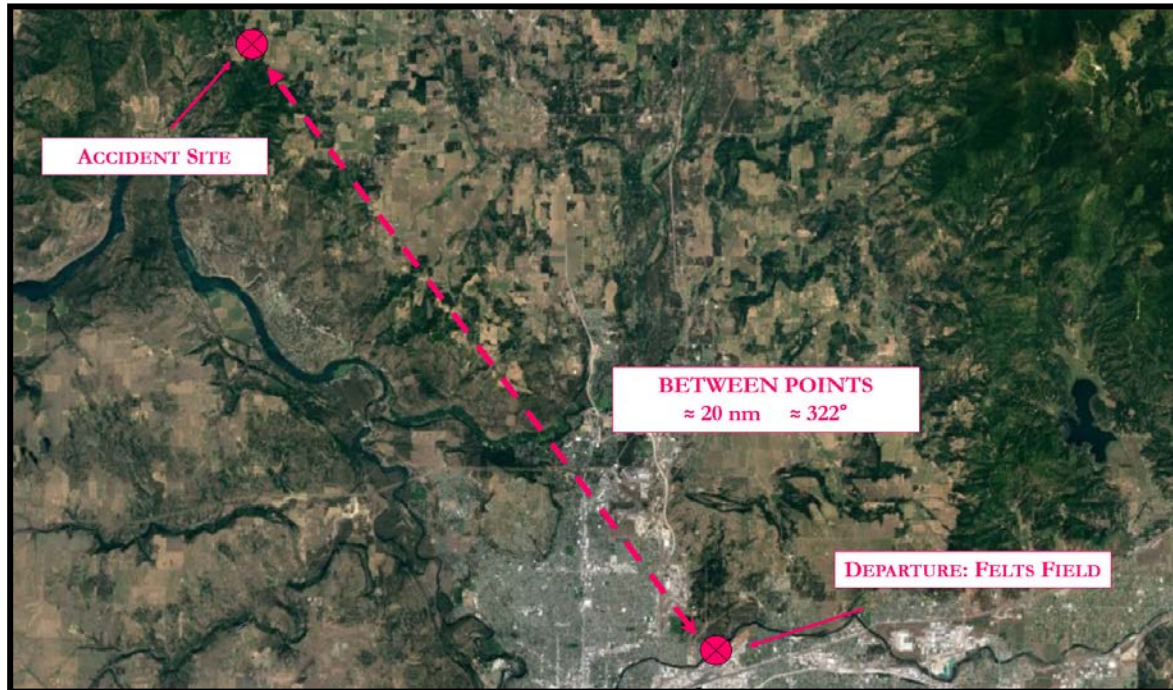


FIELD NOTES

HISTORY OF FLIGHT

On July 13, 2018, at 1021 Pacific daylight time, a Cessna 172R Skyhawk, N24442, experienced an inflight breakup and collided into a field in Deer Park, Washington. The certified flight instructor (CFI) and two student pilots were fatally injured. The airplane was substantially damaged. The airplane was registered to and operated by Moody Bible Institute of Chicago as a 14 *Code of Federal Regulations* Part 141 training flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan had been filed; the pilot was receiving flight following advisories. The local flight originated from Felts Field about 0955.



Picture 01: Accident Site in Reference to the Departure Point

The purpose of the flight was for the front-seated student pilot to undergo instruction. This was the first flight in his training program and the aft-seated student pilot was an observer.

LESSON: PLI 4 Visual Attitude Flying and Procedures Introduction (Aircraft)

Objectives: The student will apply the visual attitude flying and procedures learned in the AATD and develop partial proficiency in changing configurations within the tolerances indicated below.

Lesson Content: The student will receive ground briefing, review, and critique in the following elements:

1. Cockpit orientation
2. Passenger briefing
3. Starting procedures—use of checklist
4. Taxi practice
5. Pre-takeoff check—use of checklist
6. Review takeoff performance airspeeds and distances, departure, and emergency procedures
7. Normal/crosswind takeoff —power check
8. Climbs—straight and turning. Emphasis on pitch control, V_y climb, Cruise climb at 1000' AGL
9. Level off and straight cruise—use of checklist
10. Practice area orientation
11. Demo—coordinated turns and uncoordinated turns
12. Trimming exercise
13. Level turns—coordination and roll out on headings
14. Slow flight introduction
15. Traffic pattern at altitude
16. Descents—straight and turning (Cruise, Approach, V_g)
17. Normal/crosswind landing
18. Post landing and shutdown—use of checklist

Completion Standards: Satisfactory completion of this lesson requires that the student be able to perform the above items within the tolerances indicated below. The student will be graded on at least the grading criteria indicated.

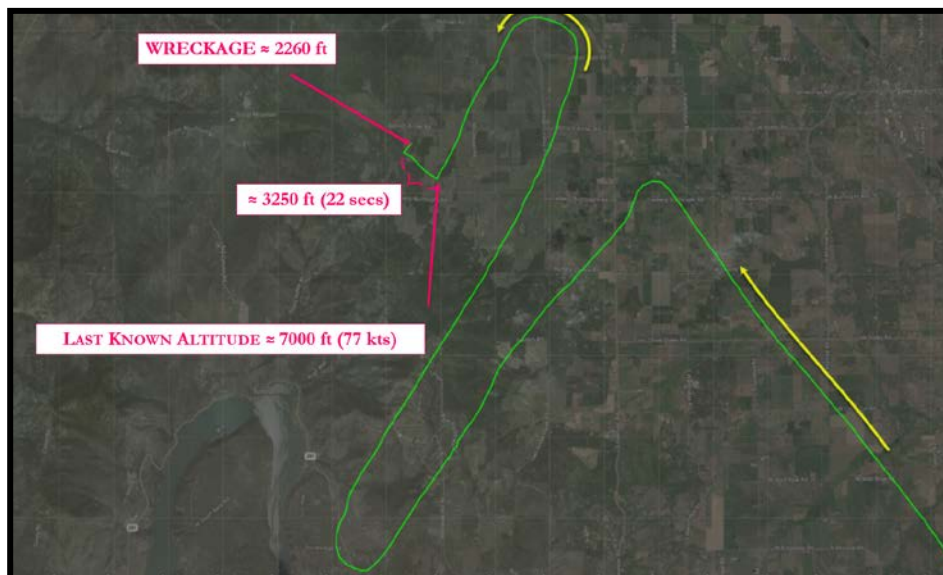
Tolerances							
Airspeed: +/- 25 kts		Altitude: +/- 250 feet		Heading: +/- 25°		Bank: +/- 10°	
Grading Criteria							
Orientation:		Division of Attention:		Coordination:		Vigilance:	
						Final Grade:	

Following departure, the CFI communicated with the Spokane Terminal Radar Approach Control (GEG TRACON) and proceeded to the Clayton practice area located about 15 miles northwest of the airport. The operator noticed the airplane was late and then at about 1110 attempted to communicate with the CFI on the radio and on his cell phone. Thereafter, the operator contacted the TRACON and they discovered that the last radar hit occurred at 1021.



Picture 02: Accident Site in Reference to the Practice Area

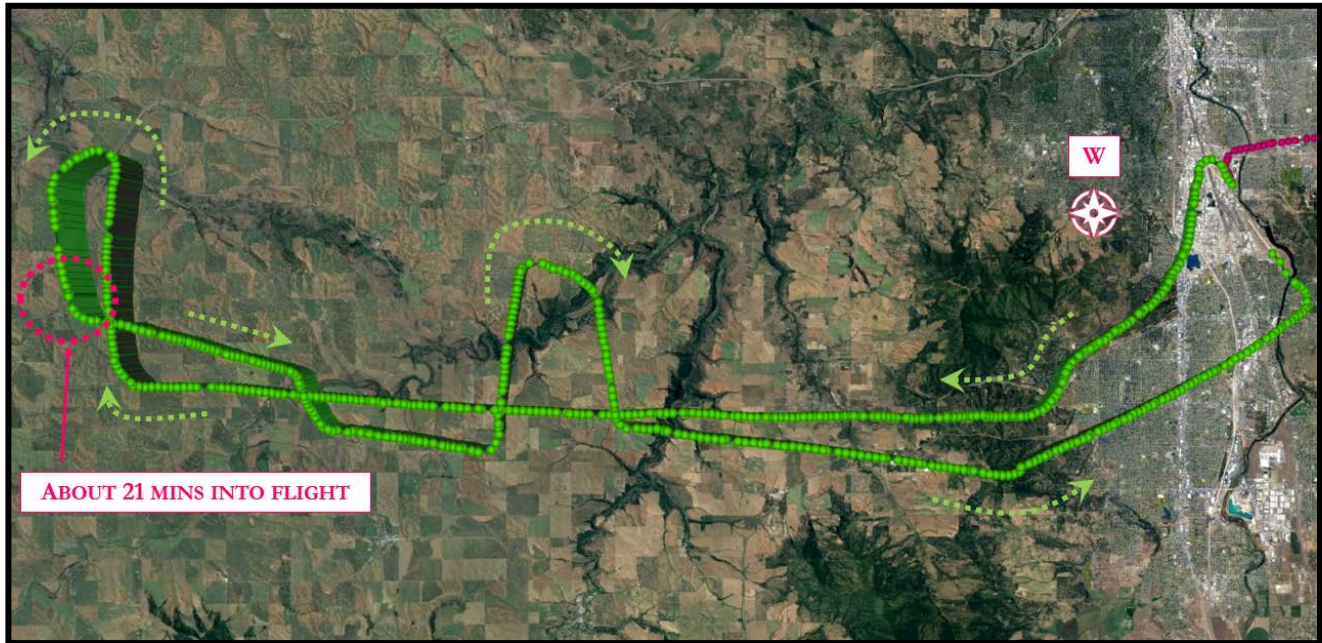
A review of the radar track data indicated that after entering Clayton, at 1010 the airplane began a gradual 90° left-turn and continued in a southwestern direction temporarily leaving the boundary of Clayton. The airplane continued in a gradual climb to about 7,000 ft mean sea level (msl) and then made a 180° right turn. The flight track remained on a northeastern heading until about 1018, at which point the airplane made another 180° turn to the heading of 208°. The airplane proceeded about 2.5 miles varying in altitude between from about 7,000 to 7,450 ft msl. At 1020:53 the track data indicated the airplane at an altitude of 7,000 ft msl and an estimated ground speed of 77 knots. From that point, the track made a sharp 90° right-turn and continued on a 305° heading for about 3,100 ft over a duration of about 14 seconds. The track then made another sharp 90° right-turn and after about 880 ft and the last recorded track data at 1021:18 indicated an estimated ground speed of 117 knots. The accident site was located about 740 ft southwest of the last recorded track data. Witnesses reported that the airplane was in a steep dive toward terrain and then they subsequently observed the wings departing the airplane at the same time.



Picture 03: Radar Track Data

PRIOR FLIGHT

The flight prior to the accident flight departed at 0805 and was conducted over the Fairfield practice area (to the south of the airport). The CFI was positioned in the right-seat, the accident rear-seated passenger was in the left front-seat and another student as rear-seated passenger. The flight landed about 0910 and the CFI immediately got ready for the next flight with the front-seated student riding in the back for the accident flight. A review of the cockpit mounted Go-Pro camera revealed that the flight was benign. About 20-25 minutes into the flight, the same duration into the accident flight, the CFI was demonstrating shallow turns.

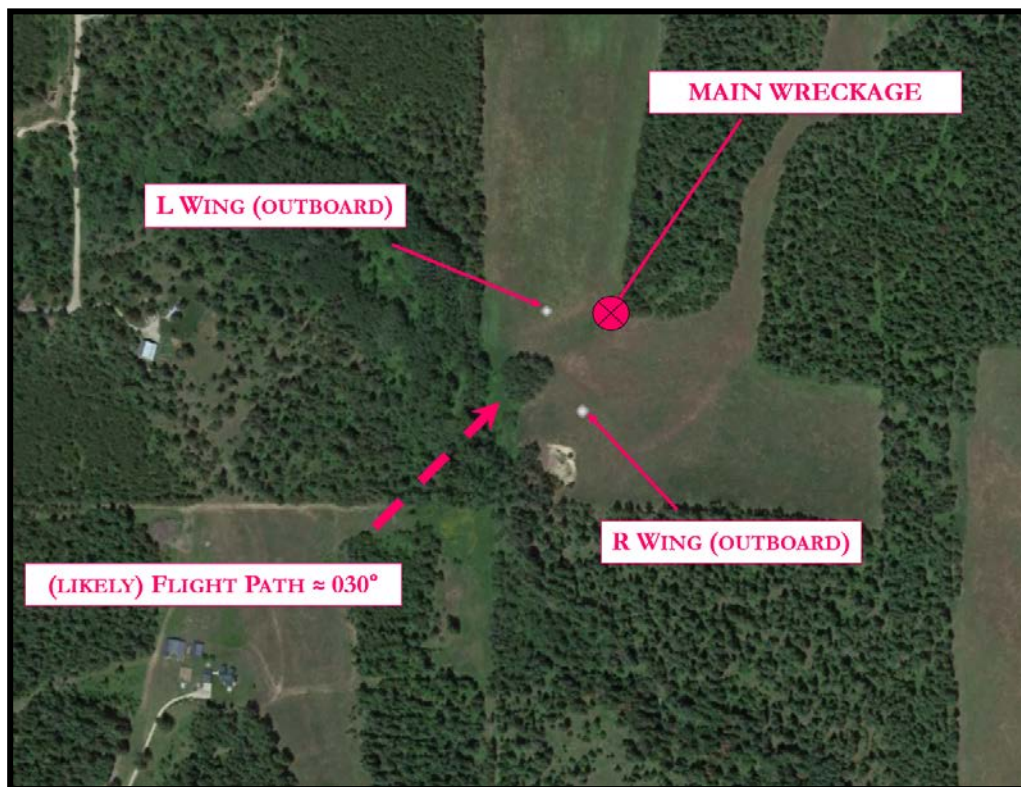


Picture 04: Prior Flight Radar Track Data

WRECKAGE AND IMPACT

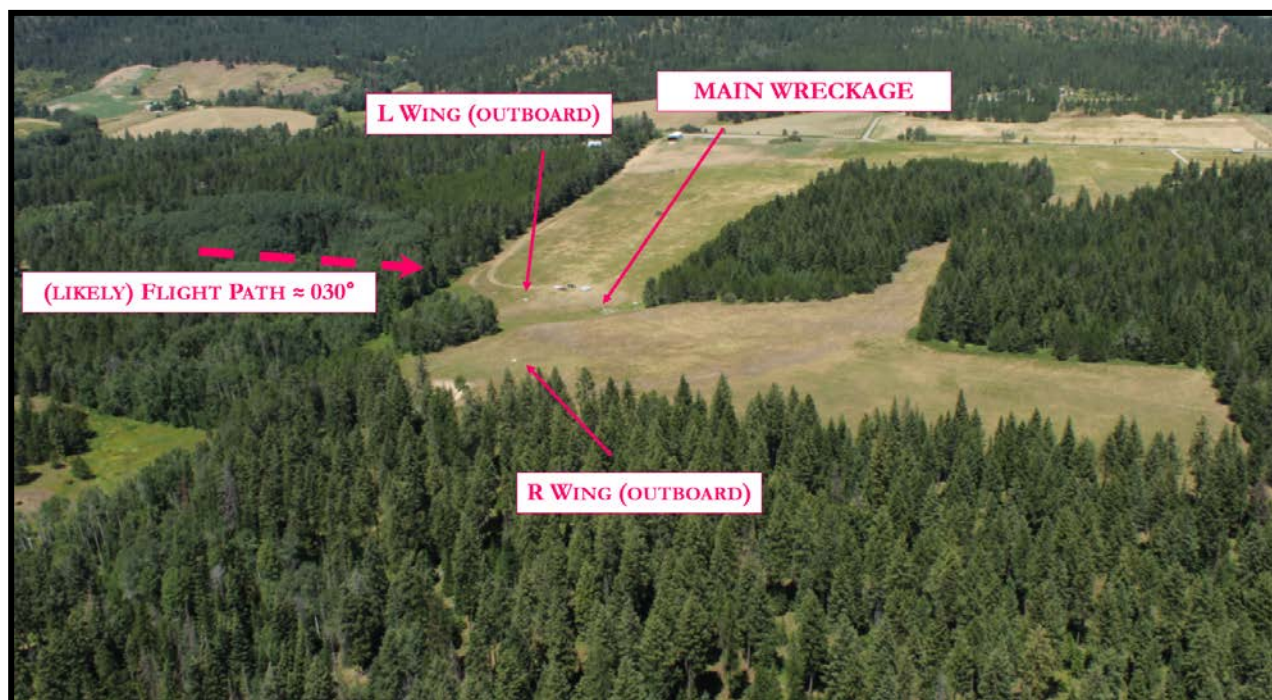
The accident site was located in a grass field in the rural farm land of Deer Park, Washington about 20 nautical miles northwest of the Felt Field airport. In character, the open fields are surrounded by densely populated tree stands of aspen, cottonwood, red fir and ponderosa pines ranging from about 50-100 ft tall. The elevation of the fuselage resting point was 2,265 feet msl.

The wreckage was found distributed over a 400 ft distance on a median magnetic bearing of about 030°. The outboard sections of both the right and left wing were located at the beginning of the debris field. The debris field between the wings and the main fuselage wreckage consisted of left wing pieces. All control surfaces and their associated mass balance weights were accounted for in the debris field.

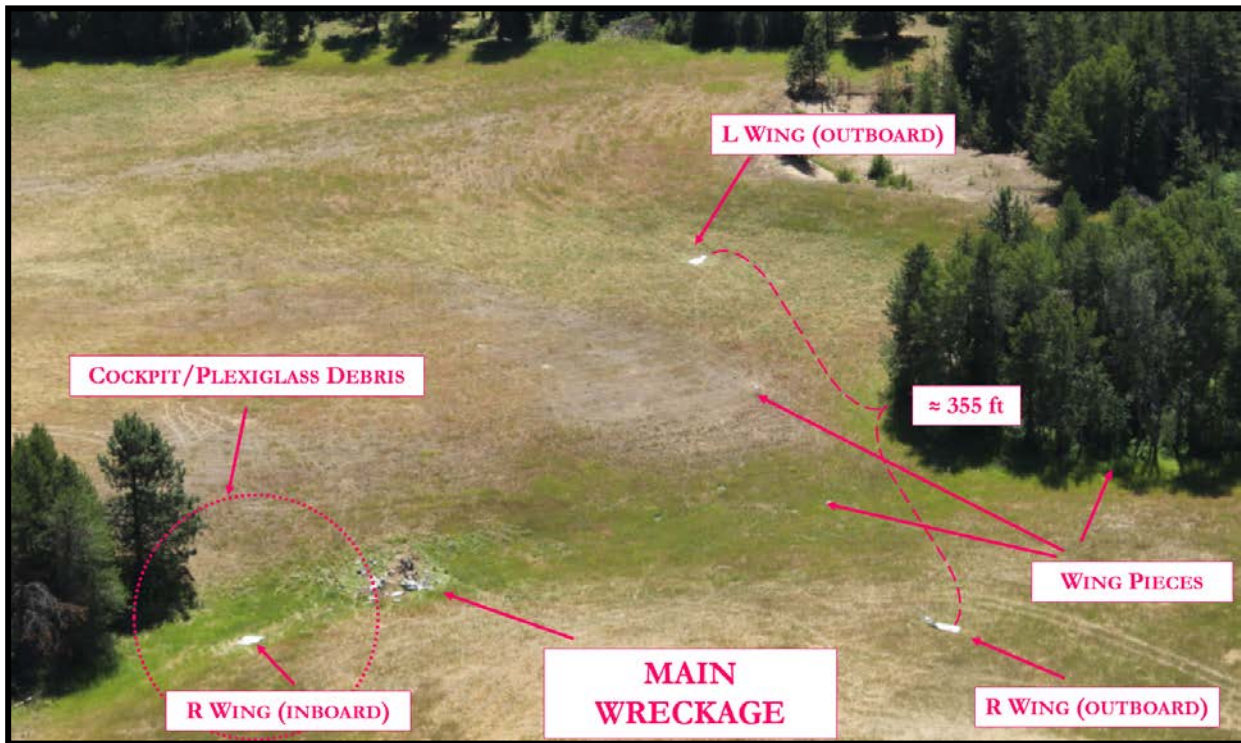


Picture 05: Accident Site in Reference to the Surrounding Terrain

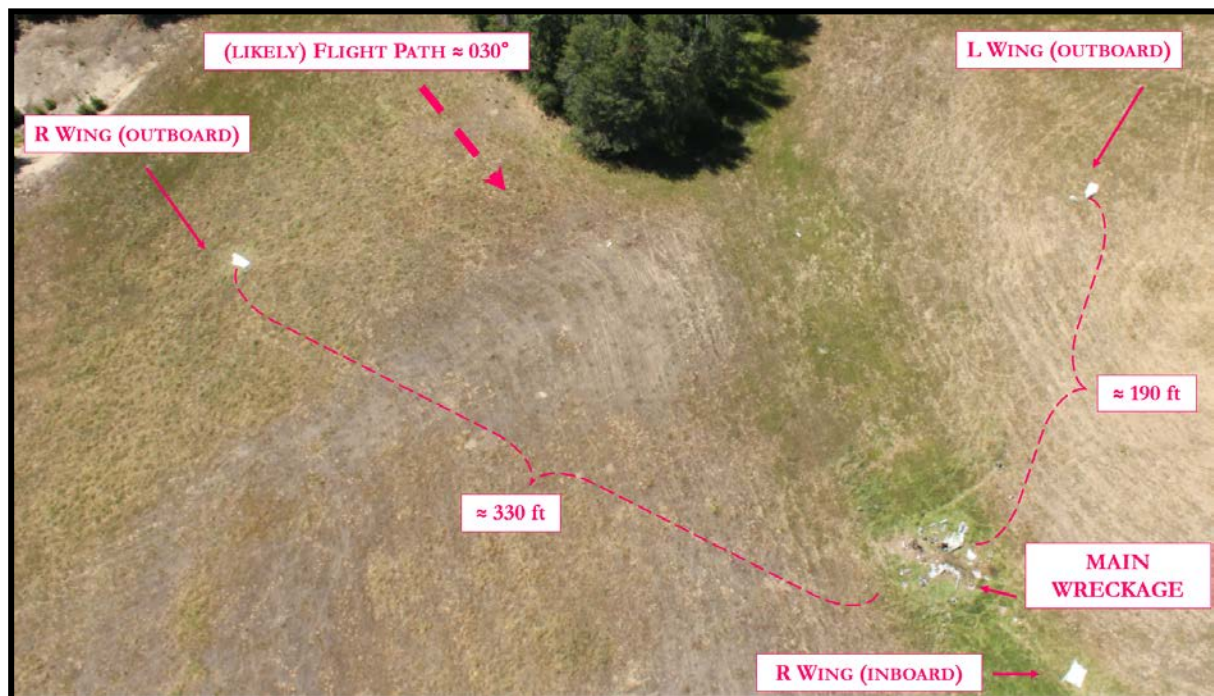
The main wreckage consisted of the: fuselage, engine, propeller, inboard left wing, vertical and horizontal stabilizers, rudder, and elevators. The main wreckage came to rest at the base of a small hill. The remaining wreckage components were found in the debris field adjacent to the main wreckage and principally consisted of plexiglass, cockpit debris, the left lower nose cowling, and the inboard right wing.



Picture 06: Ariel Overview of Accident Site



Picture 07: Ariel Overview of Accident Site



Picture 08: Ariel Overview of Accident Site

FUSELAGE

The fuselage came to rest nearly vertical and slightly inverted at the base of two shallow hills. The nose of the airplane was buried in the soft dirt; the propeller and engine were on a magnetic bearing of 360° . An

impact scar, consistent with the inverted fuselage and engine, was located just prior to the fuselage resting point. The cockpit and cabin area was crushed. The nose landing gear and cockpit components were all located in the immediate vicinity of the fuselage.



Picture 09: Bottom of Fuselage

DOORS

The left door was found on the left side of the main wreckage; the latch was locked. The right door was farther right in the debris field; the latch was locked. Both doors had sustained aft crush deformation with the metal folding back on itself indicative of a near-vertical impact.



Picture 10: Doors

SEATS

The left front-seat had been separated from the cockpit. The right-front seat remained partially attached to the floorboards; the seat back had been separated. The deformation and seatbelt position in the aft

seat were consistent with the aft-seated student pilot positioned in the left seat. This was further confirmed by a picture that student took of himself on the accident flight and sent to his spouse.

WINGS

LEFT WING

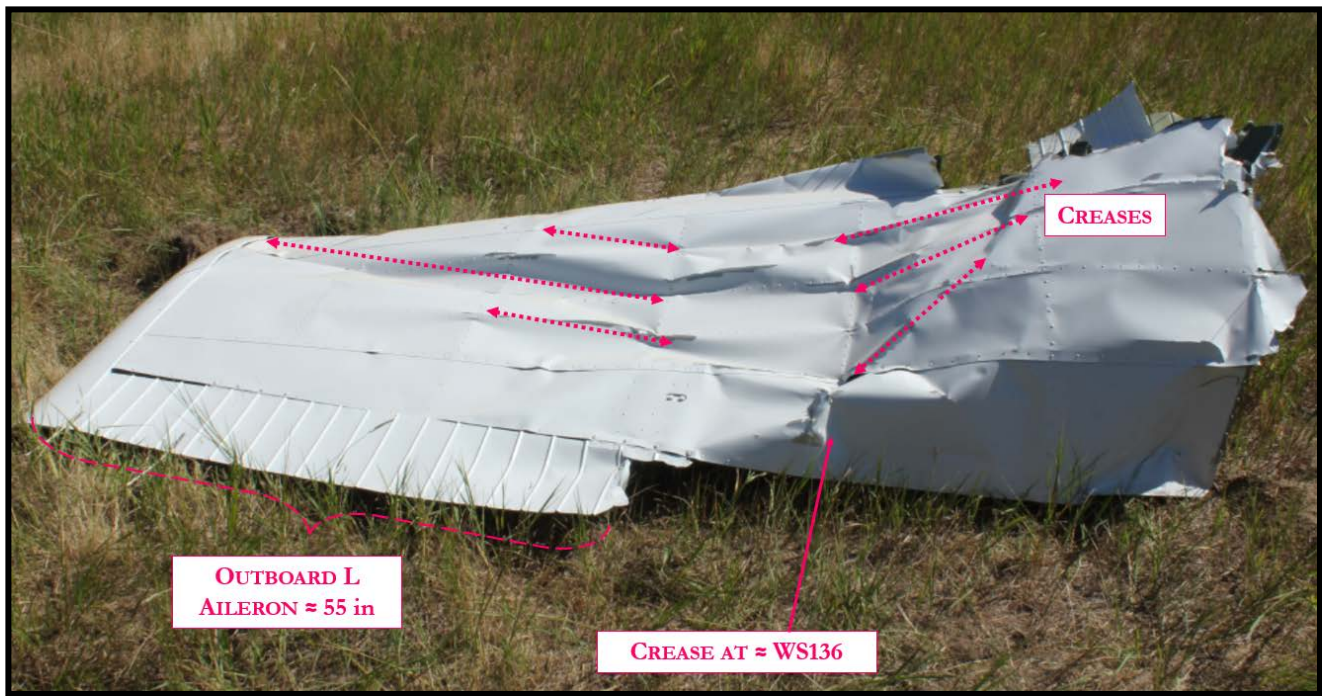
The left wing was separated into two major sections. The left outboard wing section was located about 190 ft from the main wreckage on a heading of 275°. The inboard portion of the wing was found imbedded with the main wreckage. An outboard section of the left flap and attached wing skin was adjacent to the outboard wing. A small piece of the aileron skin, upper wing skin, landing light lens, and the remainder of the inboard aileron were located in the debris field.



Picture 11: Left Wing Distribution in the Debris Field

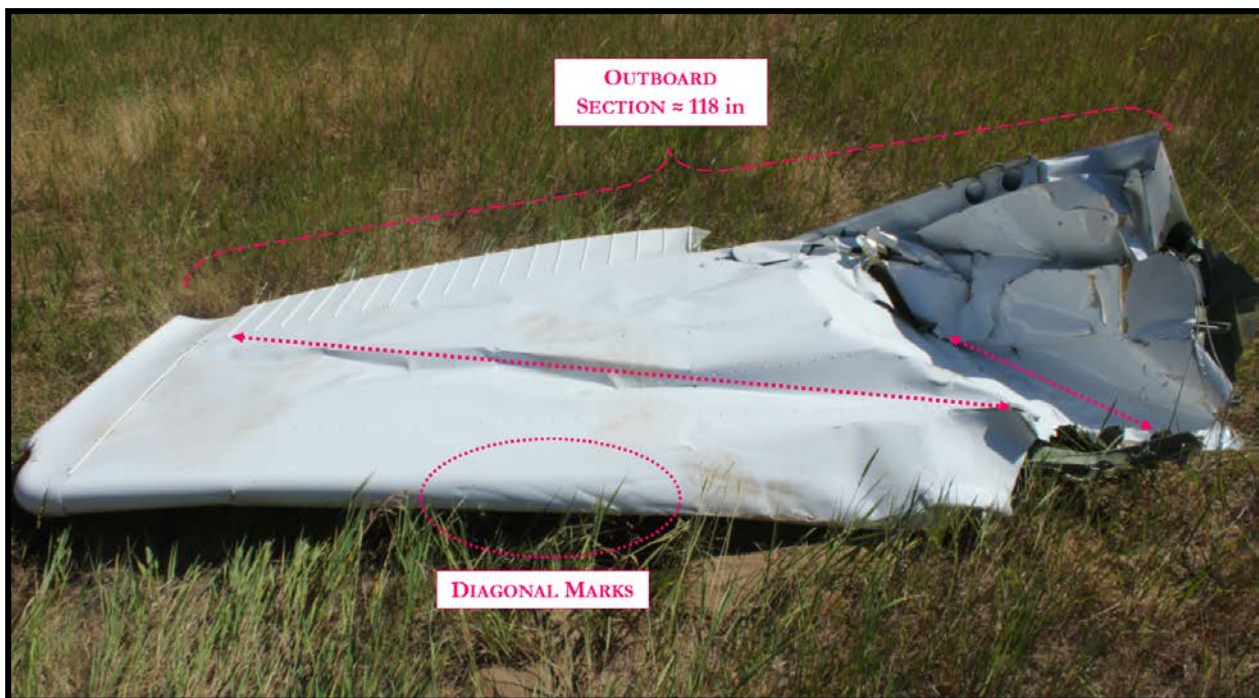
OUTBOARD LEFT WING

The section included the wingtip inboard 118 in. and the outboard portion of the aileron which was 55 in. (around WS 154). The outboard wing was a v-shape with the lower valley near WS136 and creases in the upper skin stretching from that area to the outboard leading edge.



Picture 12: Outboard Left Wing (upper surface)

The lower wing skin had crease oriented diagonally from the outboard trailing edge to the inboard leading edge stretching from WS208 to WS118. The forward and aft upper spar caps were bent in a downward direction.



Picture 13: Outboard Left Wing (lower surface)

INBOARD LEFT WING

The left inboard wing, part of the main wreckage, had sustained the most damage of all the wing sections and measured 78 in. The leading edge and bottom skin had folded back from the ribs. The trailing edge rivets had sheared consistent with a downward torsional force. The upper portion of the strut was still attached; the lower position was immediately nearby.



Picture 14: Inboard Left Wing (lower surface)

LEFT AILERON AND FLAP

The left aileron was separated into numerous pieces with only the outboard portion remaining attached. The area of the most fragmentation was near where the aileron and flap meet. The flap remained attached to the inboard attach fitting and was bent back on itself.



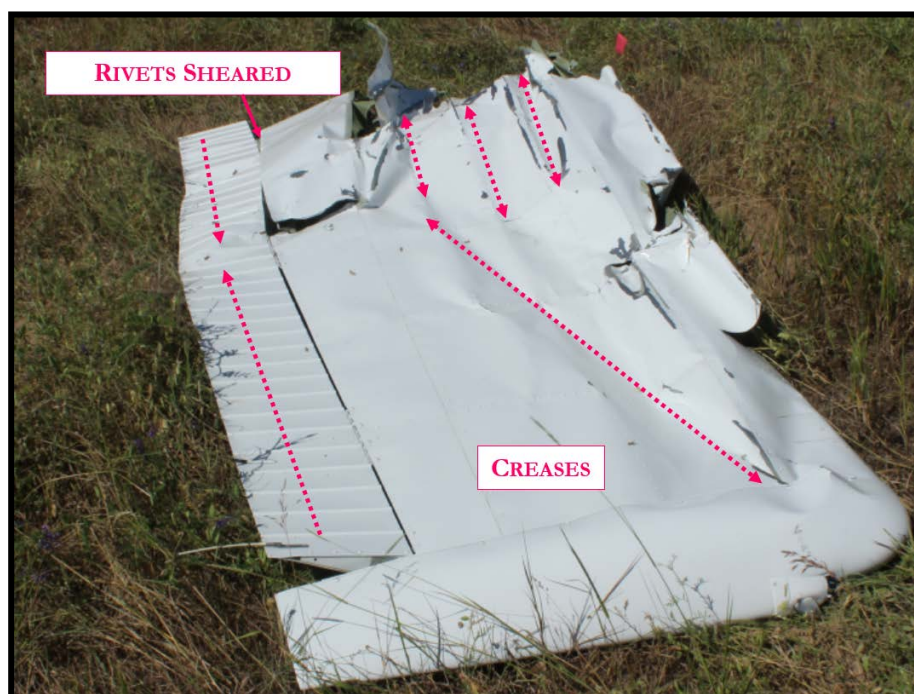
Picture 15: Left Aileron and Flap

RIGHT WING

The right wing was separated into two major pieces. The outboard section and entire aileron was located 330 ft from the main wreckage on a heading of 190°. The inboard section and flap was 50 ft from the main wreckage on a heading of 017°.

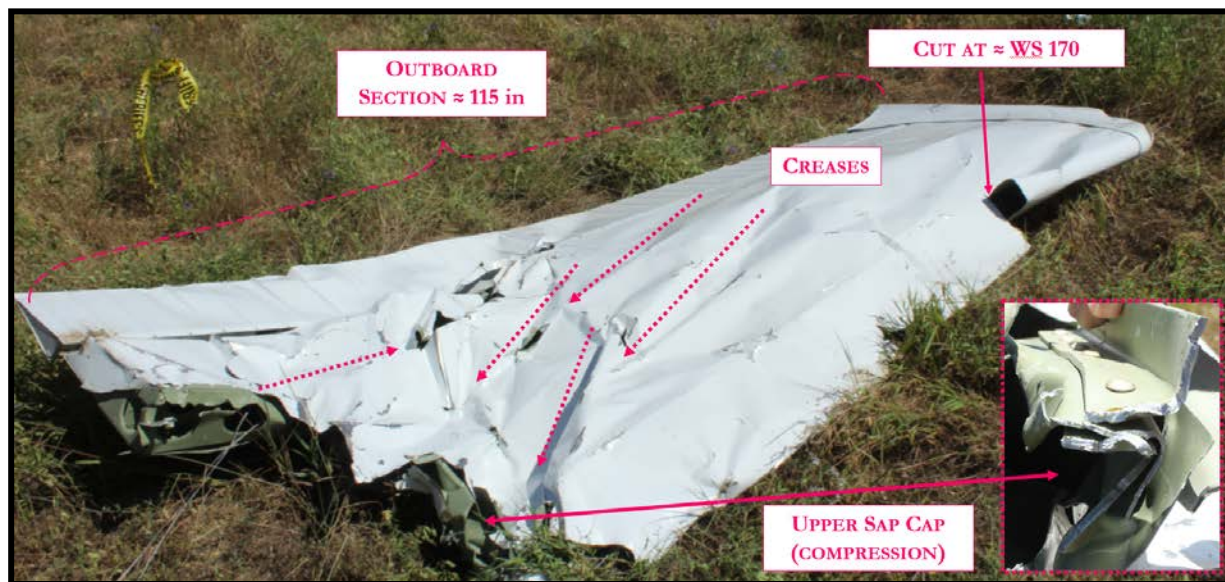
OUTBOARD RIGHT WING

The outboard right wing separated from the structure, and the leading edge was in different directions having been cut in several areas. The upper skin had a diagonal crease from WS 208 near the leading edge aft and outboard to WS 118 where aft rivet line had sheared consistent with a torsional load from the wing tip being twisted down.



Picture 16: Outboard Right Wing (upper surface)

There were numerous creases on the lower skin oriented from the outboard aft trailing edge to the inboard leading edge area. There were many red/brown spots on the leading edge and lower surface that were swabbed. There were additionally scrapes and metal transfer marks consistent with contact and sawing from the aileron cables. Examination of the forward and aft spars disclosed evidence of compressive and tensile overstress on the upper and lower spar caps, respectively, which was consistent with a primary failure of this portion of the wing in a positive direction.



Picture 17: Outboard Right Wing (lower surface)

INBOARD RIGHT WING

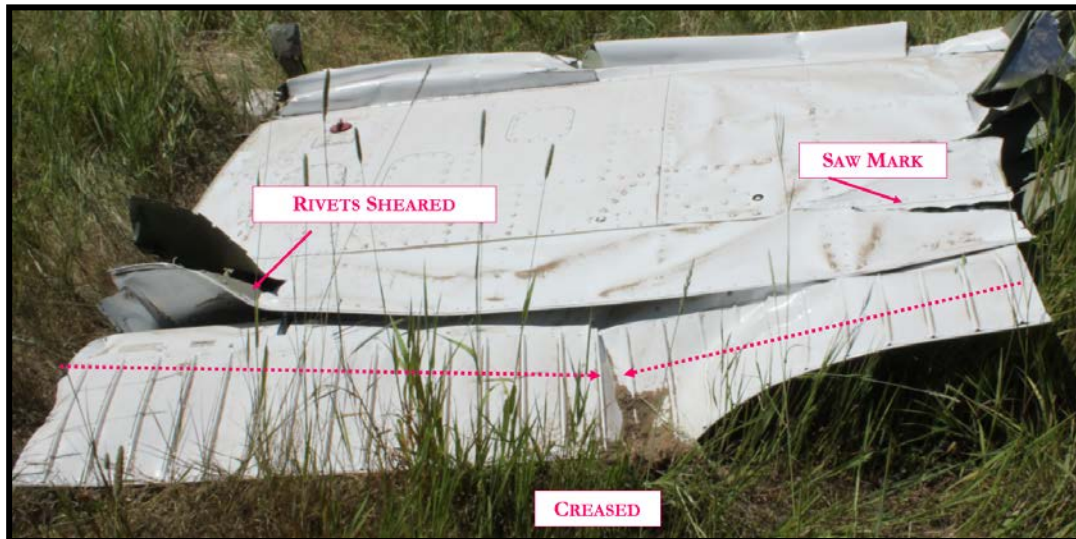
The inboard right wing was 94 in. in length and the flap and wing strut remained attached. The fuel caps was secured. The wing strut and areas on the leading edge had blue paint transfer marks. A tear in the fuselage skin created a saw mark from the outboard aft area inboard about 10 in consistent with an aileron control cable. Examination of the forward upper and lower wing spar caps disclosed evidence of compressive and tensile overstress on the lower and upper spar caps respectively. The aft wing spar disclosed evidence of compressive and tensile overstress on the upper and lower spar caps, which was consistent with a failure of this portion of the wing in a positive direction. The wing strut attachment had a granular fracture surface.



Picture 18: Inboard Right Wing

RIGHT AILERON AND FLAPS

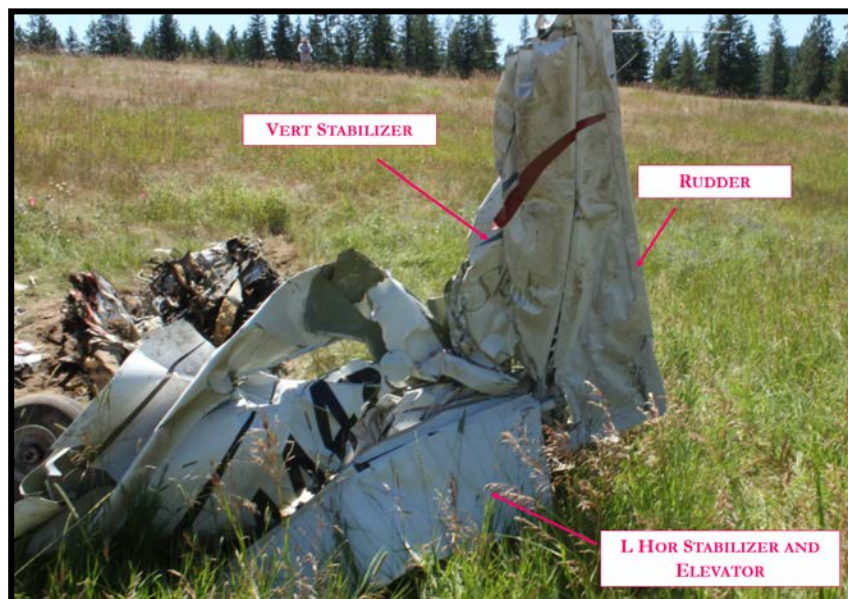
The right aileron remained attached via control cables and attach fittings on their respective bellcrank arms. There was a slight downward v-shaped bend near WS140. The control cable ends had a broomstrawed appearance consistent with an overload separation. The right-wing flap cables were separated inside the wing but the control surface remained attached to its respective fittings. The flap control had deformed into a v-shape with the downward crease near the center.



Picture 19: Right Flap

TAIL SECTION

The tail section encompassed an all-metal structure consisting of a horizontal stabilizer with elevators, and a vertical stabilizer with rudder. The entire tail section was part the main wreckage and had folded over the engine and cockpit.



Picture 20: Tail Section

The vertical stabilizer was intact and the rudder remained attached at its receptive fittings. The vertical stabilizer attach point was pulled with the bolt secured in place. The left rudder horn piece was absent and appeared to have fractured in the accident sequence. The stops were intact and did not show any evidence of abnormal contact.

The rudder was attached to all its hinges and had folded to a stationary position against the vertical stabilizer. The vertical stabilizer had sustained crush damage along its leading edge and contained a large vertical crease indicative of how it came to rest folded over the right side of the wreckage.

The right elevator remained attached on the mid connection hinge. The horizontal stabilizer was crushed forward. Both surfaces sustained the most deformation at the center hinge. The horizontal stabilizer was bent in a downward “V-shape” with the peak at 38 inches from the inboard and then the other portion of the “V-shape” being 18 inches from the edge of the outboard. The inboard leading edge had paint chips about 28 inches outboard. The entire bottom inboard skin was crushed up toward the forward spar.

The upper spar caps contained a torsional load and the lower spar caps appeared to have been bent as a result of impact damage; the fracture surfaces were indicative of that of compression. The forward spar was too deformed to determine any fracture directions. At the elevator control tubes most of the rivets were sheered out of the coupling. The right elevator was bowed upward with the peak being 32 inches up. The actuator on the trim tab was ripped past a meaningful point to be able to measure. The spar on the fuselage connecting the horizontal stabilizer was bent upward on the lower spar cap and downward on the upper spar cap.

The left horizontal stabilizer was crushed and it torsional twisting with the outboard section folded almost fully over on itself to the bottom of the elevator. The left horizontal stabilizer was still connected to the fuselage continued to bend forward to reaching the most damage about 28 inches where the main hinge point for the elevator was located. There are numerous blue transfer marks on upper skin. The left elevator control tube had sheared almost completely out of the coupling on the fuselage and had sheared from the ribs in the elevator body. The elevator was peaked upward with the apex about 28 inches where it was still connected.

ENGINE

The Lycoming IO-360-L2A, serial number RL910-51E, sustained impact damage. Despite several attempts, investigators could not rotate the crankshaft more than a quarter turn and proceeded to remove the cylinders. The combustion chambers were mechanically undamaged, and there was no evidence of foreign object ingestion or detonation. 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 that the Lycoming representative said was consistent with normal to lean operation.

There was no oil residue observed in the exhaust system gas path. The oil sump and exhaust were broken off the engine. Ductile bending and crushing of the exhaust system components was observed. The oil screen was clean.

Removal of the fuel manifold (spider) revealed that it contained slight traces of liquid that was consistent in odor with that of Avgas. The diaphragm was pliable and the spring was intact. The fuel servo was

broken free and throttle linkage and cable remained attached at the arm. The fuel pump was broken at the flange.

The magnetos were broken from their respective flanges as a result of impact and could not be functionally tested. Spark was obtained at each post during rotation.



Picture 21: Propeller

CONTROL SYSTEMS

The main bodies of the control yolks were located within the wreckage. All of the control horns were broken from the main bodies, but found in the wreckage and could be identified as to which side they had been attached by investigators matching the fracture surfaces.

The left control yoke was attached to its main body and was still located in the panel. The attachment to the aileron u-bar remain present and secured with a pin. The cog remained attached to the left side yoke and the chain was in bedded against the body as a result of bending. The pulley remained attached and was fractured in multiple locations. The u was separated at the lower end about 7 inches inboard.

The right control yoke body was more fractured than the left. The control horns were both located in the wreckage and iPad bracket had come separated. The control tube from the body to the u-bar was not located with in the wreckage. The right u-bar portion was found with in the wreckage and similarly bent forward at the upper region. The pulley was fractured and contained only a portion of one side. Pieces of pulley were found in the main debris field that were similar in size and shape to the missing portion. The bottom of the u-bar was separated 6 inches inboard. The chain was not the cogs but several teeth showed shinny marks on the outer portion, consistent with being engaged at the time of impact. The turnbuckles remained affixed to the chain and the respective end of the interconnect control cable. From the inner portion of the chain on the right side, the control cable was about 4 inches long and had a broomstrawed appearance at the end (consistent with an overstress). The other side of the cable was broomstrawed on one end and was continuous to a turnbuckle and then the swaged end. The inboard

section of the chain for the left side had come open at the last chain-link and the eyehole of the swaged end was elongated consistent with being attached during impact.

The main control column was embedded in the fuselage structure with folded layers of metal holding it which were similar in appearance to the sheet metal making up the floor. The center main bushing had separated but remained affixed on the center column. The main aileron cables remain attached to the bracket but the plastic was free from the main bushing. The cables continued through the folded sheet metal of the floorboard back through the wreckage and pulleys. The right cable continued near the pulley in the left door post and continue to the turnbuckle where it was fractured and a broom straw appearance about 25 inches from the turnbuckle. The left side contain about 45 inches of cable after the turnbuckle and was severely fractured in numerous areas all of which had a broomstrawed appearance.

The rudder pedal bars were embedded within the cockpit floorboard area. The outboard pedal from the left side remained attached and the inboard pedal for the right side remained attached.

The left door was found immediately in the main wreckage and had separated about the mid-span attachment of the window. At the forward structure door post the upper hinge that remained attached and the doors respective hinge was intact. The lower hinge contained the pin still inside and that hinge was found on the airframe remaining attached to the main wreckage. The door exhibited a 45° crush angle starting at the forward lower corner moving to the aft door which had folded over in an accordion appearance at the lower portion. The door lock pins appeared in the closed position with the receptacles elongated consistent with it being locked during impact.

The upper aft cockpit was partially attached to the fuselage and the baggage door remained attached via its chain. The cowling area was fragmented into numerous pieces (the left lower chin was found further from the wreckage on the north side). The upper cowling was in one major piece and did not sustain substantial burn; there was no evidence of oil on the lower surface.

The nose landing gear had sheared at its upper attach points and was bent aft. There was no evidence of a control system malfunction.

CONTROL YOKE

The ipad holder was bolted to the control yokes. They were mgf Products universal cradles.

<https://mgfproducts.com/collections/device-holders/products/sport-universal-cradle?variant=17442863808627>



Picture 21: iPad Holder



Picture 22: Shown Installed on an Exemplar (aft)

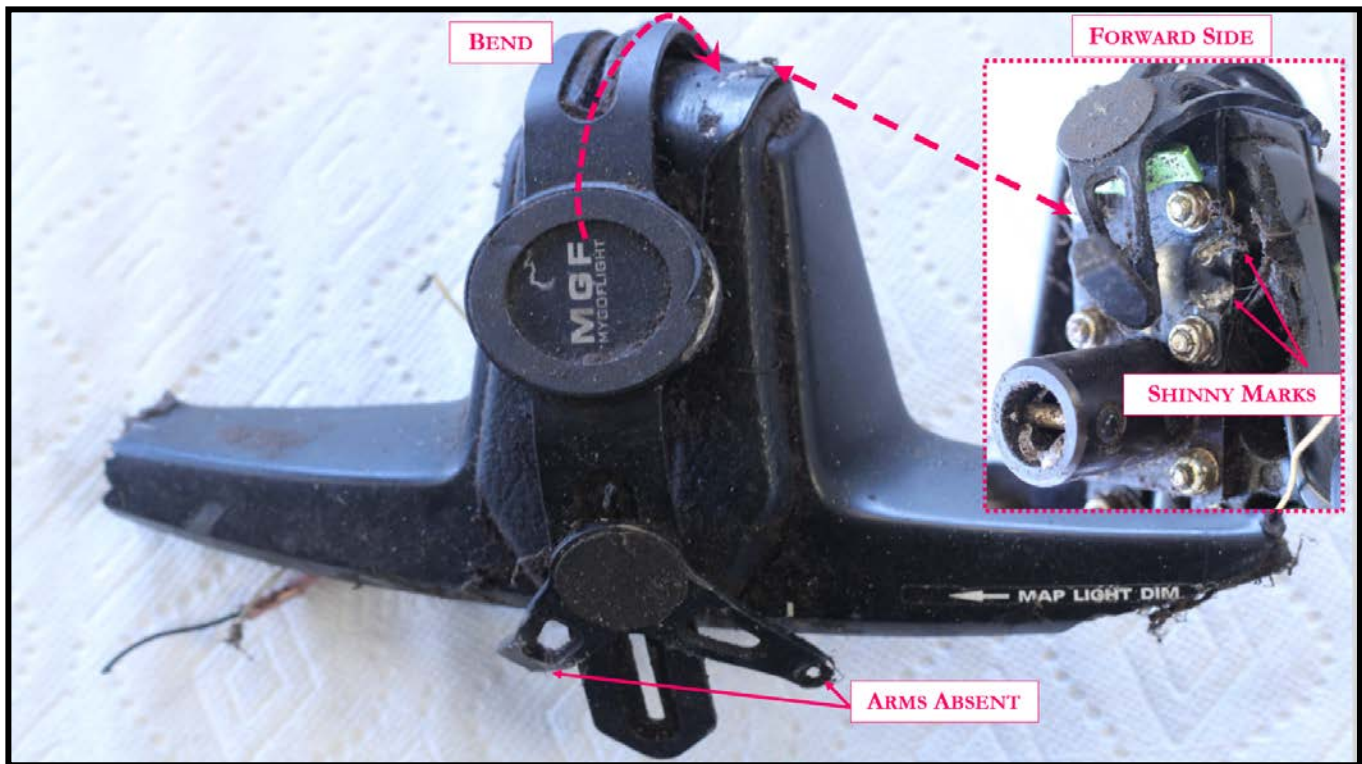


Picture 23: Shown Installed on an Exemplar (forward)



Picture 24: Shown Installed with iPad on an Exemplar (forward)

The left side MyGoFLight iPad bracket remained fixed to the main body and was bent over the top with the green knob attached. The bracket arms were all broken off except the upper right arm which had folded over to the outboard side. There were to shinny indentations in the forward side of the main body, consistent with the bracket making contact. The control tube from the main body to the cog on the left aileron control was found in the panel.



Picture 25: Left Control Yoke

The left control yoke attaching from the main body was still located in the panel and the control horns had separated on both sides. The right control yoke body was more fractured than the left. The control horns were both located in the wreckage and the iPad bracket had come separated.

TEST

The operator performed several tests of the control yokes:

1. Seated in a full forward seat position (full up, down, and in the middle) could I catch the seatbelt with the iPad mount, especially leaning forward (as if clearing)?

Pilot Ian Kerrigan: 6'0" tall, 250lbs tested in Cessna 172R N24336

- Seat full forward, seat back upright position and in highest position vertically (full up) (This would not be the normal seat position for this pilot)
 - a. With pilot seated leaning against the seat back and yoke in normal flight position the lower portion of the iPad was 3.5 inches away from the pilot. The top of the iPad was 13 inches away from the pilots chest. The face of the yoke was 12 inches away from the pilot's chest.
 - i. With pilot seated normally leaning against the seat back and yoke in full aft position (full up elevator) the lower portion of the iPad touched the pilot's belly. The top of the iPad was 9.5 inches away from the pilots chest. The face of the yoke was 8 inches away from the pilot's chest.
 - ii. Bottom of iPad just contacts pilots belly with the yoke full aft. It was not possible to touch the seatbelt with the iPad or iPad mount in this configuration. The seat belt crossed the chest well above the bottom of the iPad.
 - b. With pilot leaning forward for a normal clearing check before a turn and yoke in normal flight position the bottom the iPad was 2 inches away from the pilot. The top of the iPad was 9 inches away from the pilots chest. The face of the yoke was 8 inches away from the pilot's chest.

- i. With pilot leaning forward for a normal clearing check before a turn yoke in full aft position (full up elevator) the bottom the iPad pushed against the pilot's belly. The top of the iPad was 4.5 inches away from the pilots chest. The face of the yoke was 4.5 inches away from the pilot's chest.
 - ii. Bottom portion of iPad pushes on the pilots belly with yoke full aft, but not able to catch the seat belt in any way.
- c. ABNORMAL POSITION: With pilot leaning forward as far as possible to try and put their head on the glareshield and yoke in normal flight position the bottom the iPad pushed against the pilot's belly. The top of the iPad was 5 inches away from the pilots chest. The face of the yoke 4.5 inches away from the pilot's chest. The pilots chest contacted the face of the iPad but was unable to catch the seatbelt.
 - i. With pilot leaning forward as far as possible to try and put their head on the glareshield and yoke in the full aft position the iPad mount forced to flex so that part of the face of the iPad would contact the pilot's chest. The bottom the iPad was against pilot's belly. The top of the iPad was 2.5 inches away from the pilots chest. The face of the yoke was 2.5 inches away from the pilot's chest.
 - ii. By moving the yoke left and right and trying to position the pilot's chest just right, the iPad clips could be made to catch edge of seat belt or pilot's button up shirt, but as soon as you pull away or push the yoke forward it releases immediately. It was not possible to get the seat belt behind the iPad or iPad mount.
- Seat full forward, seat back upright position and in Mid position vertically (14 handle turns down from full up) (This would not be the normal seat position for this pilot)
 - a. With pilot seated leaning against the seat back and yoke in normal flight position the lower portion of the iPad was 4 inches away from the pilot. The top of the iPad was 13.5 inches away from the pilots chest. The face of the yoke was 12 inches away from the pilot's chest.
 - i. With pilot seated normally and yoke in full aft position (full up elevator) the lower portion of the iPad was 0.5 inches away from the pilot. The top of the iPad was 9.5 inches away from the pilots chest. The face of the yoke was 8 inches away from the pilot's chest.
 - ii. Unable to even contact the iPad or iPad mount with the pilots body or seat belt. It was not possible to for the iPad or iPad mount to catch the seatbelt in this configuration.
 - b. With pilot leaning forward for a normal clearing check before a turn and yoke in normal flight position the bottom the iPad was 2.5 inches away from the pilot. The top of the iPad was 9 inches away from the pilots chest. The face of the yoke was 8 inches away from the pilot's chest.
 - i. With pilot leaning forward for a normal clearing check before a turn yoke in full aft position (full up elevator) the bottom the iPad touched the pilot's belly. The top of the iPad was 5 inches away from the pilots chest. The face of the yoke was 5 inches away from the pilot's chest.
 - ii. Bottom portion of iPad contacts pilots belly with yoke full aft, but not able to catch the seat belt in any way.
 - c. ABNORMAL POSITION: With pilot leaning forward as far as possible to try and put their head on the glareshield and yoke in normal flight position the bottom the iPad 0.25 inches away from the pilot. The top of the iPad was 5.5 inches away from the pilots chest. The face of the yoke was 5.5 inches away from the pilot's chest. The pilots chest did not contact the face of the iPad.
 - i. With pilot leaning forward as far as possible to try and put their head on the glareshield and yoke in the full aft position the bottom the iPad touched the belly of

the pilot. The top of the iPad was 0.5 inches away from the pilots chest. The face of the yoke was 1.5 inches away from the pilot's chest. The pilots chest does contact the face of the iPad by forcefully applying pressure to the iPad with their body and flexing the iPad mount.

- ii. By moving the yoke left and right and trying to position the pilot's chest just right, the iPad clips could be made to catch edge of seat belt or pilot's button up shirt, but as soon as you pull away or push the yoke forward it releases immediately.
- Seat full forward, seat back upright position and in lowest position vertically (full down) (This would not be the normal seat position for this pilot)
 - a. With pilot seated leaning against the seat back and yoke in normal flight position the lower portion of the iPad was 5 inches away from the pilot. The top of the iPad was 14 inches away from the pilots chest. The face of the yoke was 12.5 inches away from the pilot's chest.
 - i. With pilot seated normally and yoke in full aft position (full up elevator) the lower portion of the iPad was 1.5 inches away from the pilot. The top of the iPad was 10 inches away from the pilots chest. The face of the yoke was 11 inches away from the pilot's chest.
 - ii. Unable to even contact the iPad or iPad mount with the pilots body or seat belt. It was not possible to for the iPad or iPad mount to catch the seatbelt in this configuration.
 - b. With pilot leaning forward for a normal clearing check before a turn and yoke in normal flight position the bottom the iPad was 2.5 inches away from the pilot. The top of the iPad was 8.5 inches away from the pilots chest. The face of the yoke was 8 inches away from the pilot's chest.
 - i. With pilot leaning forward for a normal clearing check before a turn and yoke in full aft position (full up elevator) the bottom the iPad touched the pilot's belly. The top of the iPad was 5 inches away from the pilots chest. The face of the yoke was 5 inches away from the pilot's chest.
 - ii. Bottom portion of iPad contacts the pilots belly with yoke full aft, but not able to catch the seat belt in any way.
 - c. **ABNORMAL POSITION:** With pilot leaning forward as far as possible to try and put their head on the glareshield and yoke in normal flight position the bottom the iPad was 1 inch away from the pilot. The top of the iPad was 7 inches away from the pilots chest. The face of the yoke was 6.5 inches away from the pilot's chest. The pilots chest did not contact the face of the iPad
 - i. Full forward seat in highest position with pilot leaning forward as far as possible to try and put their head on the glareshield and yoke in the full aft position the iPad mount forcefully flexed so that the face of the iPad would contact the pilot's chest. The bottom the iPad pushed against the pilot's belly. The top of the iPad was 1 inch away from the pilots chest. The face of the yoke was 2 inches away from the pilot's chest.
 - ii. By moving the yoke left and right and trying to position the pilot's chest just right, the iPad clips could be made to catch edge of seat belt or pilot's button up shirt, but as soon as you pull away or push the yoke forward it releases immediately.
- Summary: In normal conditions (where the yoke is during flight even with pilot leaning forward normally to clear before a turn) I was unable to contact the lower part of the iPad itself or the iPad mount on the bottom corner, definitely not able to hook it the seatbelt with the iPad in any way. At the extreme and abnormal position (leaning as far forward as possible with the yoke pulled all the way back and moving it side to side) the iPad clips could occasionally grab the edge

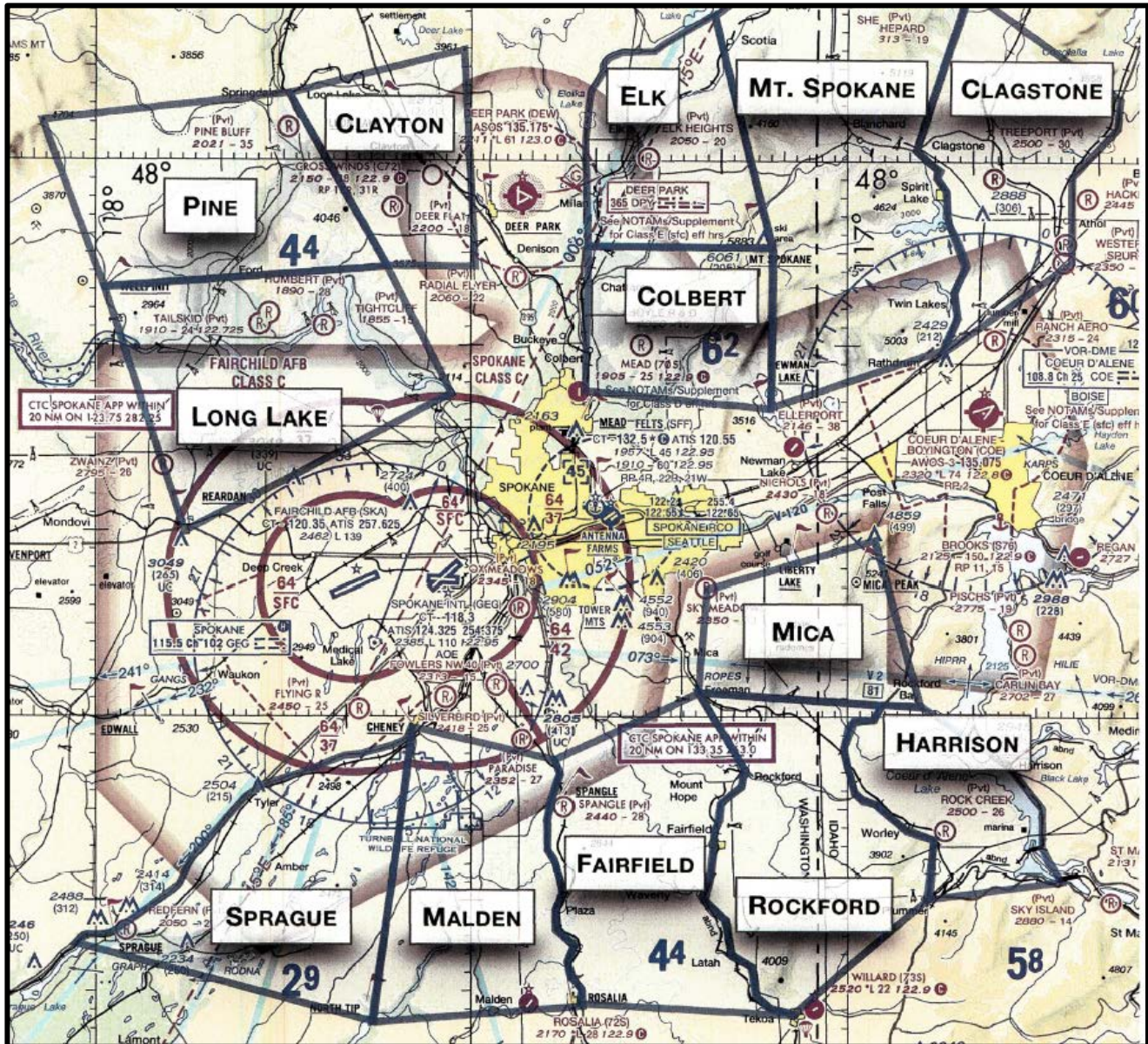
of the seatbelt or a button up shirt but as soon as you pulled away with your body or push the yoke forward it would release immediately. I couldn't ever get it to remain hooked at all. I also was unable to ever get the seatbelt in front of the iPad or iPad mount no matter how hard I tried to intentionally do so by moving my body and the yoke to try and do so.

2. If unable to hook the seatbelt on the mount, physically put it around the mount and see how much force it takes to lock the inertial reel.
 - a. Because I was unable to ever get it to hook or grab in the above test, I had to intentionally and manually position the seatbelt in front of the iPad mount using my hands to do so. Because of the mount angle, if the seatbelt was placed in front of the bottom of the mount it would slide right off. It was not possible to keep it in front of the bottom portion of the mount.
 - i. If the seatbelt was intentionally placed by hand above the top of the mount, the seat belt could be retained in front of the iPad mount just as it did if it were intentionally placed in front of the yoke by hand. It took the same effort to place the seatbelt above the top of the iPad mount as it did to place the seatbelt in front of the yoke.
 - b. If it was physically placed around the top of the iPad mount I had to very forcefully and abruptly push the yoke forward to get the inertial reel to lock. It took multiple attempts to get the inertial reel to lock, but I was able to lock the inertial reel by being very aggressive with the yoke movements.
 - c. Summary: The only way to get the seat belt inertial reel to lock with the iPad mount was to intentionally place the seatbelt in front of the top portion of the iPad mount by hand and then very aggressively and forcefully push the yoke forward. The effort required to do so was the same as required to place the seatbelt in front of the yoke itself and do the same test.
3. If the inertial reel locked would it have to be fully retracted before releasing the lock?
 - a. Once the inertial reel for the shoulder harness was locked it only took a momentary "unloading" to release the inertial lock. If forward pressure remained applied to the yoke, the inertial reel remained engaged. The seat belt did not have to be fully retracted to release the inertial reel lock and resume free movement of the seatbelt. This was tested in numerous positions of the yoke by physically placing the seat belt in front of the iPad mount and aggressively pushing forward to lock the inertial reel. From full forward yoke position to full after yoke position each time the inertial reel released immediately with a brief unloading of the forward pressure and was then free to move at the pilot's command.

ACCIDENT WRECKAGE COORDINATES

Number	LAT/LON	Name	Alt
007	N47 56' 29.1 W117 37' 37.9	Left Outboard Wing 55"	2270'
008	N 47 56' 28.2 W117 37' 39.8	14"	2261'
009	N47 56' 27.4 W117 37' 38.7	18"	2256'
010	N47 56' 28.0 W117 37' 37.3	27"	2262'
011	N47 56' 27.2 W117 37' 36.8	Aileron Inboard 29"	2275'
012	N47 56' 25.8 W117 37' 36.1	Right Outboard Wing W/ Aileron: 108" Wing: 115"	2267'
013			
014	N47 56' 29.4 W117 37' 34.9	Right Inboard Wing 111"	2257'
015	N47 56' 28.7 W117 37' 35.4	Main Wreckage, Center of mass	2253
016	N47 56.471 W117 37.591	Engine and Propeller	2253
017	N47 56.476 W117 37.590	First Point of Impact (nose wheel)	2253

PRACTICE AREAS



Picture 26: Practice Areas

PRIOR FLIGHTS (TAXI FOR PLI2)

6-23-2018 Fueled (probably full, added 30 gallons) FOR#58382
 6-29-2018 Flight 24442 FOR#58383
 7-11-2018 3 Taxi Periods FOR#58378, 58384, 58385
 7-13-2018 Flight Prior to accident flight FOR#58386

CERTIFIED FLIGHT INSTRUCTOR

The CFI held a Commercial Pilot Certificate (Airplane Single Engine Land, Instrument Airplane), Flight Instructor (Airplane Single Engine Land, Instrument Airplane), and Mechanic (Airframe, Powerplant). This pilot reported civil flight experience that included 0 total and 0 hours in last six months as of exam dated 02/11/2014. This pilot was 73 inches tall and weighed 175 lbs at the time of the last exam. This pilot was issued a Second Class Medical Certificate with the following limitation(s): Must wear corrective lenses.

Started teaching at Moody in 2017.

2017 Flight Instructor Certificate - Airplane Single Engine Land; Instrument Airplane

2016 Flight Instructor Certificate - Airplane Single Engine Land

2016 Commercial Pilot Certificate - Airplane Single Engine Land

2016 Instrument Airplane Rating

2014 Private Pilot Certificate - Airplane Single Engine Land

2014 Airplane Mechanic: Airframe and Powerplant

	Landings				Instrument								Dual			Total Time
	Total	Night	ASEL	XC	Night	IMC	Hood	APCH	FTD	AATD	As CFI	SOLO	Received	PIC		
Total from "Log 1":	646	36	378.3	97.6	13.9	1.6	49.4	68	4.6	32.8	12.6	54.9	336.6	297.2	415.7	
Total from Moody "Log 2":	1025	39	518.6	113.8	15.2	2	1.4	163		2.9	601	4.1	20.8	518	638.7	
Estimated Total to Date:	1671	75	896.9	211.4	29.1	3.6	50.8	231	4.6	35.7	613.6	59	357.4	815.2	1054.4	

Totals shown from Log 1 are taken from Diego Senn's logbook with the last flight dated 3/16/2017.

Totals shown from Log 2 are taken from Moody flight school records for Diego Senn's from 3/17/2017 through 7/13/2018.

NOTE: Time in Moody Log 2 does not include any flight time Diego may have flown outside of work with Moody Avialor

Ground Instructor Knowledge: 14 CFR 61.213(a)(3) and (a)(4)			
I certify that _____ has demonstrated satisfactory proficiency on the appropriate ground instructor knowledge and training subjects of 14 CFR 61.213 (a)(3) and (a)(4)			
Date _____	Signature _____	Certificate # _____	Exp. Date _____
Spin Training: 14 CFR 61.183(i)(1)			
I certify that <u>Diego Senn</u> has received the required training of 14 CFR 61.183(i). I have determined he/she is competent and proficient in instructional skills for training stall awareness, spin entry, spins, and spin recovery procedures.			
Date <u>10/14/2016</u>	Signature _____	Certificate # _____	Exp. Date <u>1/31/2018</u>
Flight Instructor Ground and Flight Proficiency/Practical Test: 14 CFR 61.183(g) and 61.187(a) and (b)			
I certify that <u>Diego Senn</u> has received the required training of 14 CFR 61.187(b). I have determined he/she is prepared for the CFI-Airplane Single-Engine practical test.			
Date <u>10/14/2016</u>	Signature _____	Certificate # _____	Exp. Date <u>1/31/2018</u>
Prerequisites for CFI Airplane Single-Engine Practical Test and Review of Deficiencies Identified on Airman Knowledge Test: 14 CFR 61.39 (a)(6)(i-iii)			
I certify that <u>Diego Senn</u> has received and logged training time within the two calendar months preceding the month of application for the CFI Airplane Single-Engine practical test and is prepared for the practical test, and has demonstrated satisfactory knowledge of the subject areas in which he/she was deficient on the Fundamentals of Instructing and Flight Instructor Airplane airman knowledge test.			
Date <u>10/17/2016</u>	Signature _____	Certificate # _____	Exp. Date <u>1/31/2018</u>
FLIGHT INSTRUCTOR INSTRUMENT ENDORSEMENTS			
Flight Instructor Certificate with Instrument Rating/Practical Test: 14 CFR 61.183(g) and 61.187(a) and (b)(7)			
I certify that <u>DIEGO SENN</u> has received the required CFII training of 14 CFR 61.187(b)(7). I have determined he/she is prepared for the CFII Airplane practical test.			
Date <u>20 JANUARY 2017</u>	Signature _____	Certificate # <u>BRUCE A. DEVRIES</u>	Exp. Date <u>1/31/2018</u>
Prerequisites for CFII Airplane Practical Test and Review of Deficiencies Identified on Airman Knowledge Test: 14 CFR 61.39 (a)(6)(i-iii)			
I certify that <u>DIEGO SENN</u> has received and logged training time within the two calendar months preceding the month of application for the CFII Airplane practical test and is prepared for the practical test, and has demonstrated satisfactory knowledge of the subject areas in which he/she was deficient on the Flight Instructor Instrument Airplane airman knowledge test.			
Date <u>20 JANUARY 2017</u>	Signature _____	Certificate # <u>BRUCE A. DEVRIES</u>	Exp. Date <u>1/31/2018</u>

PERFORMANCE INFORMATION

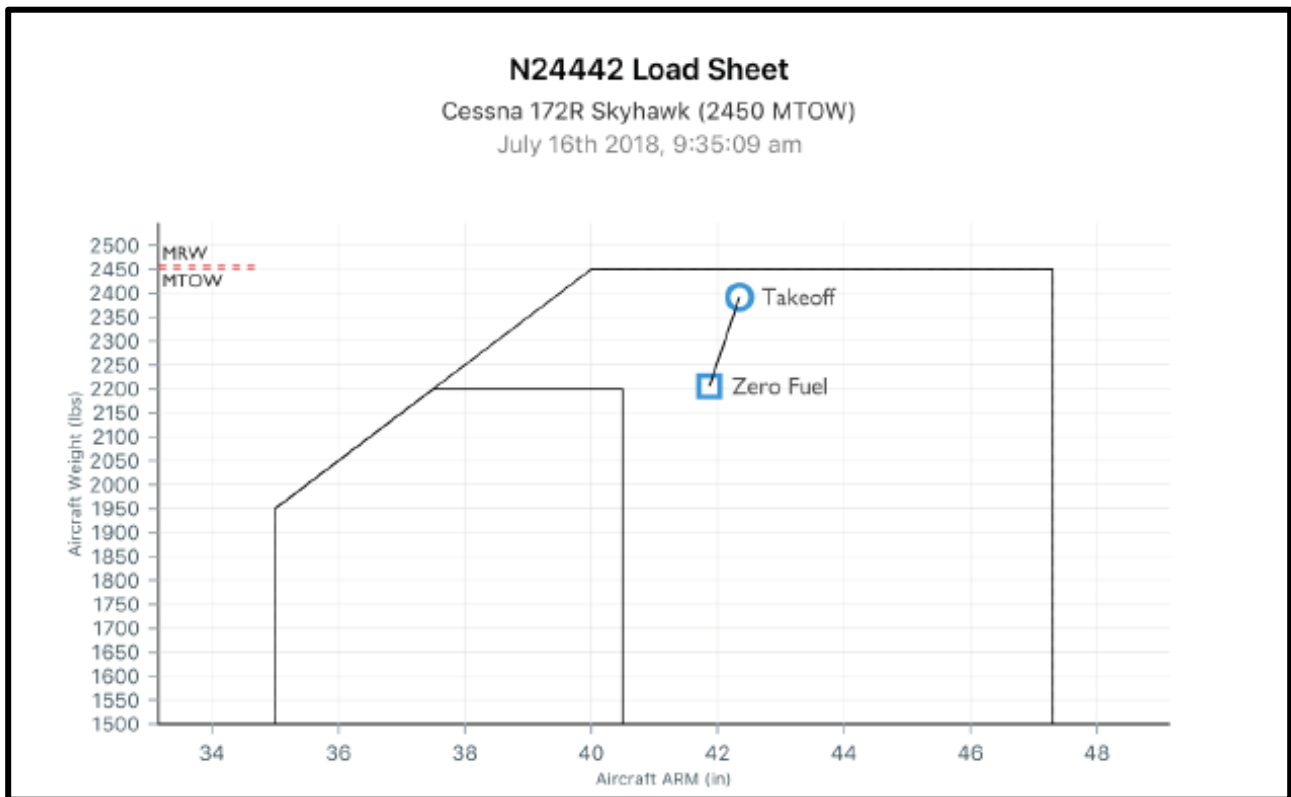
The max lift coefficient the airplane can produce is given by the stall speed V_s :

$CL_{max} = W / (0.5 * \rho * V_s^2 * S)$. The speed V_n required to pull a load factor n at the angle of attack that gives you CL_{max} (stall or max angle of attack) can be deduced from $CL_{max} = nW / (0.5 * \rho * V_n^2 * S)$.

Equating these two expressions gives $n = (V_n / V_s)^2$. V_s for a Cessna 172 is about 51 KCAS, so at 125 KCAS, $n = (125 / 51)^2 = 6$. If the airplane is in a 125 kt dive and the pilot pulls the yoke to CL_{max} without losing speed, the airplane would obtain 6 Gs. Alternately, if the airplane is at a higher speed, and slows to 130 by the time you get to CL_{max} , and you'll have 6 Gs.

WEIGHT AND BALANCE

- Diego Senn, instructor, right front seat: 185
- Joochan (Austen) Lee, student pilot, left front seat: 172
- Andrew Trouten, student pilot (passenger), rear seat: 165



Item	Weight (lbs)	Arm (in)	Moment (lbs-in)
Pilot	172.00	37.00	6,364.00
Front Right	185.00	37.00	6,845.00
Rear Left	0.00	73.00	0.00
Rear Right	165.00	73.00	12,045.00
Area A	30.00	95.00	2,850.00
Area B	0.00	123.00	0.00
Payload	552.00	50.91	28,104.00
Empty Weight	1,653.48	38.85	64,237.70
Zero Fuel Weight	2,205.48	41.87	92,341.70
Fuel Tanks	186.31	48.00	8,942.88
Ramp Weight	2,391.79	42.35	101,284.58
Fuel Tanks	-0.00	48.00	-0.00
Takeoff Weight	2,391.79	42.35	101,284.58
Fuel Tanks	-0.00	48.00	-0.00
Landing Weight	2,391.79	42.35	101,284.58

* Based on Avgas fuel density of 6.01 lbs/Gal

METEOROLOGICAL INFORMATION

KGEG 0953 16008KT 10SM FEW080 28/09 A3004 RMK AO2 SLP152 HZ ALQDS T02780094
KGEG 1053 22011G16KT 190V250 10SM FEW080 30/08 A3004 RMK AO2 SLP149 T03000078 10306 20172
58002