



National Transportation Safety Board

Office of Aviation Safety
Washington, DC

February 12, 2015

Group Chairman's Factual Report

OPERATIONAL FACTORS

ERA14MA271

A. ACCIDENT

Operator: Arizin Ventures, LLC
Location: Bedford, Massachusetts
Date: May 31, 2014
Time: 2140 eastern daylight time
Airplane: Gulfstream G-IV (s/n 1399), N121JM

B. OPERATIONAL FACTORS GROUP

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C. SUMMARY

On May 31, 2014, about 2140 eastern daylight time¹, a Gulfstream Aerospace Corporation G-IV, N121JM, operated by Arizin Ventures, LLC, crashed after a rejected takeoff and runway excursion at Laurence G. Hanscom Field (BED), Bedford, Massachusetts. The two pilots, a flight attendant, and four passengers were fatally injured. The airplane was destroyed by impact forces and a postcrash fire. The personal flight, which was destined for Atlantic City International Airport (ACY), Atlantic City, New Jersey, was conducted under the provisions of 14 *Code of Federal Regulations Part 91*. An instrument flight rules flight plan was filed. Night visual meteorological conditions prevailed at the time of the accident.

¹ All times referenced in this report are eastern daylight time (EDT), unless specifically noted otherwise.

D. HISTORY OF FLIGHT

Flight tracking data indicated that the airplane initially departed New Castle Airport (ILG), Wilmington, Delaware, about 1325 and landed at ACY about 1333. The airplane subsequently departed ACY about 1456 and landed at BED about 1544. After arrival at BED, the crew parked at the Jet Aviation fixed base operator (FBO).

Statements provided by FBO personnel indicated that the passengers departed the airplane without any baggage and departed the airport. No services were requested by the crew, and the airplane was not refueled while at BED. The crew remained on the airplane for most the time they were at BED. The crew reportedly came into the FBO to order pizza, and once it arrived they returned to the airplane. One of the pilots subsequently returned to the FBO to discard the pizza boxes and use the restroom. One of the FBO personnel noted that the crew seemed to be in good spirits. The pilots were not observed conducting any flight planning inside the FBO. Ramp service personnel did not observe any anomalies with respect to the airplane. The engine start seemed normal. However, no FBO personnel observed the takeoff roll or accident sequence.

The flight plan for the accident flight was filed directly via ARINC at 1559 (1959Z), with a proposed departure time of 1830 (2230Z). The intended destination was ACY. The filed route of flight was BED, direct Putnam (PUT) VHF Omni Range (VOR) radio navigation facility, direct Calverton (CCC) VOR, direct SHERL navigation fix, via J121 jet airway route to the BRIGS navigation fix, and direct ACY. The estimated time en route was 43 minutes, with a requested cruise altitude of flight level 220 (22,000 feet pressure altitude).

The accident flight was cleared to taxi to runway 11 via taxiway Sierra, Tango, and Echo. The airplane was taxied from the FBO ramp at 2133. The takeoff roll subsequently began at 2139. Controllers at the BED control tower reported that they observed the accident airplane during the takeoff roll traveling at "high speed." The airplane appeared to gain little or no altitude during the takeoff roll. They subsequently observed the airplane travel off the end of the runway and through the overrun. They immediately alerted first responders and activated the aircraft accident procedures.

E. FLIGHT CREW INFORMATION

Pilot-in-Command²³

The pilot-in-command (PIC), age 44, held an airline transport pilot certificate with single and multi-engine airplane ratings. The single engine rating was limited to commercial pilot privileges. He held type ratings for BE-400, G-1159 (Gulfstream II/III), LR-Jet, MU-300, and G-IV airplanes. The PIC held a flight instructor certificate with single-engine airplane and instrument airplane ratings. His most recent flight instructor certificate was issued/renewed on

² The pilot-in-command was identified as the individual listed as such on the flight plan filed with the FAA.

³ The individual identified in this report as the pilot-in-command was recovered from the left cockpit pilot seat.

November 13, 2012. The PIC was issued a first-class airman medical certificate on April 15, 2014, with no restrictions or limitations. At the time of the medical exam, he reported a total flight time of 11,250 hours, with 150 hours flown within the preceding 6 months.

The PIC's most recent training event was completed on September 17, 2013, at the Flight Safety International Philadelphia/Wilmington Learning Center. The training event consisted of the G-IV PIC Recurrent course. The course included 16 hours of ground training, 5.50 hours of briefing/de-briefing, and 16 hours of flight simulator training split equally between pilot-flying and pilot-not flying (pilot-monitoring) duties. Based on information provided by the training vendor, the course fulfilled the requirements of 14CFR 61.57 Recent flight experience and 14CFR 61.58 Pilot-in-command proficiency check.

At the time of his recurrent training event about 8 months before the accident, the PIC reported having accumulated 8,275 hours total flight time as pilot-in-command, with 1,400 hours in G-IV airplanes. He reported 11,050 hours in fixed wing aircraft and 200 hours of multi-engine flight time within the preceding 6 months. He did not report any second-in-command flight time.

Within the three days (72 hours) before the accident, the PIC reportedly had worked around the house. He did not have a trip within that three day period and his daily schedule was typical. He woke up about 8:00 am and went to bed about 10:00 pm. The PIC did not have any significant issues with sleep and appeared to be well rested each morning. He reportedly did not have any current medical issues. On the day of the accident, the PIC woke up about 8:00 am as usual, and left the house for the airport about 11:30 am. He had contacted his wife about 8:30 pm to inform her that they would be returning later than planned.

The PIC was reportedly associated with the accident airplane owners for approximately 12 years, about 8-1/2 years in the G-IV.

A contract pilot, who had flown with the accident PIC two or three times several years before the accident, noted that the PIC was a good pilot. The PIC was very familiar with the airplane checklists and he did conduct a complete flight control check before each of their flights. However, the PIC did not utilize a formal item-by-item checklist.

An autopsy and toxicology testing was conducted for the PIC. A summary of that information is included with the Survival Factors Group Chairman's report.

Second-in-Command⁴

The second-in-command (SIC), age 61, held an airline transport pilot certificate with single and multi-engine airplane ratings. The single engine rating was limited to commercial pilot privileges. He held type ratings for G-1159 (Gulfstream II/III), L-1329 (Jetstar), G-IV, and G-V airplanes. The SIC held a flight instructor certificate with single and multi-engine airplane, and instrument airplane ratings. His most recent flight instructor certificate was issued/renewed on June 18, 2012. He held a mechanic certificate with airframe and powerplant ratings, with a

⁴ The individual identified in this report as the second-in-command was recovered from the right cockpit pilot seat.

current inspection authorization. The SIC's most recent first-class airman medical certificate was issued on February 4, 2014, with a restriction for near vision corrective lenses.

The SIC's most recent training event was completed on September 20, 2013, at the Flight Safety International Savannah Learning Center. The training event consisted of the G-IV PIC Recurrent course. The course included 16 hours of ground training, 5.50 hours of briefing/de-briefing, and 16 hours of flight simulator training split equally between pilot-flying and pilot-not flying (pilot-monitoring) duties. Based on information provided by the training vendor, the course fulfilled the requirements of the 14CFR 61.57 Recent flight experience and 14CFR 61.58 Pilot-in-command proficiency check.

The SIC's flight time logbook included entries current through March 23, 2014. His flight time totaled 18,530.4 hours, with 14,441.8 hours in multi-engine airplanes. He had accumulated 1,224.6 hours of actual instrument flight time and 2,597.2 hours as pilot-in-command at night.

At the time of his recurrent training event about 8 months before the accident, the SIC reported having accumulated 18,200 hours total flight time, with 2,800 hours in G-IV airplanes, 4,700 hours in G-1159 (Gulfstream II/III) airplanes, and 1,000 hours in L-1329 (Jetstar) airplanes.

Within the three days (72 hours) before the accident, the SIC reportedly had worked from home. He did not have a trip within that three day period and his daily schedule was typical. He handled the day-to-day operations of the flight department and managed expense reports. He normally worked from home unless he needed be at the hangar for some reason or he was on a trip. He usually woke up about 6:00 am and went to bed about 9:30 pm. He rarely had difficulty sleeping and did not have any current medical issues. On the day of the accident, he left the house about 8:50 am, ultimately arriving at the airport about 10:35 am.

The SIC was reportedly associated with the accident airplane owners for approximately 27 years, about 8-1/2 years in the G-IV. Before the G-IV, the SIC had flown a G-III, Jetstar II, and a Jetstar for the owners.

An autopsy and toxicology testing was conducted for the SIC. A summary of that information is included with the Survival Factors Group Chairman's report.

F. OWNER / OPERATOR INFORMATION

The accident airplane was registered to SK Travel, LLC, and operated by Arizin Ventures, LLC. The accident flight, as well as the preceding flight, was a personal flight for the purpose of attending a charity event. The airplane was reportedly co-owned by two private individuals through SK Travel LLC. A dry lease agreement was in effect between SK Travel and Arizin Ventures. The lease agreement specifically prohibited operation of the airplane for compensation or hire under 14CFR Part 135.

Individuals familiar with the operation of the airplane confirmed that the aircraft was used solely for personal and business purposes in accordance with 14 CFR Part 91. The airplane was reportedly never used for transporting persons or property for compensation or hire.

The second-in-command pilot at the time of the accident acted as the Chief Pilot and Director of Maintenance. He coordinated pilot training and maintenance activity for the accident airplane. The accident pilots normally flew the accident airplane as a crew. Contract pilots were used only occasionally when one of the accident pilots was on vacation or otherwise not available. The accident pilots customarily traded seats, left and right, between flights as both pilots were qualified in the airplane.

Airplane flight logs were recovered. The most recent flight activity contained in the logs was dated May 20, 2014. The log included four flight legs that day, totaling 2.7 hours. Prior to that, six flight legs were conducted between April 27 and May 1, 2014. These flights totaled 11.5 hours. Based on the flight logs, the accident pilots flew 8.9 hours within the 30 days, and 53.0 hours within the 90 days preceding the date of the accident. A total of 150.2 hours had been flown since the beginning of the year. Each of those log pages included the accident flight SIC and PIC as the listed Captain and First Officer, respectively. According to the log, a total of 308.8 hours was flown during 2013.

Other than the dry lease agreement, no documentation related to the operation of the airplane under the name of Arizin Ventures was located. However, a Flight Operations Manual associated with SK Travel was recovered and reviewed. The manual included aspects of organization and administration, safety management, operating procedures, emergency procedures, qualifications and training, and aircraft maintenance. Safety management included a risk assessment process for individual flights. The operations manual specified additional documentation and review of elevated risk factors. For example, risk assessments scoring above 18 required a secondary Safety Risk Profile. The risk profile provided a formal procedure for documenting specific risk factors and identifying mitigation strategies for those factors. Risk assessments scoring above 25 required an evaluation by the Chief Pilot / Director of Maintenance from the perspective of accepting, rejecting, or mitigating the risk. The operation of flights with risk assessment scores exceeding 30 were not permitted under the operations manual.

A review of the risk assessment process and the known factors related to the accident flight indicated that the corresponding risk assessment score for the accident flight was at or below 9. Under the safety management plan, this assessment score did not require any further review or documentation.

Audits of the SK Travel safety management system (SMS) were conducted by a third-party auditor in accordance with the International Business Aviation Council's (IBAC) International Standard for Business Aircraft Operations (IS-BAO). The IS-BAO is an industry code of best safety practices and participation is voluntary. This program is available to member organizations of the IBAC. SK Travel was a member of the National Business Aviation Association (NBAA).

An initial audit was completed on July 29, 2010 and found that SK Travel, LLC, was compliant with the IS-BAO standards at the Stage 1 level (basic SMS). A second audit, completed on May 10, 2012, found that SK Travel LLC was compliant with the IS-BAO standards and recommended renewal at the Stage 2 level (demonstration of effective SMS). The SIC, who also served as the Chief Pilot / Director of Maintenance, was reportedly preparing for a third audit at the time of the accident.

G. AIRPLANE OPERATION

The Airplane Flight Manual, Operating Manual, and Quick Reference Handbook provided detailed information regarding operation of the airplane.

Gust Lock

The Before Starting Engines checklist contained within the Airplane Flight Manual, Section 2 – Normal Procedures, included the item:

- 70. GUST LOCK AS REQUIRED

The Starting Engines checklist included the item:

- 4. GUST LOCK OFF

The engine start sequence was specified after the gust lock in items 9 through 18.

The Operating Manual (Chapter 2A – Production Aircraft System, Section 2A-27-80: Gust Lock System) noted that the gust lock is engaged by raising the gust lock handle located on the right side of the cockpit center pedestal. The gust lock handle is located adjacent to the flap handle. A spring loaded trigger is incorporated into the handle in order to prevent the handle from inadvertently being pulled. Moving the ailerons and rudder to their neutral positions and the elevator to the trailing edge down position allows the gust lock to engage and lock the flight controls. A mechanical interlock between the gust lock and the engine power levers restricts movement of the power levers to a maximum of six percent above ground idle when the gust lock is engaged.

In addition, the manual noted that to prevent any hydraulic forces acting upon an engaged gust lock, the gust lock should be released prior to engine starting and not engaged until all hydraulic pressures read zero.

Flight Controls

The After Starting Engines checklist contained in the Airplane Flight Manual, Section 2 – Normal Procedures, included the items:

- 16. Flight Controls / Bungee / Rudder Torque Limiter CHECK

Check flight controls for freedom and correct movement over full range of motion while observing Marshaller.

NOTE: While performing the elevator check, pull the yoke aft and then release. The yoke should slowly fall forward until the elevator surface reaches its stop. A failed bungee has shown that when the yoke reaches the forward stop, there is a slight hesitation and the yoke cycles approximately one inch aft then forward. For a normal bungee, there should not be any hesitation or aft movement after the yoke is released. Any windy conditions may invalidate the yoke cycling test.

The Line Up checklist contained in the Airplane Flight Manual, Section 2 – Normal Procedures, included the items:

- 4. Ground Spoilers ARMED

NOTE: Advance power levers before arming spoilers. Avoid retarding power levers to idle to prevent inadvertent ground spoiler deployment.

NOTE: At sixty (60) knots, the pilot shall confirm that the elevators are free and the yoke has reached the neutral position.

NOTE: If the Flight Power Shutoff Handle is pulled at rotation due to a flight control problem, high pull forces will be required to achieve the takeoff attitude. There will be a delay in airplane rotation and, once airborne, a push force will be necessary to maintain the climb attitude. Application of forward trim will be required shortly after becoming airborne. To avoid running out of forward trim, reduce speed as necessary.

With respect to flight control malfunctions, the Airplane Flight Manual, Section 4 – Emergency Procedures, included procedures for a flight control runaway or immovable flight controls.

Specifically, the Flight Control Runaway to Hardover Position checklist included the item:

- 3. Elevator Control (Pitch) VERIFY that runaway Electric Trim or Stall Barrier is not the problem, then Flight Power Shutoff Handle PULL

The Immovable Flight Controls checklist included the item:

- 3. Elevator Control (Pitch) PULL Flight Power Shutoff Handle

Regarding warning, caution, and advisory messages, the manuals and handbook noted that a RUDDER LIMIT advisory (blue) message was displayed when the rudder torque actuator limiter

was in operation. There was no associated corrective action required by the crew in response to the advisory.

Additional information regarding application of the flight controls during the accident flight is included in the Flight Data Recorder Group Chairman's report.

H. FLIGHT CREW TRAINING

A review of the training materials provided by Flight Safety International in conjunction with the G-IV training course included a GIV Pilot Training Handbook. This handbook provided a description of the airplane systems similar to that included in the Airplane Operating Manual. It included a brief description of the gust lock system, noting that the engine power lever movement is restricted when the gust lock is engaged.

In addition, pilots were reportedly provided a GIV Pilot Initial Study Guide. The study guide included several study questions related to each aircraft system, with the corresponding answer. Related to the flight controls, one of the study questions was: "If an engine is inadvertently started with the gust lock engaged, what is the appropriate procedure?" The answer provided was: "Shut down the engine and bleed the hydraulic pressures to zero before disengagement."

The contract pilot reported that he was aware that, in instances when the gust lock was not disengaged before starting the engines, some pilots occasionally used the flight power shutoff handle to momentarily remove hydraulic pressure from the flight controls. This allows the gust lock to be removed without shutting down the engines. The contract pilot did not attribute these comments to a specific pilot or flight crew.

I. ATTACHMENTS

Attachment 1 -- NTSB Owner/Operator Accident Report

Attachment 2 -- Witness Statements

Attachment 3 -- Controller Statements

Attachment 4 -- Flight Plan

Attachment 5 -- Pilot Training Records PIC – Excerpts

Attachment 6 -- Pilot Training Records SIC – Excerpts

Attachment 7 -- Pilot Logbook SIC – Excerpts

Attachment 8 – Conversation Records – Pilot’s Spouses

Attachment 9 -- Conversation Record – Contract Mechanic

Attachment 10 -- Conversation Record – Contract Pilot

Attachment 11 -- Conversation Record – G-III Pilot

Attachment 12 -- Airplane Flight Logs – January 2014 to May 2014

Attachment 13 -- Airplane Flight Logs – January 2013 to December 2013

Attachment 14 – SK Travel Flight Operations Manual – Excerpt

Attachment 15 -- Audit Report

Attachment 16 -- Aircraft Dry Lease Agreement – Excerpts

Attachment 17 -- Airplane Flight Manual – Excerpts (Checklists)

Attachment 18 -- Airplane Operating Manual – Excerpts (Gust Lock System)

Attachment 19 -- Airplane Operating Manual – Excerpts (Advisory Messages)

Attachment 20 -- Airplane Operating Manual – Excerpts (Flight Control Emergency Procedures)

Attachment 21 -- Flight Safety G-IV Training Material – Excerpts