, 2017.

AIRCRAFT INFORMATION

The four-seat, low-wing, twin-engine, retractable landing gear airplane, serial number ME-150, was manufactured in 1979. It was powered by two Lycoming O360-A1G6D 180-hp engine and equipped with two-bladed Hartzell adjustable-pitch propellers. Review of the maintenance logbook records revealed the most recent annual inspection was completed March 3, 2018, at a recorded tachometer reading of 2130.1 hours and airframe total time of 14,150.9 hours. At the time of the inspection, the right engine total time was 7,494.4 hours, 197.8 hours since major overhaul (SMOH), and the left engine total time was 5,108.5 hours, and 197.8 SMOH.

The left propeller, a Hartzell HC-M2YR-2CEUF/FC7666A (Blade 1 serial number K81294, Blade 2 serial number K81291), total time was 2,263.8 hours and 263.8 since overhaul. The right propeller, a Hartzell HC-M2YR-2CLEUF/FJC7666A (Blade 1 serial number H27247, Blade 2 serial number K86053), total time was 1420.6 hours and 423.7 hours since overhaul. The left assembly number was FB1396B and the right assembly serial number was FB1360B.

METEOROLOGICAL INFORMATION

The 1953 automated weather observation from Ramona Airport (RNM), located about 18 miles northwest of the accident site, included winds from 290° at 7 knots, 10 statute miles visibility, sky clear, temperature 16°C, dew point 13°C, and an altimeter setting of 29.86 inches of mercury.

There were several surface-based “unofficial” wx reporting stations within about 4 miles of the accident location, at elevations between about 3200’ and 4300’. Note that siting of these equipment, maintenance standards and calibration are unknown.

For the hour surrounding the accident time, one station about 3 miles upwind of the accident location at an elevation of 4284’ reported sustained wind of about 3 knots or less from (generally) the west with gusts to 8 knots or less. However, another station about 4 miles north-northwest of the accident location, at an elevation of 3242’, reported sustained wind of up to 14 knots southwest to west-southwest with gusts to 19 knots.

The wind at Ramona Airport located about 19 miles west-southwest of the accident location at an elevation of about 1400' reported relatively light west-northwesterly to northwesterly surface winds during the period.

METAR KRNM 110153Z **26005KT** 10SM CLR 18/13 A2984 RMK AO2 SLP096 T01830133=

METAR KRNM 110253Z **29007KT** 10SM CLR 16/13 A2986 RMK AO2 SLP102 T01560128 53005=

METAR KRNM 110353Z AUTO **28004KT** 10SM CLR 13/12 A2987 RMK AO2 SLP106 T01330122=

HRRR model data for the time period identified wind magnitudes near 6100' of about 35 knots from the west-southwest above the accident location. Notably, 6100' resided near the top of a temperature inversion present in the lower altitudes. The accident site also looked to be immediately downwind of terrain with tops to about 5500'.

Doppler winds applicable above a point located about 28 miles west-southwest of the accident location presented shifting wind magnitudes below 10000' during the time surrounding the accident time. The image below is from the KNKX VAD wind profile for the period, where the vertical-axis is thousands of feet and the horizontal-axis is time (UTC) on 11 May 2018.

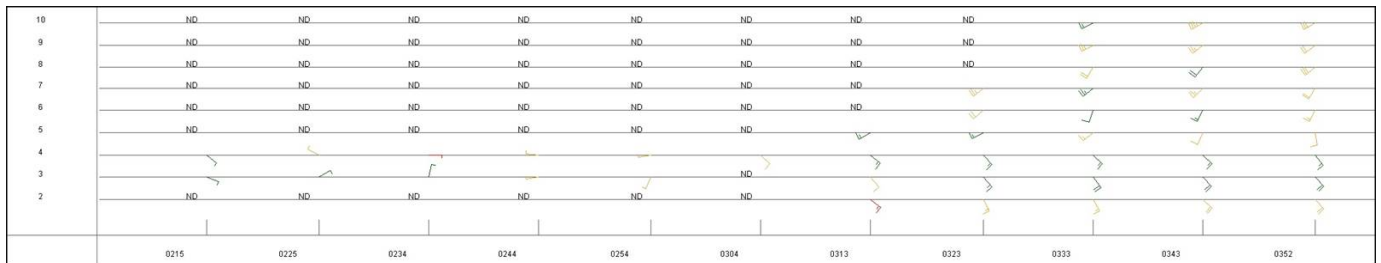


Figure 5: KNKX VAD wind profile.

There were no helpful PIREPs for wind.

There was an **AIRMET active for moderate turbulence** below 12000' for the accident region. This AIRMET had been **issued at 1945 PDT**.

The National Weather Service Area Forecast discussed gusty surface wind conditions for the mountains/deserts: "...*Gusty west winds through 08Z Friday from 15-25 mph gusting 35-45 mph...*" The highest surface winds were expected the day after the accident.

A review of the Los Angeles Sectional chart, valid thru June 21, 2018, revealed a caution block near the Julian VOR that reads, "Caution: Extreme turbulence and severe up and down drafts during high wind conditions".

WRECKAGE AND IMPACT INFORMATION

The accident site was located less than 1 mile southeast of the Julian VOR (Very-High-Frequency Omnidirectional Range Navigation Equipment) in mountainous terrain near the bottom of a draw at an elevation of about 4,200 ft. The wreckage debris was orientated along an east-west direction and the initial impact direction was on a westerly heading. The wreckage was contained within a 150-foot circumference of the initial impact point. The first piece of identified wreckage near the initial impact point was the fire extinguisher. The farthest portion of wreckage located downslope of the initial impact was the right-side propeller. All structural components were located at the accident site.

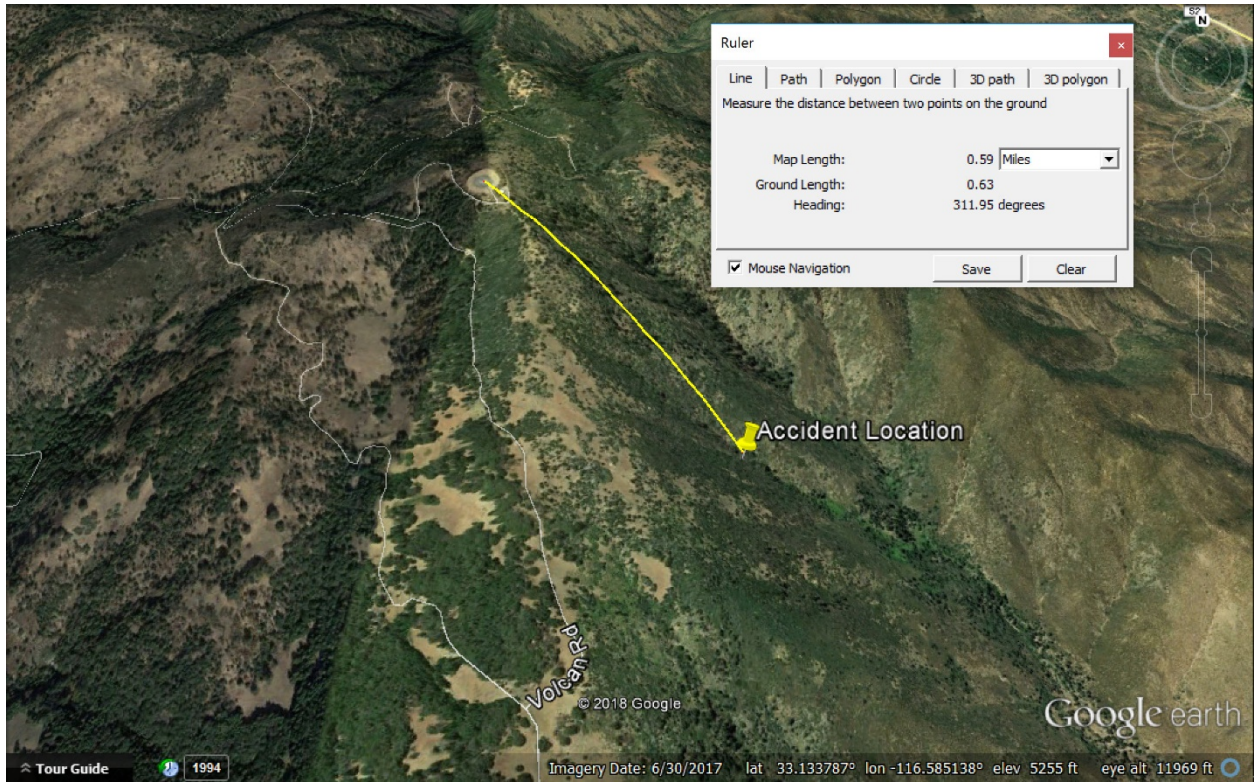


Figure 6: Google Earth – Map of accident location.

The main wreckage consisted of the fuselage, both wings, and both engines. The overall diameter of the main wreckage was about 20 ft. All structural components of the airplane were consumed by post impact fire, with the exception of a small part of the left aileron and some of the left wing.



Figure 7: View of Main Wreckage

All flight control cable pullies, with the exception of the two aileron pullies in the center cabin area, were destroyed by the post impact fire. The flight control cables were observed in photographs taken at the site wrapped around a tree. The cockpit control handles for ailerons and elevator were observed with the aluminum tubing between the handles and the control “T” burned away during the fire.

Aileron control cables, one control cable remained attached to the left aileron bellcrank in the wing. The remaining aileron control cables were observed loose from their attachment location, however the attachment hardware remained in place and with the cotter pin installed. The aileron interconnect control cables on the cockpit control were observed with one chain separated from the impact, however, the chains remained wrapped around both sprockets. The drive cables remained attached to the interconnect which was cut during recovery and the other separated in a tension overload type separation.

The elevator control cables were observed attached to the bottom of the cockpit control column and appeared to have been cut during recovery. The remainder of the elevator control cable system cables were either cut during recovery or exhibited tension overload type separations. All cable ends had hardware were installed. The elevator down force spring was observed in the wreckage. The elevator torque tube was observed attached to each other and the bell crank exhibited thermal damage. The elevator trim control cables were observed attached together and were cut during recovery. Both trim tab actuators exhibited extensive thermal damage and the trim tab setting was not determinable. The trim tab control wheel in the cockpit was destroyed by the post impact fire.

The rudder control cable system at the rudder was observed with the rudder bellcrank consumed by the post impact fire. One of the control cables attached to the rudder bellcrank was observed with a small section of the bellcrank attached. The remainder of the cables were observed either cut or exhibited tension overload type separations. The rudder pedals were not observed in the wreckage. The rudder trim cables were observed either cut during recovery or exhibited tension overload type separation. The rudder trim actuator exhibited extensive thermal damage and the trim tab setting was not determinable. The trim tab control wheel in the cockpit was destroyed by the post impact fire.

The flap actuator was observed in the fully extended (36 threads) position which according to the manufacture is the flap retracted position. The flap torque tubes were not observed.

The fuel system was destroyed by the post impact fire.

Both fuel selectors were found in the debris path and were set to on.

All four seat bases were found loose in the debris path and were destroyed by the post impact fire. Three seat belt buckles were observed latched together and one female buckle was observed not buckled. The male section of one the belt buckles was not located in the wreckage.

ENGINE

Both engines were found in the main wreckage about 20 ft from one another.

Left

The engine remained attached to the airframe firewall by the engine mount. The engine and attached components had sustained severe thermal effect damage resulting from the post impact ground fire. The single drive-dual magneto, carburetor, fuel pump and a significant section of the accessory case and oil sump had been consumed by the fire. Impact damage and deformation was noted at the right upper section of the engine encompassing the No. 1 cylinder fins, exhaust pushrod and rocker cover. Visual examination of the engine revealed no evidence of pre-impact catastrophic mechanical malfunction or fire.

The two bladed constant speed propeller, along with the attached crankshaft flange were displaced from the engine.

Propeller Governor

The propeller governor was securely attached at the mounting pad with the pitch control rod securely attached at the control arm. The propeller governor had sustained extensive thermal damage that rendered the unit unsuitable for testing. The governor was removed for examination. The drive was intact. The gasket screen was free of visible contamination. The data plate was destroyed. The various fuel supply lines at the engine and firewall exhibited extensive impact/thermal damage. There was no fuel observed. The carburetor was destroyed by post impact fire. All that remained were the steel components of the throttle plate, shaft, arm and control rod ends of the throttle and mixture. The throttle/mixture controls were found securely attached at their respective control arms of the carburetor. The serrated interface of the control arms remained properly seated on the shaft. The carburetor data plate was destroyed. The carburetor heat airbox along with the attached carburetor heat control cable displayed extensive thermal damage. The fuel pump was completely destroyed by the post impact fire.

Magneto

The single drive, dual magneto was destroyed by post impact fire. All that remained was the steel components of the magneto drive gear and shaft. The gear and shaft exhibited no evidence of preimpact mechanical malfunction. Magneto to engine timing could not be ascertained, due to the destruction of the flywheel and magneto. The data plate was destroyed.

Spark Plugs

The spark plugs were secure at each position and displayed extensive impact and thermal damage. The Top spark plugs were removed, examined and photographed. The spark plug electrodes remained mechanically undamaged and displayed varying coloration consistent with a post impact fire.

The ignition harness had been subjected to post impact fire and had sustained thermal damage. The harness appeared to have been attached at each spark plug lead.

Starter

The starter was securely attached at the mounting pad and had sustained fire damage. The alternator was detached from the engine and destroyed. The rear-mounted vacuum pump was secure at the mounting pad. The drive coupler was melted due to thermal effect. The rotor/vanes were undamaged when opened for examination. The data plate was destroyed.

Oil System

The oil suction screen cap was found secure. The oil suction screen was free of any debris. The oil filter was destroyed by fire. There was no evidence of any preaccident lubrication system contamination observed during the engine examination.

Fuel

The various fuel supply lines at the engine and firewall were subjected to the forces of impact energy and the thermal effects of the post impact fire. There was no fuel observed.

The carburetor had been partly consumed by the thermal effects of the post impact fire. The throttle/mixture controls were found securely attached at their respective control arms of the carburetor. The serrated interface of the control arms remained properly seated on the shaft. The carburetor data plate was destroyed.

The carburetor heat airbox along with the attached carburetor heat control cable were subjected to the thermal effects of the post impact ground fire. The fuel pump was mostly consumed resulting from the thermal effects of the post impact ground fire. The data plate was destroyed.

Engine Continuity

Rotation of the crankshaft was precluded due to impact damage to the engine case and crankshaft at the nose of the engine. The rocker covers were removed. The complete valve train within the rocker box areas remained intact and appeared to be free of any preaccident mechanical malfunction. The combustion chamber of each cylinder was examined through the spark plug holes utilizing a lighted borescope. The combustion chambers remained mechanically undamaged, and there was no evidence of foreign object ingestion. The valves were intact and undamaged. There was no evidence of valve to piston face contact observed. The gas path and combustion signatures observed at the spark plugs, combustion chambers and exhaust system components displayed coloration consistent with normal operation. There was no oil residue observed in the exhaust system gas path.

To facilitate further internal examination, holes were drilled through the engine case material in various locations and in-line with the rotational plane of each connecting rod. A lighted borescope was inserted to visualize each connecting rod, crankshaft, and cam lobes at the respective cylinder position. There was no evidence of lubrication deprivation or contamination found. The crankshaft and attached connecting rods remained free of heat distress.

There was not any evidence of preaccident catastrophic mechanical malfunction. The camshaft was intact and each of the cam lobes appeared normal in their shape.

The accessory case was removed. The accessory gears including the crankshaft gear, bolt and dowel were intact and remained undamaged and no preaccident malfunction was noted.

The muffler and various pipes had sustained impact damage. There was significant ductile bending of the exhaust system components. The muffler was sectioned utilizing a saw to be internally examined. The muffler internal baffle material exhibited signatures of erosion and deformation but was not occluding or hindering the flow of exhaust gases.

Propeller

The two bladed constant speed propeller, along with the attached crankshaft flange were displaced from the engine. The crankshaft fracture surface exhibited signatures consistent with torsional overload due to the absorption of rotational energy. The propeller blades remained attached at the hub.

The propeller governor was securely attached at the mounting pad. The pitch control rod remained securely attached at the control arm. The propeller governor had sustained significant thermal effect damage that rendered the unit unsuitable for testing. The governor was removed for examination. The drive was intact. The gasket screen was free of visible contamination.

Right Engine

The engine remained attached to the airframe firewall by the engine mount. The engine and attached components had sustained extensive thermal effect damage resulting from the post impact ground fire. The single drive-dual magneto, carburetor, fuel pump and a significant section of accessory case had been consumed by the fire. Impact damage and deformation was observed at the lower section of the engine encompassing the muffler and alternator. Visual examination of the engine revealed no evidence of pre-impact catastrophic mechanical malfunction or fire.

Magneto

The single drive, dual magneto had been destroyed due to the thermal effects of the post impact ground fire. All that remained was the steel components of the magneto drive gear and shaft. A small portion of the distributor was recovered. The gear and shaft exhibited no evidence of pre-impact mechanical malfunction. Magneto to engine timing could not be ascertained, due to the destruction of the flywheel and magneto. The data plate was destroyed.

Spark Plugs

The spark plugs were secure at each position and had been subjected to impact and thermal damage. The top spark plugs were removed, examined and photographed. The spark plug

electrodes remained mechanically undamaged, and displayed varying coloration attributed to thermal effects of the post impact ground fire.

The ignition harness had been subjected to post impact ground fire and had sustained extensive thermal damage. The harness appeared to have been attached at each spark plug lead.

Starter

The starter was securely attached at the mounting pad, with the electrical connection secure at the post.

Alternator

The alternator was displaced from the mountings and had sustained damage.

Vacuum Pump

The rear-mounted vacuum pump base was secure at the mounting pad and had been mostly consumed by fire.

The drive coupler was melted due to thermal damage. The rotor was intact. The data plate was destroyed.

Oil System

The oil suction screen cap was found secure. The oil suction screen was free of any preaccident debris. The oil filter was destroyed by fire. There was no evidence of any preaccident lubrication system contamination observed during the engine examination.

Engine Continuity

Rotation of the crankshaft was precluded due to impact damage to the engine case and crankshaft at the nose of the engine. The No 4. aluminum cylinder head was separated from the barrel threads. The rocker covers were removed. The complete valve train within the rocker box areas appeared to be free of any preaccident mechanical malfunction. The combustion chamber of each cylinder was examined through the spark plug holes utilizing a lighted borescope. The combustion chambers remained mechanically undamaged, and there was no evidence of foreign object ingestion. The valves were intact and undamaged. There was no evidence of valve to piston face contact observed. The gas path and combustion signatures observed at the spark plugs, combustion chambers and exhaust system components displayed coloration consistent with normal operation. There was no oil residue observed in the exhaust system gas path.

To facilitate further internal examination, holes were drilled through the engine case material in-line with the rotational plane of each connecting rod. A lighted borescope was inserted to visualize each connecting rod, crankshaft, and cam lobes at the respective cylinder position.

There was no evidence of lubrication deprivation or contamination found. The crankshaft and attached connecting rods remained free of heat distress. There were no signatures or conditions observed consistent with any preaccident catastrophic mechanical malfunction. The camshaft was intact and each of the cam lobes appeared normal in their shape.

The accessory case was removed. The accessory gears including the crankshaft gear, bolt and dowel were intact and remained undamaged by any pre-impact malfunction.

The muffler and various pipes had sustained impact damage. There was significant ductile bending of the exhaust system components. The muffler was internally examined. The muffler internal baffle material remained intact and was not occluding or hindering the flow of exhaust gases.

Propeller

The two bladed constant speed propeller, along with the attached crankshaft flange were displaced from the engine.

COCKPIT/CABIN OBSERVATIONS

All Instruments and switches were destroyed and unrecognizable.