Aviation Investigation Final Report

Location:	Fulshear, Texas	**Accident Number:**	CEN22FA081
Date & Time:	December 21, 2021, 09:26 Local	**Registration:**	N1116N (A1); Unregistered Ultralight (A2)
Aircraft:	Cessna 208 (A1); Dudek Paragliders Solo 21 (A2)	**Aircraft Damage:**	Destroyed (A1); Substantial (A2)
Defining Event:	Midair collision	**Injuries:**	1 Fatal (A1); 1 Fatal (A2)
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled (A1); Part 103: Ultralight (A2)		

Analysis

A Cessna 208B airplane collided with a powered paraglider during cruise flight at 5,000 feet mean sea level (msl) in Class E airspace. Based on video evidence, the powered paraglider operator impacted the Cessna's right wing leading edge, outboard of the lift strut attachment point. The outboard 10 ft of the Cessna's right wing separated during the collision. The Cessna impacted terrain at high vertical speed in a steep nose-down and inverted attitude. The powered paraglider operator was found separated from his seat style harness. The paraglider wing, harness, and emergency parachute were located about 3.9 miles south of the Cessna's main wreckage site.

Based on video evidence and automatic dependent surveillance-broadcast (ADS-B) data, the Cessna and the powered paraglider converged with a 90° collision angle and a closing speed of about 164 knots. About 8 seconds before the collision, the powered paraglider operator suddenly turned his head to the right and about 6 seconds before the collision, the powered paraglider maneuvered in a manner consistent with an attempt to avoid a collision with the converging Cessna.

Research indicates that about 12.5 seconds can be expected to elapse between the time that a pilot sees a conflicting aircraft and the time an avoidance maneuver begins. Additionally, research suggests that general aviation pilots may only spend 30-50% of their time scanning outside the cockpit.

About 8 seconds before the collision (when the powered paraglider operator's head suddenly turned to the right), the Cessna would have appeared in the powered paraglider operator's peripheral view, where research has demonstrated visual acuity is very poor. Additionally, there would have been little apparent motion because the Cessna and the powered paraglider were on a collision course.

Under optimal viewing conditions, the powered paraglider may have been recognizable to the Cessna pilot about 17.5 seconds before the collision. However, despite the powered paraglider's position near the center of his field of view, the Cessna pilot did not attempt to maneuver his airplane to avoid a collision. Further review of the video evidence revealed that the powered paraglider was superimposed on a horizon containing terrain features creating a complex background. Research suggests that the powered paraglider in a complex background may have been recognizable about 7.4 seconds before the collision. However, the limited visual contrast of the powered paraglider and its occupant against the background may have further reduced visual detection to 2-3 seconds before the collision. Thus, after considering all the known variables, it is likely that the Cessna pilot did not see the powered paraglider with sufficient time to avoid the collision.

The Cessna was equipped with a transponder and an ADS-B OUT transmitter, which made the airplane visible to the air traffic control system. The operation of the powered paraglider in Class E airspace did not require two-way radio communication with air traffic control, the use of a transponder, or an ADS-B OUT transmitter and therefore was not visible to air traffic control. Neither the Cessna nor the powered paraglider were equipped with ADS-B IN technology, cockpit display of traffic information, or a traffic alerting system.

Postmortem toxicological testing detected the prescription antipsychotic medication quetiapine, which is not approved by the Federal Aviation Administration (FAA), in the Cessna pilot's muscle specimen but the test results did not provide sufficient basis for determining whether he was drowsy or otherwise impaired at the time of the collision (especially in the absence of any supporting details to suggest quetiapine use). Testing also detected ethanol at a low level (0.022 g/dL) in the Cessna pilot's muscle specimen, but ethanol was not detected (less than 0.01 g/dL) in another muscle specimen. Based on the available results, some, or all of the small amount of detected ethanol may have been from postmortem production, and it is unlikely that ethanol effects contributed to the accident. The Cessna pilot likely did not have sufficient time to see and avoid the powered paraglider (regardless of whether he was impaired by the quetiapine) and, thus, it is unlikely the effects of quetiapine or an associated medical condition contributed to the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The limitations of the see-and-avoid concept as a method for self-separation of aircraft, which resulted in an inflight collision. Contributing to the accident was the absence of collision avoidance technology on both aircraft.

Findings

Personnel issues (A1)	Monitoring other aircraft - Not specified
Personnel issues (A1)	Identification/recognition - Not specified
Organizational issues (A1)	Adequacy of policy/proc - Not specified
Environmental issues (A1)	En route - Effect on operation
Personnel issues (A2)	Monitoring other aircraft - Not specified
Personnel issues (A2)	Identification/recognition - Not specified
Organizational issues (A2)	Adequacy of policy/proc - Not specified
Environmental issues (A2)	En route - Effect on operation
Aircraft (A2)	(general) - Not installed/available

Factual Information

History of Flight

Enroute-cruise (A1)	Midair collision (Defining event)
Maneuvering (A2)	Midair collision

On December 21, 2021, about 0926 central standard time, a Cessna 208B airplane, N1116N, collided with a powered paraglider while inflight near Fulshear, Texas. The pilot of the Cessna and the non-certificated powered paraglider operator were fatally injured. The Cessna was destroyed and the powered paraglider sustained substantial damage. The Cessna was operated as a Title 14 *Code of Federal Regulations* (CFR) Part 135 cargo flight, and the powered paraglider was operated as a Title 14 CFR Part 103 personal flight.

According to air traffic control data, about 0910, the Cessna departed George Bush Intercontinental Airport (IAH), Houston, Texas, and flew southwest toward Victoria Regional Airport (VCT), Victoria, Texas. At 0917:53, the Cessna pilot was cleared to climb and maintain 5,000 ft mean sea level (msl). At 0924:08, the Cessna pilot asked the air traffic controller, "… confirm you wanted me at five thousand opposite direction traffic." The controller replied that he wanted the Cessna to remain at 5,000 ft msl, but to expect a higher altitude soon.

According to ADS-B track data, between 0925:31 and 0925:34, the Cessna departed level flight at 5,000 ft msl and entered a rapidly increasing descent. At 0925:34, the final recorded ADS-B track data was at 4,725 ft msl and about 0.5 mile northeast of the Cessna's main wreckage site. As of the final recorded ADS-B track point, the Cessna was descending about 8,960 feet per minute.

The powered paraglider was not equipped with a transponder or an ADS-B OUT transmitter and, as such, the powered paraglider's position was not displayed on the air traffic controller's display. Postaccident review of available radar data revealed sporadic primary returns near where the Cessna departed level flight and ADS-B data was lost. However, these primary returns were not displayed on the controller's display and did not have a reported altitude.

The powered paraglider operator was using a video camera that captured the final 7 minutes 13 seconds of the flight. The recovered camera footage included a field of view that captured almost the entirety of the paraglider operator, the paraglider rigging, and the paraglider wing. The recovered audio track did not align with the video footage and was subsequently determined not relevant to the investigation.

Review of the camera footage revealed no anomalies with the operation of the powered paraglider until the final 8 seconds of the flight. At 7 minutes 6 seconds into the recording, the

powered paraglider operator turned his head about 45° to the right in a manner consistent with his attention being quickly drawn to something to the right of the powered paraglider's northerly flight path. Based on the powered paraglider operator's head movements, his attention remained to the right of his position during the final 8 seconds of the flight.

About 6 seconds before the collision, with his head still turned toward the right, the powered paraglider operator pulled the left control toggle and turned toward a northwest heading. The profile of a high-wing airplane, later discernible as a Cessna 208B, emerged slightly above the horizon and to the right of the powered paraglider.

About 3 seconds before the collision, with his head still sharply turned to the right, the powered paraglider operator aggressively pulled down on both control toggles.

About 1 second before the collision, with his head still sharply turned to the right, the powered paraglider operator relieved the downward pressure on the left control toggle and sharply pulled down on the right control toggle to enter a right turn. The Cessna remained in level flight with no apparent change in roll or heading.

In the final moments of the video, the powered paraglider remained in a steep right turn with the operator's body slung up and to the left with respect to the paraglider's wing. The powered paraglider operator's head position remained sharply to the right as the Cessna converged with the powered paraglider.

The final recovered frame of video showed the powered paraglider in a steep right bank, the powered paraglider operator's head rotated about 45° to the right, and his hands on their respective control toggle. The Cessna's right-wing leading edge, outboard of the right-wing lift strut attachment point, appeared to be inline with the body of the powered paraglider operator. The flight path of the Cessna appeared to be straight and level with no change in roll or heading.

Pilot Information (A1)

Certificate:	Commercial	**Age:**	35,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Unmanned (sUAS)	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	June 14, 2021
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 23, 2021
Flight Time:	(Estimated) 3500 hours (Total, all aircraft)		

Pilot Information (A2)

Certificate:	None	**Age:**	51,Male
Airplane Rating(s):	None	**Seat Occupied:**	Single
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	None None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information (A1)

Aircraft Make:	Cessna	**Registration:**	N1116N
Model/Series:	208 B	**Aircraft Category:**	Airplane
Year of Manufacture:	1994	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	208B0417
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	October 19, 2021 AAIP	**Certified Max Gross Wt.:**	8750 lbs
Time Since Last Inspection:	65.7 Hrs	**Engines:**	1 Turbo prop
Airframe Total Time:	13125 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney Canada
ELT:	C91 installed, not activated	**Engine Model/Series:**	PT6A-114A
Registered Owner:	Aero Leasing	**Rated Power:**	675 Horsepower
Operator:	Martinaire Aviation LLC	**Operating Certificate(s) Held:**	Commuter air carrier (135)
Operator Does Business As:	Martinaire	**Operator Designator Code:**	MT9A

Aircraft and Owner/Operator Information (A2)

Aircraft Make:	Dudek Paragliders	**Registration:**	Unregistered Ultralight
Model/Series:	Solo 21	**Aircraft Category:**	Ultralight
Year of Manufacture:	2021	**Amateur Built:**	
Airworthiness Certificate:	None	**Serial Number:**	P-231031
Landing Gear Type:	None	**Seats:**	1
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	220 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Nirvana Paramotors
ELT:	Not installed	**Engine Model/Series:**	Rodeo 125 Blue Line
Registered Owner:	On file	**Rated Power:**	28 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TME,166 ft msl	**Distance from Accident Site:**	9.8 Nautical Miles
Observation Time:	09:15 Local	**Direction from Accident Site:**	16°
Lowest Cloud Condition:		**Visibility**	6 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	50°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	8°C / 7°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Houston, TX (IAH) (A1); Fulshear, TX (A2)	**Type of Flight Plan Filed:**	IFR (A1); None (A2)
Destination:	Victora, TX (VCT) (A1); Fulshear, TX (A2)	**Type of Clearance:**	IFR (A1); None (A2)
Departure Time:	09:10 Local (A1)	**Type of Airspace:**	Class E (A1); Class E (A2)

Based on the video footage recovered from the powered paraglider, visual meteorological conditions prevailed with no clouds or visibility restrictions.

At the time of the accident, the sun's position relative to the accident site was to the southeast (137° true) and was about 22.3° above the horizon.

Wreckage and Impact Information (A1)

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	29.650019,-95.950949

Wreckage and Impact Information (A2)

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	29.650019,-95.950949

An onsite examination revealed that the outboard 10 ft of the Cessna's right wing separated following the impact with the powered paraglider. The separated section of the right wing was located about 0.6 mile east of the main wreckage site. There was a semicircular impact impression in the leading edge of the right wing outboard section that measured about 5 ft wide and about 36 inches deep. Fabric remnants resembling the powered paraglider operator's jacket were found within the semicircular impression.

The Cessna impacted terrain at high vertical speed in a steep nose-down and inverted attitude on a 332° magnetic heading. The Cessna wreckage was found highly fragmented in the 10-ft-deep impact crater. Flight control continuity could not be established due to fragmentation and soil embedment; however, all flight control cable separations were consistent with tensile overload. The engine and propeller were located at the base of the impact crater. All three propeller blades had separated from the hub and exhibited leading edge gouging and chordwise scoring. Two of the propeller blades exhibited S-shape bending.

The powered paraglider operator and the paraglider engine were found about 0.7 mile east-northeast of the Cessna's main wreckage site. The powered paraglider operator had separated from his seat-style harness.

The paraglider wing, harness, and emergency parachute were located about 3.9 miles south of the Cessna's main wreckage site. The paraglider harness exhibited tearing and impact damage. The static and control lines remained intact and attached to the harness and wing. The paraglider wing remained intact with minor tearing of the lower wing surface. The emergency parachute was found deployed, intact, with no tearing or damage.

Medical and Pathological Information

Cessna Pilot

The Cessna pilot's last aviation medical examination was completed on June 14, 2021. At that time, he reported no medication use. He reported a history of anxiety due to legal issues and family stress, and a 2008 court-martial with dishonorable discharge from the Air Force. He had used the antidepressant/sleep aid medication trazodone for a short time in 2008 and was issued a FAA Letter of Eligibility for medical certification for his anxiety and legal issues in 2011. No significant issues were identified at the Cessna pilot's last aviation medical examination, and he was issued a first-class medical certificate without limitation.

An autopsy of the Cessna pilot was performed by Fort Bend County Medical Examiner Office. The autopsy report was reviewed by a National Transportation Safety Board (NTSB) Medical Officer. According to the autopsy report, the cause of death was multiple blunt force trauma, and the manner of death was accident. The ability of the autopsy examination to evaluate for natural disease was extremely limited by the extent of traumatic injury.

The FAA Forensic Sciences laboratory performed toxicological testing of postmortem specimens from the Cessna pilot. The prescription antipsychotic medication quetiapine was detected in muscle tissue. Ethanol was detected in one muscle specimen at 0.022 g/dL but was not detected in another muscle specimen. No blood was available for FAA testing.

Quetiapine, sometimes marketed as Seroquel, is a prescription antipsychotic medication. In the United States, quetiapine is approved by the Food and Drug Administration (FDA) for treating schizophrenia. Quetiapine is also FDA-approved for treating acute episodes of mania and depression in bipolar disorder, and as part of chronic multi-drug treatment of bipolar disorder. Additionally, quetiapine is approved as part of multi-drug treatment of major depressive disorder. Quetiapine is regularly prescribed for off-label (non-FDA-approved) uses, including in low doses for treatment of insomnia without underlying psychiatric illness. Some other possible off-label uses include chronic single-drug treatment of bipolar disorder, as well as treatment of post-traumatic stress disorder and anxiety.

Quetiapine commonly causes drowsiness, especially in the initial days after starting a treatment regimen. This is a result of the drug's sedating antihistamine effects, to which users may develop tolerance over time. Quetiapine also has multiple other potential adverse side effects. The drug typically carries a warning that it has the potential to impair judgment, thinking, and motor skills, and that users should be cautioned about performing activities requiring mental alertness, such as operating a motor vehicle or hazardous machinery, until they are reasonably certain that the drug does not affect them adversely. The FAA considers quetiapine to be a "do not issue/do not fly" medication.

According to the FAA medical case review for this accident, quetiapine is unacceptable for FAA medical certification because of the underlying conditions it is used to treat. In addition to being used medicinally, quetiapine has emerged as a potential drug of misuse and abuse. Commonly, abuse of quetiapine involves its use in combination with recreational substances such as cocaine, marijuana, alcohol, benzodiazepines, or opioids. Users may seek to enhance

those substances' desired effects or to self medicate for undesired symptoms caused by substance use or withdrawal. Some people may abuse quetiapine seeking effects of hypnosis or euphoria, although the drug's ability to produce a pleasurable "high" in the absence of other recreational drugs is not clear. People also sometimes misuse or abuse quetiapine seeking relief from anxiety or insomnia.

A review of the Cessna pilot's primary care medical records from a period of 3 years before the crash date did not document any use of quetiapine, the presence of any psychiatric disorder, or any history of substance abuse.

Ethanol is a type of alcohol. It is the intoxicating alcohol in beer, wine, and liquor, and, if consumed, can impair judgment, psychomotor performance, cognition, and vigilance. FAA regulation imposes strict limits on flying after consuming ethanol, including prohibiting pilots from flying with a blood ethanol level of 0.04 g/dL or greater. However, consumption is not the only possible source of ethanol in postmortem specimens. Ethanol can be produced by microbes in a person's body after death. Postmortem ethanol production is made more likely by extensive traumatic injury and can cause an affected toxicological specimen to test positive for ethanol while another specimen from the same person tests negative.

Powered Paraglider Operator

An autopsy of the powered paraglider operator was performed by Fort Bend County Medical Examiner Office. The autopsy report was reviewed by a NTSB Medical Officer. According to the autopsy report, the powered paraglider operator's cause of death was blunt force injuries, and his manner of death was accident. The autopsy did not identify any significant natural disease. The FAA Forensic Sciences laboratory performed toxicological testing of postmortem specimens from the powered paraglider operator, which did not detect any ethanol or tested-for drugs.

Tests and Research

Inflight Collision Study

Based on the video evidence, the Cessna approached the powered paraglider's right side at an estimated 90° collision angle. Based on ADS-B data, the Cessna was traveling at 162 knots groundspeed before the collision with the powered paraglider. According to its manufacturer, the powered paraglider's trim speed range was 21-27 knots. Therefore, the powered paraglider's speed was estimated to be about 24 knots. Assuming a 90° collision angle, the closing speed between the Cessna and the powered paraglider was about 164 knots.

As discussed previously, about 8 seconds before the collision, the powered paraglider operator suddenly turned his head to the right and continued to look in that direction until the collision with the Cessna. About 6 seconds before the collision, the powered paraglider operator began maneuvering the powered paraglider in a manner consistent with an attempt to avoid a collision with the converging Cessna.

FAA Advisory Circular 90-48E, Pilot's Role in Collision Avoidance, identifies the perceptual, cognitive, and psychomotor steps required for collision avoidance and provides a time approximation for each step. This breakdown indicates that about 12.5 seconds can be expected to elapse between the time that a pilot sees a conflicting aircraft and the time an avoidance maneuver begins, as depicted in table 1.

Process/Task	Response (Seconds)	Cumulative (Seconds)
See an object ahead	0.1	0.1
Recognize that object is an aircraft	1.0	1.1
Become aware that a collision course exists	5.0	6.1
Make a decision to turn left or right	4.0	10.1
Muscular reaction	0.4	10.5
Aircraft lag in response to flight control input	2.0	**12.5**
Total time before aircraft begins to move	**12.5**	

Table 1. Time required for a pilot to see an object, recognize the potential for an inflight collision, and maneuver to avoid the inflight collision

Under optimal viewing conditions, consisting of a static object exhibiting a high contrast with its background, normal visual acuity can be as small as 1 minute of arc (0.017°) to resolve a detail like a line or space; however, about 5 minutes of arc (0.083°) is required for an individual to recognize a simple shape such as a test letter "E".

From the powered paraglider operator's view, about 8 seconds before the collision, the subtended visual angle of the Cessna's 52 ft wingspan was about 1.35°. For comparison, a thumbnail held at arm's length subtends a visual angle of about 1.5°.

Research has demonstrated that visual acuity drops dramatically about 2° away from the center of fixation (an area known as the fovea), and that visual acuity is very poor in the peripheral field. Although the periphery is sensitive to motion, from the powered paraglider operator's view, the Cessna would have had little apparent motion because the two aircraft were on a collision course.

From the Cessna pilot's field of view, the powered paraglider would have appeared vertically centered and about 8.4° left of center. Based on the video evidence, the airplane's windscreen center post did not obstruct the pilot's view of the powered paraglider. Additionally, despite the

powered paraglider's position near the center of his field of view, the Cessna pilot did not attempt to maneuver his airplane to avoid a collision with the powered paraglider.

The powered paraglider's wing was its largest component. The Cessna pilot's view of the powered paraglider was from the side; therefore, the powered paraglider's wing chord, measuring about 7 ft, was the widest visible dimension. From the Cessna's pilot view, about 17.5 seconds before the collision, the subtended angle of the powered paraglider's wing chord was 0.083°. Similarly, at 12.5 seconds before the collision, the subtended angle of the power paraglider's wing chord was 0.116°.

Based on the video evidence, the powered paraglider was superimposed on a horizon containing terrain features creating a complex background. Research indicates that the minimum subtended angle required for recognizing an uncommon shape in a field of distractor items is 0.20°. Using this criterion, the powered paraglider would have been recognizable about 7.4 seconds before collision.

Visual contrast is another consideration for estimating recognition time. The powered paraglider wing was white and blue, with orange wingtips. The wing was likely superimposed on or adjacent to (just below) a bright blue sky. The paraglider operator, who was suspended below the powered paraglider wing, was wearing a dark brown or olive-colored flight suit and was superimposed on or adjacent to the terrain, which was a patchwork of brown and green colors. Research indicates that the minimum subtended angle for recognizing a complex, low-contrast target is about 0.4° to 0.6°. Using this criterion, from the Cessna pilot's view, the powered paraglider's wing chord would have been recognizable 2-3 seconds before the collision.

Limitations of Visual Scanning

As previously discussed, visual acuity is dramatically lower more than 2° away from the center of fixation. To compensate for the small foveal area, the FAA recommends pilots make separate fixations on different portions of their visual field, no less than 10° apart, and devote at least one second to each fixation. However, as highlighted by an Australian Transport Safety Bureau (ATSB) study, a pilot using this strategy would need 54 seconds to systematically scan an area 180° wide and 30° tall. By the time a pilot completed such a scan, the scene could have changed, and they would need to start over, causing the ATSB to conclude that the systematic use of this strategy is impractical. In a separate study that used a mathematical model of optimum scanning techniques, it was determined that there was a 30% likelihood of detecting a 40-foot-wide aircraft with a 200 knot closing speed.

Additional research indicates that pilots do not systematically scan their visual field; their visual scans are biased. Moreover, general aviation pilots may only spend 30-50% of their time scanning outside the cockpit. The authors of a study that examined data from actual flights utilizing an intruder aircraft determined an 85% probability that detection would occur with 12 or fewer seconds before a collision, given a closing speed of 120 knots.

Additional Information

The Cessna was operating under Title 14 CFR Part 135 on an instrument flight plan in visual meteorological conditions. The Cessna was equipped with a transponder and an ADS-B OUT transmitter, which made the airplane visible to the air traffic control system.

The powered paraglider was operating as an ultralight vehicle under the provisions of Title 14 CFR Part 103. In the United States, ultralight vehicles are not identified as aircraft and, as such, do not require a FAA registration certificate, FAA airworthiness certificate, or a FAA pilot certificate to operate.

According to Title 14 CFR Part 91.227 (ADS-B OUT Equipment Performance Requirements) and Advisory Circular No. 20-165B (Airworthiness Approval of ADS-B OUT Systems), in the United States, among other requirements, an aircraft registration number and an International Civil Aviation Organization 24-bit address are required for an ADS-B OUT system to be installed in a civil aircraft. As such, ultralight vehicles that are operated in the United States without FAA registration, as most are, are not authorized to use an ADS-B OUT transmitter.

The inflight collision at 5,000 ft msl occurred in Class E airspace. The operation of the powered paraglider in Class E airspace did not require two-way radio communication with air traffic control, the use of a transponder, or an ADS-B OUT transmitter.

Neither the Cessna nor the powered paraglider were equipped with ADS-B IN technology, cockpit display of traffic information, or a traffic alerting system.

According to Title 14 CFR Part 103.13 (Operation Near Aircraft; Right-of-Way Rules), an ultralight vehicle shall maintain vigilance to see and avoid aircraft and shall yield the right-of-way to all aircraft. Additionally, no person shall operate an ultralight vehicle in a manner that creates a collision hazard with respect to any aircraft.

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew
Additional Participating Persons:	Casey J. Love; Textron Aviation; Wichita, KS Alan S. Rusinowitz; Martinaire Aviation LLC; Addison, TX Steven Hiles; Martinaire Aviation LLC; Addison, TX Rick Bolton; Federal Aviation Administration - Houston FSDO; Houston, TX Nora Vallée; Transportation Safety Board of Canada; Gatineau
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