Aviation Investigation Final Report

Location:	Houston, Texas	**Accident Number:**	DCA24FA017
Date & Time:	October 24, 2023, 15:20 Local	**Registration:**	N510HM (A1); N269AA (A2)
Aircraft:	TEXTRON AVIATION INC 510 (A1); Raytheon Hawker (A2)	**Aircraft Damage:**	Substantial (A1); Minor (A2)
Defining Event:	Runway incursion veh/AC/person	**Injuries:**	4 None (A1); 3 None (A2)
Flight Conducted Under:	Part 91: General aviation - Personal (A1); Part 135: Air taxi & commuter - Non-scheduled (A2)		

Analysis

A Raytheon Hawker 850XP, N269AA, operated by DuPage Aerospace, collided with a Textron Aviation Inc 510 Citation Mustang, N510HM, at the intersection of runways 13R and 22 at William P. Hobby Airport (HOU) in Houston, Texas. N510HM was rolling after landing on runway 13R, and N269AA was on its takeoff roll on runway 22. About the time of lift-off, the left wingtip of N269AA struck the left side of N510HM's tail cone, resulting in substantial damage to N510HM. N269AA continued its takeoff, and during initial climb advised the HOU air traffic control tower (ATCT) that they needed to return to the airport. The local control (LC) controller provided vectors to runway 13R, where N269AA landed uneventfully.

About 4.5 minutes prior to the collision, the LC controller cleared N510HM to land while it was on a 9-mile final. About 2.5 minutes before the collision, N510HM reported a 4-mile final. About 2 minutes prior to the collision the LC controller cleared N269AA to "line up and wait" (LUAW) on runway 22. The pilot monitoring (PM) correctly readback the clearance with "*line up and wait uh, two two uh, six nine Alpha Alpha*". During post-accident interviews, the PM recalled hearing the LUAW clearance and a subsequent clearance for takeoff, and the pilot flying (PF) recalled hearing only a clearance for takeoff. However, a review of the certified air traffic control voice recordings revealed that there was no takeoff clearance issued to N269AA (or other airplanes) at that time. This discrepancy was likely due to the pilots' expectation bias, a cognitive phenomenon where individuals perceive what they expect to hear or see and act accordingly.

Both Hawker pilots recalled that near the time of the LUAW clearance, the programmed V-speed references were no longer displayed on their instruments. They discussed the issue, and the PM began re-entering data into the flight management system to restore the speeds. The PF stated he felt “a little bit rushed” due to the perceived takeoff clearance and he did not want to delay on the runway. The crew discussed the speeds and elected to proceed with the takeoff. This activity may have distracted the pilots and exacerbated their expectation bias.

Additionally, when the LC controller issued the LUAW clearance, they did not provide a traffic advisory to either airplane, which is a required procedure. A traffic advisory would have provided more context and awareness for both crews about the location and activity of the other airplane. However, the PM correctly acknowledged the LUAW clearance, which should be sufficiently clear that a delay was required before takeoff could commence, regardless of the reason. Therefore, it is unlikely that the lack of a traffic advisory contributed to the outcome.

The N269AA crew taxied onto the runway and began the takeoff without a clearance from the ATCT. The ATCT controllers observed its movement and the Airport Surface Detection Equipment – Model X (ASDE-X) in the ATCT sounded a warning of a perceived collision. The LC controller twice instructed N269AA to stop and hold position but received no response.

The pilots recalled that as they began the takeoff roll, two events occurred. First, they noticed that the rudder bias system had activated, which they resolved by adjusting the thrust such that both engines were set to similar power setting. The PF did this, and the rudder bias system deactivated. Second, the elevator trim warning system activated, and the PM then adjusted the pitch trim (by rolling it nose down about 1/16 inch) which extinguished the warning. These activities likely distracted the pilots and prevented them from recognizing the instructions from the LC controller to stop. They continued their takeoff roll, and both pilots recalled that they did not see N510HM until about 1 second before the collision.

According to the chief pilot of DuPage Aerospace, company policy and training (and as part of every takeoff briefing) specify that takeoffs should be aborted for “any fault or failure” below 80 knots. He elaborated that if a fault were indicated on the annunciator panel [which is where the elevator trim warning system indictor is displayed], “then you should be aborting.” He further stated that “it depends what the fault or failure is” and described that if the elevator trim warning activated during takeoff, while the trim setting was very near either end of the takeoff range, that he would re-trim the airplane and then move the throttles back into the takeoff position and make sure the warning did not reactivate. If it were to reactivate, he would then abort the takeoff.

Similarly, the PM noted during his interview that the elevator trim warnings are common in the Hawker, particularly when the trim setting was at or near the very aft mark of the [takeoff range] of the trim indicator. He said that typically a slight roll forward of the trim wheel would extinguish the light.

This suggests there is some discrepancy or exceptions between the operator's policy and at times, the in-practice procedures, with regard to conditions that warrant an aborted takeoff. In this case, the elevator trim warning (and the activation of the rudder bias) was temporary and easy to quickly remedy, though it happened to occur at a critical time as ATC was attempting to stop the takeoff roll.

Separately, the chief pilot stated that it was company policy (and an element of the before start checklist) to test the cockpit voice recorder (CVR) prior to every flight. After the accident, the CVR was found to be inoperative due to activation of the impact or G switch, which interrupts electrical power to the CVR and its control unit in the cockpit. This can occur for several reasons, including hard landings or during maintenance operations.

Review of the recording revealed audio consistent with maintenance activities. The CVR does not record date and time, however it likely became inoperative at some time prior to this crew's pairing, which began two flights prior to the accident flight. Post accident testing of the CVR and the impact switch revealed they operated as designed. The flight crew should have been aware of the CVR's nonoperational status during the before start checklist prior to the accident and the two previous flights, had they 1) pressed the CVR test button and 2) noticed that none of the indicator lights on the CVR control unit had illuminated, because the control unit (and CVR) were not powered. Normally, the indicator lights show the progress of the self-test, and whether the test passes or fails.

However, during normal operation (no faults, and not in self-test mode) none of the indictor lights on the cockpit voice control unit are illuminated. Therefore, the control unit would look the same if 1) the CVR was running normally, or 2) if it was completely unpowered by the activated inertial switch. The only methods for the flight crew to determine if the unit is functioning are to use the self-test function, or by monitoring the audio through the headset jack on the control panel.

Since the CVR was inoperative, the relevant crew conversations that would have provided additional insight to the investigation were not captured. This demonstrates the importance of properly testing the CVR before each flight.

Probable Cause and Findings

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

The takeoff by the flight crew of N269AA, without a takeoff clearance, which resulted in a collision with N510HM that was landing on an intersecting runway. Contributing to the accident was the N269AA crew's expectation bias and distraction.

Findings

Personnel issues (A1)	Incorrect action selection - Pilot of other aircraft
Personnel issues (A2)	Incorrect action selection - Pilot
Environmental issues (A2)	Equipment/operational - Effect on personnel
Environmental issues (A2)	Equipment/operational - Compliance w/ procedure

Factual Information

History of Flight

Landing-landing roll (A1)	Runway incursion veh/AC/person (Defining event)
Takeoff (A2)	Navigation error
Takeoff (A2)	Runway incursion veh/AC/person

On October 24, 2023, about 15:20 central daylight time, a Raytheon Hawker 850XP, N269AA, was taking off on runway 22 when its left wing collided with the vertical stabilizer of a Textron Aviation (Cessna) Citation Mustang, N510HM, which was landing on runway 13R at William P. Hobby Airport (HOU), Houston, Texas. Day visual meteorological conditions prevailed at the time of the accident.

There were no injuries to the two pilots and one passenger aboard N269AA or to the one pilot and three passengers aboard N510HM. N269AA sustained minor damage and N510HM was substantially damaged during the collision. N269AA was operating as a Title 14 *Code of Federal Regulations* (*CFR*) Part 135 on-demand passenger flight from HOU to Waukesha County Airport (UES), Waukesha, Wisconsin. N510HM was operating as a Title 14 *CFR* Part 91 flight from Fulton County Executive Airport/Charlie Brown Field (FTY), Atlanta, Georgia, to HOU.

HOU has intersecting runways, and at the time of the accident N510HM was rolling out after landing on runway 13R, while N269AA was on its takeoff roll on runway 22. See figure 1.

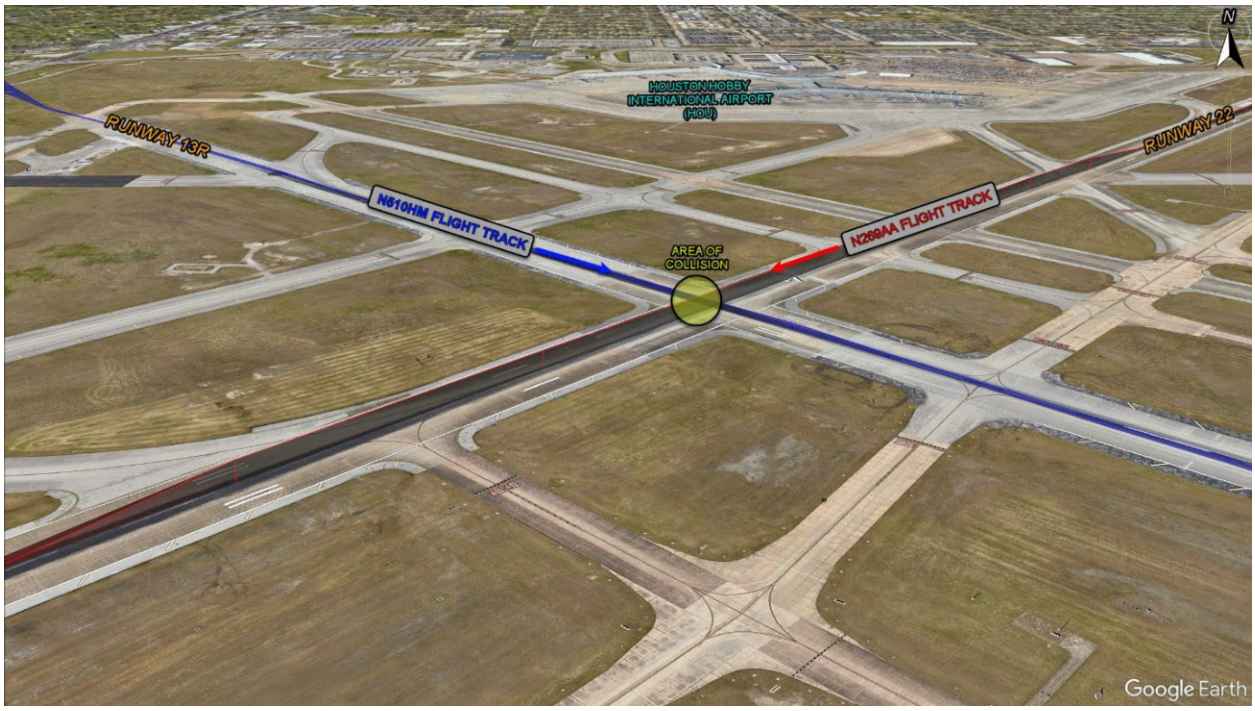

Figure 1. View of both airplanes' flight tracks with the area the ground collision occurred highlighted in yellow. The blue line represents the N510HM flight track, and the red line represents the N269AA flight track.

A review of certified air traffic control voice recordings provided by the Federal Aviation Administration (FAA) revealed that at 1514:09, before N269AA began its taxi, the flight crew contacted ground control (GC) to request clearance to taxi for departure, which they received.

About a minute later, the pilot of N510HM checked in with local control (LC) controller while on a nine-mile final to runway 13R. The LC controller then cleared the pilot of N510HM to land.

At 15:15:15, N269AA taxied northeast on parallel taxiway K (Kilo) and approached runway 22 for departure. At 1515:50 the GC controller instructed the crew of N269AA to monitor the LC frequency. The flight crew stated in their post-accident interview that as they passed taxiway "K2" during their taxi to runway 22, they switched to the LC frequency.

At 1517:32 the pilot of N510HM reported a four-mile final.

At 1518:01 the LC controller instructed the crew of N269AA to line up and wait (LUAW) on runway 22, however the LC controller did not provide a traffic advisory to either airplane regarding the other, as required. The pilot monitoring (PM) replied with "*line up and wait uh, two two uh, six nine Alpha Alpha"* at 1518:04. The PM recalled that about the same time, they noticed that the V-speeds were no longer depicted on the display screens. They had a discussion about this, and the PM began reentering some of the data into the flight management system.

The pilot flying (PF) recalled that he felt “a little bit rushed” due to what he believed was a takeoff clearance and he did not want to delay too long on the runway. He said the crew discussed the speeds and knew what they should be, so they elected to go. The PF recalled hearing only a clearance for takeoff, while the PM recalled hearing the LUAW clearance followed by a clearance for takeoff. Both pilots recalled hearing the clearance for takeoff about the time they began the left turn toward the runway at the end of taxiway Kilo. See figure 2 below.

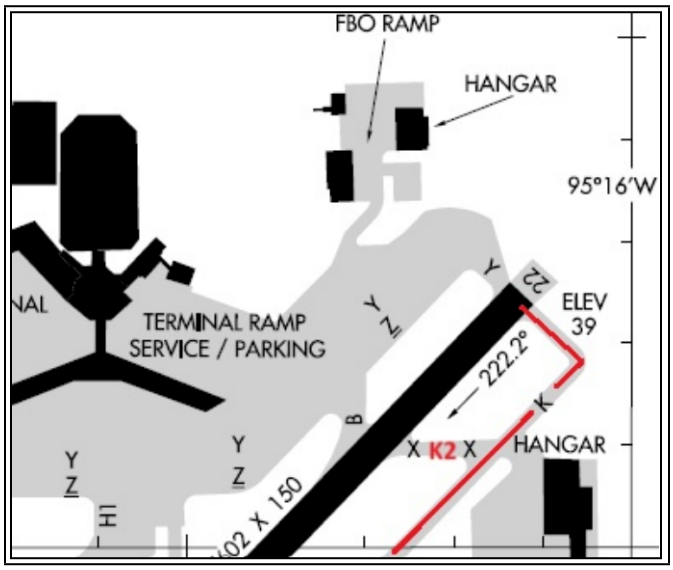

Figure 2. Taxiways K (Kilo) and K2 (Kilo 2) at the departure end of runway 22.

According to the air traffic control voice recordings, no takeoff clearance was issued near that time to N269AA or to any other airplanes. N296AA entered runway 22, and subsequently began their departure roll, without authorization from the LC controller.

About 1518:29, N510HM was on an approximate one and a half mile final for runway 13R. As N269AA began the takeoff roll, the (PF) felt some right rudder input, and mentioned it to the PM. The PM explained that it was the rudder bias system, and advised that if the throttles were brought up, that it would clear itself. The PF reduced the throttles and then brought them back up slowly, and the rudder bias deactivated. The crew also observed an amber elevator trim annunciator light as the takeoff roll began. The PM adjusted the elevator trim wheel slightly, and the light extinguished.

N269AA was on the takeoff roll on runway 22, when the flight data/clearance delivery controller alerted the LC about N269AA’s movement, and at 1519:47 the local controller stated “nine alpha alpha, stop, hold your position.” There was no response from the crew of N269AA. At 1519:49, the automated airport surface detection equipment sounded an alarm warning of

the impending collision. At 1519:52 the LC controller again stated, “alpha, alpha, hold your position, stop,” to which there was still no response.

At 1520:00, N269AA collided with N510HM. At 1520:14, the LC controller began providing instructions to send around all aircraft that were on final approach behind N510HM.

At 1520:29 the crew of N269AA, who had taken off and was in the initial climb, informed local control that they needed to return to the airport, and the LC controller provided vectors to return to the airport and land on runway 13R.

At 1521:08 the LC controller cleared N269AA to land on runway 13R, and the flight landed otherwise uneventfully.

In the post-accident interview, the N510HM pilot said that he did not see N269AA, but during the landing roll he heard a sound similar to a truck tire blowing out on a highway. He said that the airplane did not yaw, and the airplane had no controllability issues rolling down the runway or taxiing to the ramp. It wasn’t until the pilot got out of the airplane that he saw the damage to the airplane.

Both crew members in N269AA (the PF was in the left seat, and the PM was in the right seat) said that they did not see N510HM until about 1 second prior to impact and described the feeling of the impact as a “thud.”

Pilot Information (A1)

Certificate:	Private	**Age:**	40,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 3 None	**Last FAA Medical Exam:**	May 3, 2023
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 3, 2022
Flight Time:	(Estimated) 1000 hours (Total, all aircraft), 300 hours (Total, this make and model)		

Pilot Information (A2)

Certificate:	Airline transport; Commercial	**Age:**	67,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	September 26, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 24, 2023
Flight Time:	(Estimated) 28000 hours (Total, all aircraft), 3800 hours (Total, this make and model)		

Co-pilot Information (A2)

Certificate:	Airline transport; Commercial; Flight engineer	**Age:**	69,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	May 12, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 24, 2023
Flight Time:	(Estimated) 24000 hours (Total, all aircraft), 300 hours (Total, this make and model)		

N510HM Pilot

The pilot, age 40, held a FAA Private Pilot certificate with ratings for Airplane Multi-engine Land, Airplane Single-Engine Land, Instrument Airplane, and type ratings in the CE-510 and CE-510S. He had a FAA Third Class medical certificate issued on May 3, 2023, with no restrictions or limitations. The pilot's estimated flight hours were based on the information he provided during a post-accident interview. He estimated he had about 1,000 total hours of flight experience and about 300 of those hours were in the accident airplane make and model.

N269AA Crew

The PF was 69 years old and had a FAA Airline Transport Pilot certificate with ratings for Airplane Single- and Multi-engine Land, with type ratings for B-737, B-757, B-767, B-777, B-787, DC-9, and HS-125. Additionally, he had a Flight Engineer certificate with rating of Turbojet Powered and a Mechanic certificate with Airframe and Powerplant. He had a FAA First Class medical certificate issued on May 12, 2023, with limitations: Must use correct lens(es) to meet vision standards at all required dista[nces]. The PF's estimated flight hours were based on interview, company and FAA records. His total flight experience was about 24,000 hours, of which about 300 were in the accident airplane make and model. He was seated in the left seat for the flight.

He had a temporary residence in Aurora, Illinois, about a 30-minute drive from the DuPage airport. He had been in Illinois since October 12 or 13th flying short trips lasting 2 or 3 days. On October 22, 2023, he flew a trip and arrived back to DuPage about 16:00. He arrived at his temporary residence close to 18:00, had dinner and was in bed between 20:00 and 21:00.

On October 23, the PF set his alarm for 03:30 because he had a 06:30 departure from DuPage. He felt rested that day. He took about an hour nap, went to the gym, had dinner, and then went to bed. His bedtime was unknown.

On October 24, he woke up about 08:30 and had breakfast at 09:00. He had an extended checkout and completed paperwork and training before the flight. He thought he dozed off while completing the training but felt rested for the flight. He did not recall if they took an Uber or shuttle to the airport.

He had no issues falling asleep or staying asleep and had never talked to his doctor about a sleep disorder. He thought he needed 7 hours of sleep on average per night to feel rested. He may sleep up to 10 hours when arriving back home in San Diego after flying.

The PM was also the pilot in command (PIC) for the flight. He was also a training captain for DuPage Aerospace. He was 67 years old and held an FAA Airline Transport Pilot Certificate with ratings for Airplane Single- and Multi-engine Land and type ratings of B-727, B-737, CE-500, DA-20, DC-9, G-200, HS-125, and LR-JET. Additionally, he held a Flight Engineer certificate with rating of turbojet powered. He held a First-Class medical certificate, dated September 26, 2023, with a limitation: Must use corrective lens(es) to meet vision standards at all required

dista[nces]. According to his interview he had about 28,000 hours of total flight experience and approximately 3,800 hours of flight experience in the accident aircraft make and model. He was seated in the right seat for the flight.

He had flown a multi-day trip which ended on Saturday, October 21, 2023. He was off duty on Sunday, October 22. He did work around his house. He thought he went to bed about 21:00 and got a good night's sleep.

On Monday, October 23, he had an early show, he thought 04:30, for a 06:30 departure from DuPage. He thought he woke up about 02:30 or 03:00. They flew to Waukesha, then to Houston, and then went to the hotel. He thought he may have napped sometime during the afternoon. He went to dinner and thought he returned to the hotel about 20:30 or 21:00. He went to bed after Monday Night Football ended.

On Tuesday, October 24, he woke up by 08:30 with his alarms, which were set for 08:00, 08:15 and 08:30, and went downstairs for a coffee and breakfast snack. He went back to his room and got ready for his day. He did not nap prior to the accident flight. He thought Signature picked them up and took them to the airport. He felt "perfect" and was excited to go flying.

He had no issues falling asleep or staying asleep.

Aircraft and Owner/Operator Information (A1)

Aircraft Make:	TEXTRON AVIATION INC	**Registration:**	N510HM
Model/Series:	510	**Aircraft Category:**	Airplane
Year of Manufacture:	2016	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	510-0468
Landing Gear Type:	Retractable - Tricycle	**Seats:**	7
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:		**Engine Manufacturer:**	P&W CANADA
ELT:		**Engine Model/Series:**	PW615F-A
Registered Owner:	SB 501 LLC	**Rated Power:**	1460 Lbs thrust
Operator:	Green Circle Demolition, LLC	**Operating Certificate(s) Held:**	None

Aircraft and Owner/Operator Information (A2)

Aircraft Make:	Raytheon	**Registration:**	N269AA
Model/Series:	Hawker 850XP	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	258800
Landing Gear Type:	Retractable - Tricycle	**Seats:**	15
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	2
Airframe Total Time:		**Engine Manufacturer:**	
ELT:		**Engine Model/Series:**	
Registered Owner:	WHITMORE HOLDINGS LLC	**Rated Power:**	
Operator:	WHITMORE HOLDINGS LLC	**Operating Certificate(s) Held:**	On-demand air taxi (135)

DuPage Aerospace Corporation is a 14 *CFR* Part 135 operator, located at DuPage Airport in West Chicago, Illinois. At the time of the accident their fleet consisted of 8 aircraft, of which 5 were the same make and model as the accident airplane.

According to Hawker 800/800XP systems description documents provided by DuPage Aerospace Corporation:

Elevator Out of Trim Warning System

The elevators provide primary control of the aircraft in the pitch axis either mechanically through control column movement or electronically through the autopilot elevator servo. A microswitch in each trim jack monitors elevator trim setting. If the elevator trim is set outside the takeoff range with weight-on-wheels, advancing the throttles to about the 60% N1 RPM position activates microswitches which in turn illuminate the amber ELEV/AIL TRIM annunciator on the MWS [master warning system] panel. Setting the elevator trim within the takeoff setting range extinguishes the annunciator.

Rudder Bias System

The rudder bias system automatically provides rudder movement in response to an engine failure or malfunction to assist with directional control. A spring strut reduces the rudder bias effect at large rudder deflections.

Engine bleed air from the LP [low pressure] stage of each engine drives the rudder bias system. LP bleed air from each engine travels to opposite ends of a double-acting pneumatic strut. Under symmetrical power conditions, the LP bleed air pressure balances within the struts, resulting in no net rudder input. Under asymmetric power conditions, air pressure differential between the engines operates the pistons so the rudder moves to counteract the asymmetric thrust.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KHOU,47 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	249°
Lowest Cloud Condition:	Scattered / 3500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / 27 knots	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	29°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Atlanta, GA (FTY) (A1); Houston, TX (HOU) (A2)	**Type of Flight Plan Filed:**	
Destination:	Houston, TX (A1); Waukesha, WI (UES) (A2)	**Type of Clearance:**	Unknown (A1); Unknown (A2)
Departure Time:	13:46 Local (A1); 15:20 Local (A2)	**Type of Airspace:**	Unknown (A1); Unknown (A2)

Airport Information

Airport:	William P Hobby Airport KHOU	**Runway Surface Type:**	Concrete
Airport Elevation:	46 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	22	**IFR Approach:**	None
Runway Length/Width:	7602 ft / 150 ft	**VFR Approach/Landing:**	

William P. Hobby Airport is located about 8 miles southeast of Houston, Texas. It is a publicly owned airport by the City of Houston. The airport elevation is 46 ft above mean sea level and has three paved airplane landing surfaces designated as runway 4/22, 13R/31L, and 13L/31R.

The paved surface for runway 13R/31L is 7,602 ft long and 150 ft wide, Runway 4/22 is 7,602 ft long and 150 ft wide, and 13L/31R is 5,148 ft long and 100 ft wide. The airport is serviced by an air traffic control tower, which was in operation at the time of the accident. Operations at HOU in a 12-month period, April 30, 2022, to April 30, 2023, totaled 207,669, of which 57,272 were considered general aviation. The airport diagram is shown in figure 3.

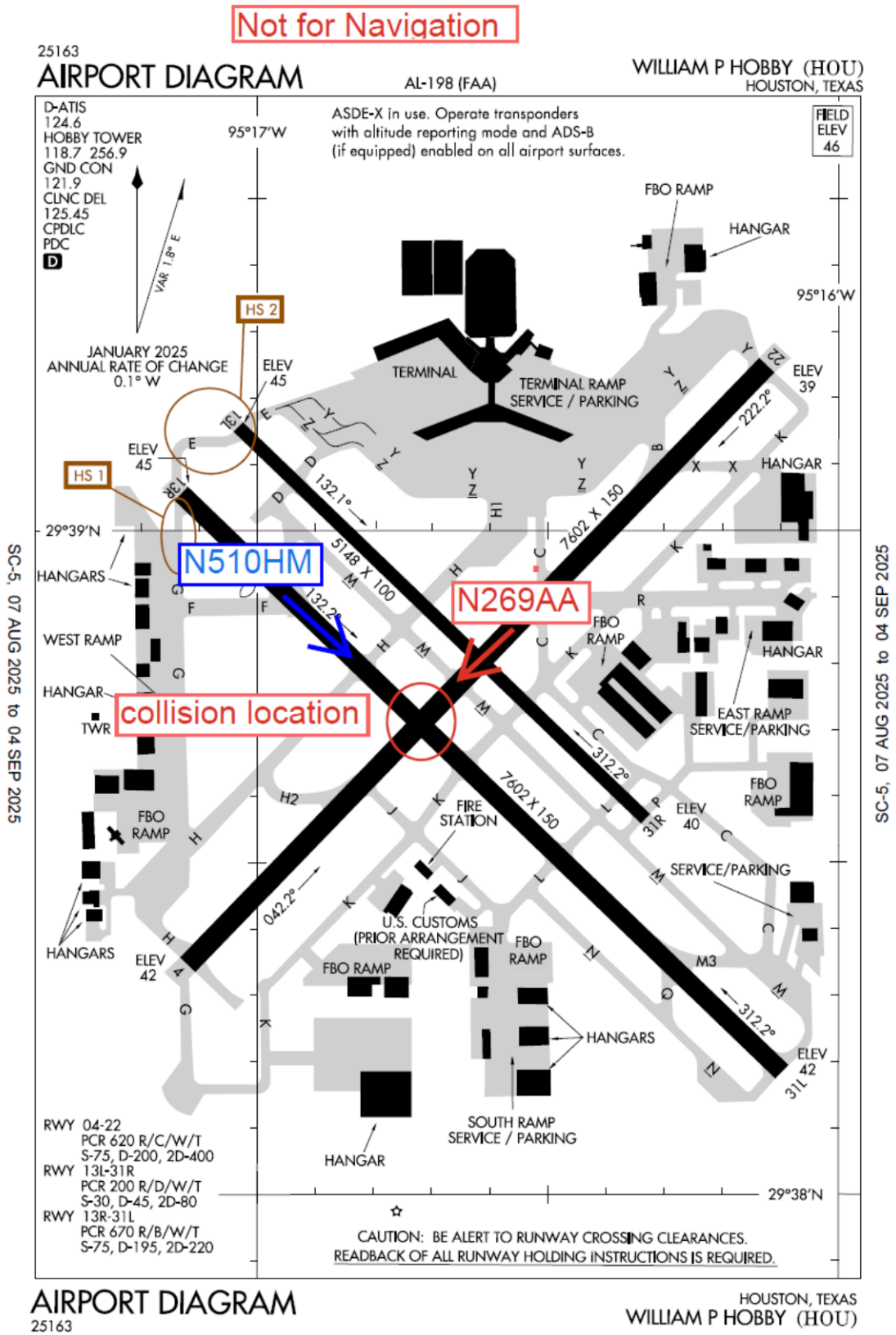

Figure 3. HOU Airport Diagram.

Airport Surface Detection Equipment

The HOU airport traffic control tower is equipped with an Airport Surface Detection Equipment – Model X (ASDE-X) system, with displays located at the LC, GC, operations supervisor, and helicopter position workstations.

ASDE-X is a surface movement radar system that enables air traffic controllers to detect potential runway conflicts by providing detailed coverage of movement on runways and taxiways. ASDE-X collects data from a variety of sources to track vehicles and aircraft on the airport movement area and obtain identification information from aircraft transponders.

During the event, the ASDE-X system first alerted controllers to a perceived collision between the two airplanes at 15:19:49, about 11 seconds before the collision occurred. Figure 4 shows the ASDE-X replay at this time.

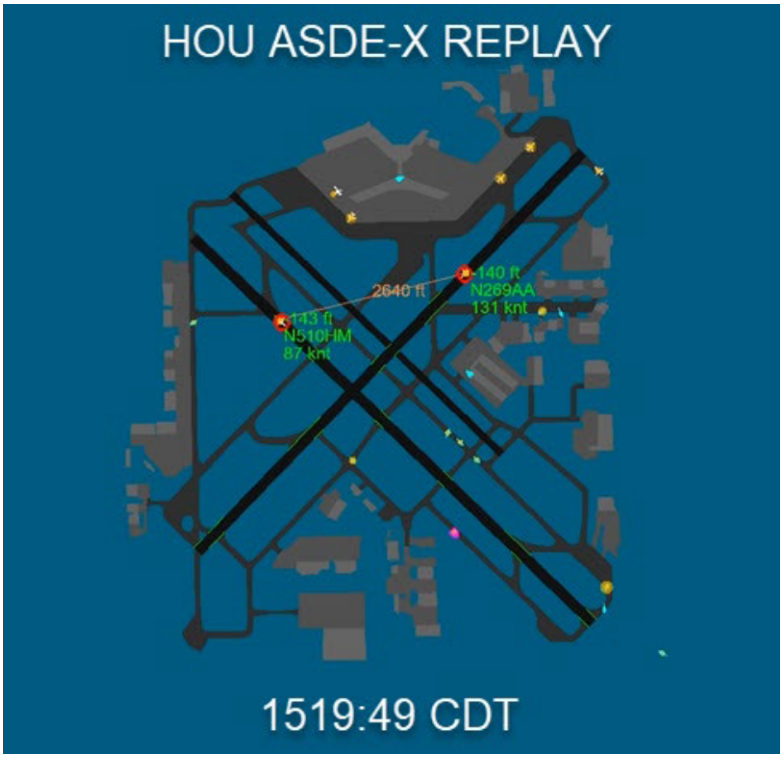

Figure 4. ASDE-X display at time of first alert.

Wreckage and Impact Information (A1)

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 None	**Latitude, Longitude:**	29.6407,-95.274

Wreckage and Impact Information (A2)

Crew Injuries:	2 None	**Aircraft Damage:**	Minor
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	29.6407,-95.274

Aircraft Damage Assessment

Post-accident examination of N269AA revealed impact damage to the left wing. The titanium leading-edge panel exhibited a “V-shape” aft indention to the wing front spar with sheet metal remnants of the Cessna Mustang embedded, see figure 5.

N269AA’s left-wing winglet remained attached to the left wing. The winglet leading edge exhibited white paint transfer marks and the navigation light lens was impact separated and pieces of the glass were found in the Cessna Mustang’s tail cone/stinger. About ten inches of the top section of N269AA’s winglet had separated due to the impact with N510HM, see figure 6.

Figure 5. Close up view of N269AA's left-wing leading-edge damage.

Figure 6. Close up view of N269AA's left winglet/navigation light assembly damage.

Post-crash examination of N510HM revealed that the left side of its tail section had been impacted by the left wing of N269AA. The torn skin on the tail section was consistent with N269AA's wing penetrating the left side of N510HM's tail stinger and exiting the right side, severing a portion of the stinger. The impact damage was isolated to the area of the empennage, see figures 7, 8 and 9.

The impact fractured and separated a section of the aft canted bulkhead. A section of the aft horizontal stabilizer spar; common to the rudder sector attach point, was torn and bent consistent with the wing impact. The rudder sector mount was torn from the structure at the fastener locations.

The rudder torque tube was fracture separated from the rudder control sector and the rudder. The upper and lower left and lower right rudder control cables were broken in a manner consistent with tensile overload. The upper right rudder control cable remained intact, but the ball end was pulled from the rudder sector. The autopilot rudder servo control cable was fractured in tensile overload. The left autopilot cable pulley bracket, with pully attached, was separated from the canted bulkhead. The left strake was impact fractured from the tail cone stinger and was recovered from the runway along with various sheet metal fragments from the stinger.

Figure 7. Left side view of N510HM's damage to its empennage.

Figure 8. Aft view of N510HM's damage to its empennage.

Figure 9. Right side view of N510HM's damage to its empennage.

Flight recorders

N510HM was not equipped with a flight data recorder (FDR) or cockpit voice recorder (CVR), and neither was required. N269AA was required to be equipped with a CVR, and one was installed. The unit was not damaged and was downloaded successfully at the NTSB Vehicle

Recorder Laboratory in Washington, DC. The recording contained two hours of audio, none of which was related to the accident flight. The laboratory examination determined that the CVR was not recording during the accident flight.

The audio was consistent with maintenance activities that had occurred sometime in the past. A Federal Aviation Administration (FAA) inspector responded to the scene, boarded the airplane and asked the crew to pull the circuit breaker, about 20-30 minutes after the airplane had parked on the ramp. Had the CVR been operational, the two hours of audio recorded prior to when the circuit breaker was pulled, would have captured the accident flight. The CVR did not record date and time (nor was it required), therefore it was not possible to determine when the audio was recorded or how long the CVR had been inoperative.

The airplane was equipped with an inertial switch designed to disconnect electrical power from the CVR after an impact/accident (to cease recording and prevent subsequent erasure) if the airplane's batteries continue to power the recorder after an accident. A sudden longitudinal deceleration would activate the inertial switch, disconnect electrical power and turn off the CVR.

It would remain off, unless and until the inertial switch was manually reset by a maintenance technician. Testing of the switch after the accident found that it was in the activated (no power to CVR) position.

Further testing revealed that both the CVR system and the inertial switch functioned as designed.

The NTSB Vehicle Recorder Laboratory staff have observed a history of unintended activations of inertial switches (which can occur for several reasons, including hard landings, maintenance procedures, turbulence or sudden deceleration) that have disabled CVRs in the days, weeks or months prior to an accident flight.

As required by the FAA, the airplane was equipped with a feature to test the CVR, and the operator's procedures required that pilots perform the test prior to every flight. Normally, the test is performed by pressing the "test" button on the CVR control unit, which is in the cockpit on the captain's left side radio panel. The test lasts about 15 seconds, during which the red and green status lights flash alternately, and the green signal meter fully illuminates intermittently. If the test is successful, the green indictor light will illuminate solidly for 10 seconds.

A failed test results in a solid or flashing red indicator light. However, with the inertial switch activated, electrical power is disconnected from the CVR and the CVR control unit, and the self-test cannot be executed. Pressing the test button has no effect, and none of the lights on the CVR control unit will illuminate. When operating normally with no faults (and not in self-test mode), none of the lights on the control unit will be illuminated. The control unit is shown in figure 10.

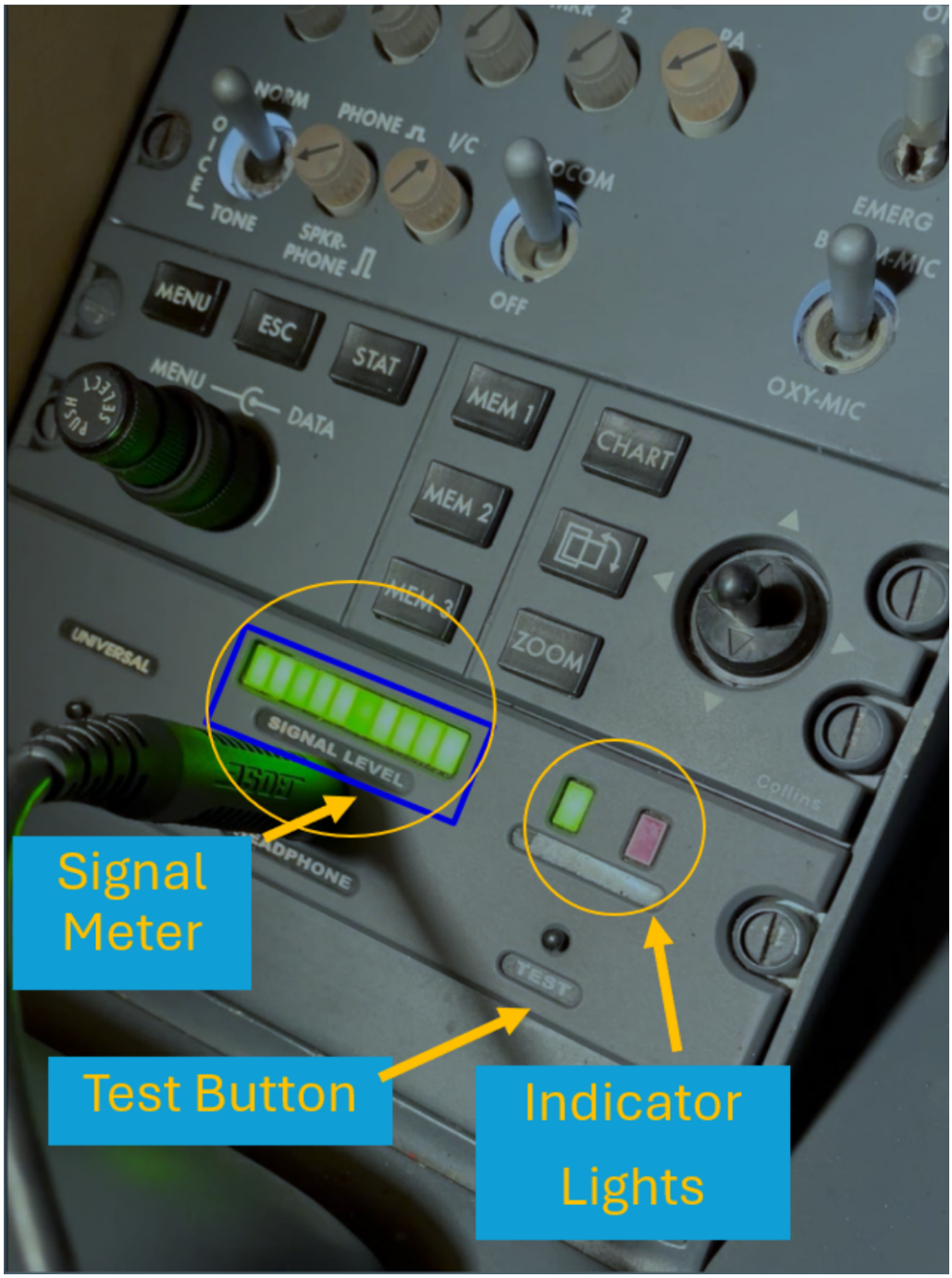

Figure 10. Cockpit voice recorder control unit.

Medical and Pathological Information

Both of the N269AA pilots underwent post-accident urine drug testing and breathalyzer alcohol testing on the day of the accident as a part of the Department of Transportation's Drug and Alcohol Testing program. No tested-for substances (6-aceytate morphine, marijuana metabolites, cocaine metabolites, amphetamines, MDMA, opiates, and phencyclidine) nor alcohol were detected.

Tests and Research

Expectation Bias

Expectation bias occurs when a pilot hears or sees something that he or she expects to hear or see rather than what actually may be occurring. That expectation often is driven by experience or repetition. For example, if a pilot is regularly cleared to cross a particular runway during operations at a familiar aerodrome, he/she may come to "expect" the clearance. This could cause a potentially dangerous situation if on a particular day, the pilot actually is instructed not to cross the runway in question due to another aircraft landing or taking off.

SKYbrary Aviation Safety. "Flight crew expectation bias." Accessed September 10, 2025. https://skybrary.aero/articles/flight-crew-expectation-bias

Organizational and Management Information

DuPage Aerospace Corporation (N269AA) Cockpit Voice Recorder Testing

According to the DuPage Aerospace Corporation chief pilot's interview transcript, the CVR "*is to be checked on every flight….I'm sure everybody pushes the test button and moves onto the next thing. But there's a series of lights that flash, and the last light would say, red fail, green pass…"* He further stated in regard to if the impact switch is tripped "*…if you press the test button, nothing lights up."*

The crew operated two flights the day prior in the accident airplane. Counting the accident flight, the crew had three opportunities to recognize that the CVR was not operating. Therefore, had the crew performed the self-test, as required by DuPage Aerospace policies and procedures, they would have been aware that the CVR was not functioning as intended.

Elevator Out of Trim Warning

According to the chief pilot of DuPage Aerospace, the takeoff briefing included "*the training is and the* [takeoff] *briefing is, below 80 knots, we'll abort for any fault or failure called from either seat."* The chief pilot went on to provide that "*Again, if we're going to brief that we're going to abort for a fault or failure, and a fault pops up on the annunciator panel, then you should be aborting, and they would have been aborting at 10 knots, okay. It would have no brake cooling…"* When asked what options a crew could take in response to an elevator out of trim warning, the chief pilot added *"It depends what the fault or failure is. If they look down and see elevator trim and it's actually dead center of the green arc, I'd be all concerned myself. If they see it way at the bottom or way at the top of the green arc, although it may appear to be in the green arc, it's not there, by the little micro switch or whatever that's in the pedestal, I would re-trim the airplane. I would move the throttles up and back into the takeoff position and make sure the light doesn't come on. If it came on again, even though the airplane was re-trimmed, I wouldn't go… Because you never know."*

The pilot monitoring (who was also the pilot in command as well as a training captain, seated in the right seat) said during his post-accident interview "*So we pull out on the runway, reached up, turned the igniters on, hit the strobes, and we applied the power and [PF] said I feel some right rudder, I said that's the rudder bias, if you'll bring them on up, that will clear itself. I also noticed the elevator-out-of-trim light, which is also a common thing on the Hawker, the -- where the light is, actually it is right at the very aft mark of the trim indicator and it's typically, like move the wheel that far just to get it out of that range and you're still -- you're still close to the takeoff setting, but it's just not -- in eight years of flying the airplane, roll it forward a little bit, get the light out, go*."

Additional Information

Air Traffic Control

The LC controller was providing services to both N510HM and N269AA at the time of the accident. He had been certified on LC since May 2023 and was current and proficient on all positions for which he was certified in accordance with facility standards on the day of the accident. He held a second-class medical clearance with no documented waivers or limitations.

The flight data / clearance delivery (FD/CD) controller was working combined positions during the time of the accident. He had been certified on FD and CD since October 2017 and was current and proficient on all positions for which he was certified in accordance with facility standards on the day of the accident. He held a second-class medical clearance with no documented waivers or limitations.

The GC controller was signed on and was monitoring a trainee at the GC position at the time of the accident. Almost immediately after the accident occurred, the trainee signed off and the GC controller continued to work through the event. He had been certified on GC since January 2011 and was current and proficient on all positions for which he was certified in accordance with facility standards on the day of the accident. He held a second-class medical clearance with documented waivers that included prescription medication.

The operations supervisor (OS) was working standalone and providing general supervision from the watch desk position in the tower cab during the time of the accident. He had been certified OS since July 2022 and was current and proficient on all positions for which he was certified in accordance with facility standards on the day of the accident. He held a second-class medical clearance with a requirement to wear corrective lenses “when needed” while performing ATC duties and stated he was not wearing them on the day of the accident, nor were they needed.

Administrative Information

Investigator In Charge (IIC):	Brazy, Douglass
Additional Participating Persons:	Todd Gentry; FAA Dan Carrico; NATCA Casey Love; Textron Aviation Scott Southwell; DuPage Aerospace Corporation Samuel Bacon; Green Circle Demolition, LLC ; Atlanta, GA
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