National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

ANC23FA008

OPERATIONAL FACTORS/HUMAN PERFORMANCE

Group Chairs' Factual Report

November 21, 2023

TABLE OF CONTENTS

A. ACCIDENT

Location: Kaupo, Hawaii
Date: December 15, 2022
Time: 2130 Hawaii Standard Time (HST)[1]
December 16, 2022 at 0730 Universal Time Coordinated
Airplane: N13GZ, Raytheon Aircraft Company C90A, Serial Number LJ-1590

B. OPERATIONAL FACTORS/HUMAN PERFORMANCE

Group Co-Chair: Shawn Etcher
Operational Factors – AS30
National Transportation Safety Board
Washington, D.C. 20594

Group Co-Chair: Sabrina Woods
Human Performance – AS-60
National Transportation Safety Board
Washington, D.C. 20594

Member: Mitch Mitchell[2]
AVP-110
Federal Aviation Administration (FAA)
Washington, D.C. 20594

C. SUMMARY

On December 15, 2022, about 2114 Hawaii-Aleutian standard time, a Raytheon Aircraft Company (formerly Beech) C90A, twin-engine, turbine-powered airplane, N13GZ, sustained substantial damage when it was involved in an accident near Kaupo, Hawaii. The airline transport pilot, flight paramedic, and flight nurse were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 air ambulance positioning flight. The flight, operated by Guardian Flight LLC dba Hawaii Life Flight, departed the Kahului Airport (OGG) on the Island of Maui, Hawaii, at 2053, on an instrument flight rules (IFR) flight plan. The accident airplane was destined for the Waimea-Kohala Airport (MUE) on the Island of Hawaii to pick up a patient to be transported to Honolulu, Hawaii. Dark night conditions prevailed at the time of the accident.

[1] All times in this report, unless otherwise noted, will be in local HST time. At the time of the accident HST was UTC – 10 hours.
[2] On August 9, 2024 inspector Mr. Edwin Miller was assigned to replace Mr. Mitchell on the Operational Factors/Human Performance Group.

1.0 Operational Factors Activities

1.1 December 23, 2022

The Operational Factors specialist was assigned to the case and began collecting pilot information from the FAA.

1.2 January 7, 2023

The Operational Factors specialist requested and received pilot training documentation, and duty and flight history.

1.3 February 14, 2023

The IIC, Human Performance and Operational Investigators convened in Maui, Hawaii to interview two pilots that were based with the accident pilot, and two flight nurses that flew with the accident pilot, and the FAA party coordinator. Following the interviews, the investigators flew to HNL on a commercial flight to conduct further interviews the following day with additional personnel. Those interviews were recorded and sent to be transcribed.

1.4 February 15, 2023

The investigators met at the operator's facility located on the south side of the PHNL airport. The investigators interviewed two instructor pilots, the communication specialist that was on duty at the time of the accident, and a check airman that had given the accident pilot a recent checkride. Those interviews were recorded, and those recordings were sent to be transcribed.

1.5 February 16, 2023

The investigators returned to the operator's facility to conduct two interviews with the assistant chief pilot and the program manager for Hawaii Life Flight. Those interviews were recorded and have been sent off to be transcribed. Following the interviews, the group discussed and determined that additional interviews would need to be conducted with company personnel located in South Jordan, Utah. A tentative date of March 20th was established. The request was sent to the operator's headquarters. In addition, a request was sent to AVP-100 to arrange for the investigators to interview the Principal Operations Inspector (POI) and her Front Line Manager (FLM) while in SLC.

1.6 March 21, 2023

The operational factors/human performance group reconvened at the Guardian Flight LLC headquarters located in South Jordan, Utah. The investigators interviewed

the Chief Pilot and Director of Safety. The interviews were recorded and will be transcribed.

1.7 March 22, 2023

The operational factors/human performance group interviewed the director of training and director of operations for Guardian Flight LLC headquarters located in South Jordan, Utah. The interviews were recorded and will be transcribed.

1.8 March 23, 2023

The operational factors/human performance group interviewed the Principal Operations Inspector and the Front-Line Manager/former Principal Operations Inspector for Guardian Flight LLC at the Salt Lake City, Utah FAA Flight Standards District Office. The interviews were recorded and will be transcribed.

1.9 June 7, 2023

The operational factors/human performance group reconvened at the NTSB headquarters in Washington D.C. with the IIC and party coordinators to review the Appareo Vision on board camera video recording. The recording was recovered from a chip within the camera by a NTSB Recording Specialist. See the NTSB Appareo Vision 1000 Specialist Report located in the docket associated with this accident investigation.

2.0 History of Flight

According to ADS-B[3] data, the accident flight began taxiing from the east ramp at OGG about 2052. The flight taxied to runway 2 via taxiway K and taxiway E. The airplane taxied onto runway 2 and began the takeoff departure roll about 2054.

[3] Automatic Dependent Surveillance - Broadcast

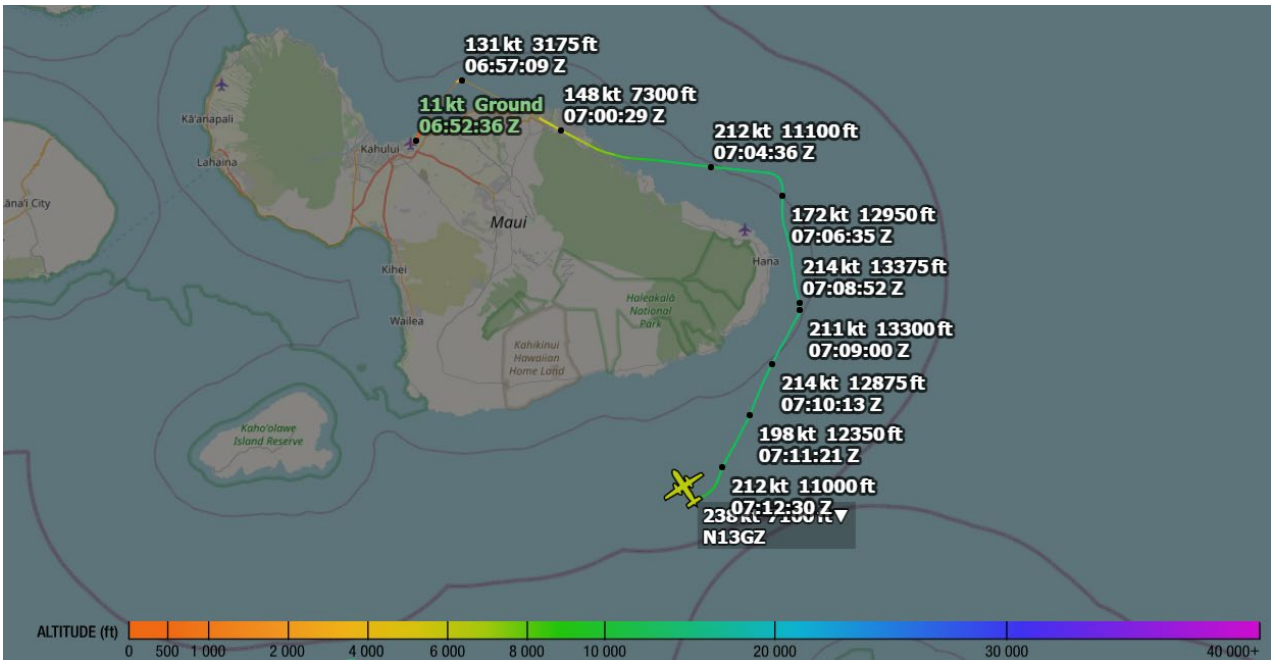

Figure 1: Accident Flight Ground Track (Source: ADSB Exchange) (Note: Time is in UTC)

The airplane departed to the northeast and continued to climb. About 3,000 ft the airplane made a turn to the southeast and a subsequent turn to the east-southeast.

About 2106 and after reaching 13,000 ft, the airplane made a right turn to the south and continued on a southern ground track for about 3 minutes then turned towards the southwest.

FAA Air Traffic Control (ATC) recorded data showed that the part 91 flight had climbed to an altitude of 11,000 ft on a southeast heading to the east side of the island of Maui. ATC asked if the flight could climb to 13,000 ft to which the pilot replied in the affirmative. Approximately 4 minutes later, ATC instructed the pilot to turn right to a heading of 180° and then turn further right to 200°. About one minute later, ATC instructed the pilot to descend to 12,000 ft and about a minute later to descend to 8,000 ft. The pilot acknowledged and accepted both clearances. About two minutes later ATC instructed the pilot to fly a 180° heading, and subsequently cleared the flight direct to the TAMMI[4] intersection, which was the initial approach fix for the RNAV (GPS) 4 approach to the destination (see section 6.1 for the RNAV (GPS) 4 approach chart). The pilot acknowledged the instructions. About 1 1/2 minutes later the controller queried the flight to verify they were direct to TAMMI. The pilot responded "*13GZ is off navigation here.*" ATC instructed the pilot to turn right to a 170° heading and maintain 8,000 ft. about 10 seconds later the pilot was heard saying "*Hang on.*" No further transmissions were received from the accident flight.

[4] TAMMI intersection was located at N20°05.34 W156°02.01.

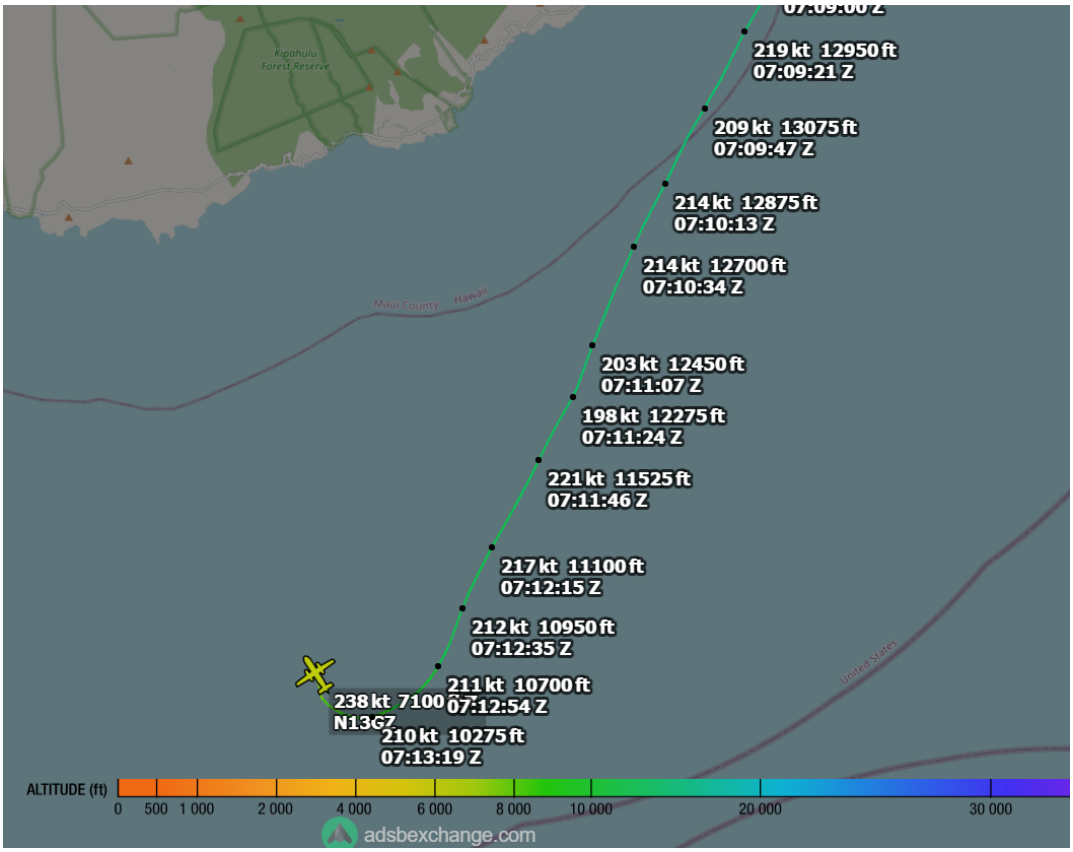

Figure 2: Last approximate 4 minutes of flight (Source: ADSB Exchange)

3.0 Crew Information

The crew consisted of a pilot, flight nurse, and flight medic. All three occupants, employed by Guardian Flight LLC dba Hawaii Life Flight, were fatally injured.

3.1 Pilot Information

The pilot was 47 years old and held an Airline Transport Pilot (ATP) certificate with a rating for multiengine land and Rotorcraft- helicopter, commercial pilot privileges for airplane single-engine land and airplane single-engine sea, and type ratings on the B-737[5], EMB-145[6], and LR-60[7] which included limitation of B-737, EMB-145 Circling approach – VMC[8] Only, EMB-145 is subject to pilot-in-command

[5] The Boeing Company, 737-100, 737-200, 737-200C, 737-300, 737-400, 737-500, 737-600, 737-700, 737-700C, 737-800, 737-900, 737-900ER, 737-8, 737-9. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.
[6] Embraer S.A., EMB-135ER, EMB-135LR, EMB-135KE, EMB-135KL, EMB-135BJ, EMB-145, EMB-145ER, EMB-145MR, EMB-145LR, EMB-145XR, EMB-145MP, EMB-145EP. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.
[7] Learjet Inc., 60. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.
[8] Visual Meteorological Conditions.

limitation(s), LR-60 SIC[9] privileges only, and English Proficient. He held a flight instructor certificate with ratings for rotorcraft-helicopter and instrument helicopter, and a remote pilot certificate with a rating for small unmanned aircraft system. He held an FAA second-class medical certificate dated April 21, 2022, with limitation of must have available glasses for near vision. At the time of the accident, he was based at OGG.

3.2 Pilot's Certification Records

FAA records of the pilot indicated the following:

Private Pilot – Rotorcraft Helicopter certificate was issued February 1, 2008.

Commercial Pilot – Rotorcraft Helicopter certificate was issued November 7, 2008.

Notice of Disapproval – Flight Instructor Helicopter was issued May 29, 2009. Unsatisfactory items: Area of Operation II. Technical Subjects.

Flight Instructor – Rotorcraft Helicopter was issued June 4, 2009.

Notice of Disapproval – Commercial Pilot Instrument – Rotorcraft was issued October 8, 2009. Unsatisfactory items: Areas of Operation I. Preflight Preparation, IV. Flight by reference to instruments, V. Navigation systems, VI. Instrument approach procedures, VII. Emergency Operations, and VIII. Postflight procedures.

Commercial Pilot – Rotorcraft Helicopter, Instrument Helicopter; Limitation: English Proficient certificate was issued October 13, 2009.

Notice of Disapproval – Flight Instructor Instrument – Rotorcraft was issued November 10, 2009. Unsatisfactory items: Area of Operation VII. Navigation Systems.

Flight Instructor – Rotorcraft Helicopter; Instrument Helicopter certificate was issued November 16, 2009. Reissued: November 8, 2011, September 24, 2013, October 7, 2015, September 3, 2017, August 4, 2019, and June 10, 2021.

Commercial Pilot – Rotorcraft Helicopter, Instrument Helicopter; Private Pilot Privileges; Airplane Single Engine Land; Limitation: English Proficient certificate was issued July 5, 2011.

Airline Transport Pilot – Rotorcraft Helicopter; Private Pilot Privileges; Airplane Single Engine Land; Limitation: English Proficient certificate was issued November 8, 2011.

[9] Second-in-Command.

Airline Transport Pilot – Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land; Limitation: English Proficient, Not Valid for Carriage of Persons for Hire in Airplanes on Cross-Country Flights of More than 50 Nautical Miles or at Night certificate was issued January 13, 2012.

Airline Transport Pilot – Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land; Limitation: English Proficient certificate was issued February 27, 2012.

Airline Transport Pilot – Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land, Airplane Single Engine Sea, Instrument Airplane; Limitation: English Proficient certificate was issued April 21, 2013.

Airline Transport Pilot – Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land, Airplane Single Engine Sea, Airplane Multiengine Land, Instrument Airplane; Limitation: English Proficient certificate was issued May 21, 2013.

Remote Pilot – Small Unmanned Aircraft System certificate was issued May 31, 2017.

Airline Transport Pilot – Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land, Airplane Single Engine Sea, Airplane Multiengine Land, Instrument Airplane, LR-60; Limitation: English Proficient, LR-60 SIC Privileges Only certificate was issued December 7, 2017.

Notice of Disapproval – Airline Transport Pilot Multiengine Land Airplane was issued on August 14, 2018. Unsatisfactory Items: Area of Operations II. Preflight Procedures, III. Takeoff and Departure Phase, IV. Inflight Maneuvers; Comments: Incorrect performance procedures. Incorrect Turn after takeoff procedures. Planning. Poor Automation management especially as to FMS[10] and lateral nav situational awareness.

Notice of Disapproval – Airline Transport Pilot Multiengine Land Airplane was issued on August 23, 2018. Unsatisfactory Items: Area of Operations III. Takeoff and Departure Phase; Comments: Climb Profile. Did not monitor climb performance.

Airline Transport Pilot – Airplane Multiengine Land; EMB-145, LR-60; Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land, Airplane Single Engine Sea; Limitations: English Proficient; This certificate is subject to pilot-in-command limitation for EMB-145; LR-60 SIC Privileges Only; ATP Circ. Apch.-VMC only; EMB-145 Circ. Apch.- VMC Only certificate was issued September 5, 2018.

Notice of Disapproval – Airline Transport Pilot Multiengine Land Airplane was issued April 23, 2019. Unsatisfactory Items: Area of Operations IV. Inflight Maneuvers, VI. Landings and approaches to landings; Comments: Applicant did not demonstrate

[10] Flight Management System.

proper recovery for clean stall. Applicant did not demonstrate proper knowledge of Non-ILS[11] procedures.

Airline Transport Pilot – Airplane Multiengine Land; B-737, EMB-145, LR-60; Rotorcraft Helicopter; Commercial Privileges; Airplane Single Engine Land & Sea; Limitations: English Proficient; ATP Circ. Apch.-VMC only; EMB-145 Circ. Apch.- VMC Only, The EMB-145 is subject to pilot-in-command limitation(s), LR-60 SIC Privileges Only; B-737 Circ. Apch. -_VMC Only certificate was issued May 9, 2019.

3.3 Pilot's Certificates and Ratings Held at Time of the Accident

AIRLINE TRANSPORT PILOT (issued May 9, 2019)
Airplane Multiengine Land
Rotorcraft Helicopter
B-737, EMB-145, LR-60
Commercial Privileges – Airplane Single Engine Land & Sea
Limitations: English Proficient; ATP Circ. Apch.-VMC only; EMB-145 Circ. Apch.- VMC Only, The EMB-145 is subject to pilot-in-command limitation(s), LR-60 SIC Privileges Only; B-737 Circ. Apch. -VMC Only

FLIGHT INSTRUCTOR (originally issued November 16, 2009)
Rotorcraft – Helicopter
Instrument – Helicopter

REMOTE PILOT (issued May 31, 2017)
Small unmanned aircraft system

MEDICAL CERTIFICATE SECOND CLASS (issued April 21, 2022)
Limitations: Must have available glasses for near vision

3.4 Flight Hours

The following hours were provided by Guardian Flight LLC and was part of the pilot's "*annual resume*."

Previous 24 hours[12]	1.6
Previous 7 days[13]	8.1
Previous 30 days	11.4

[11] Instrument landing system.
[12] According to company records the pilot operated two flights on the morning of the 15th, the first flight was operated as a Part 135 flight and departed about 0400. The second flight was a Part 91 flight and departed about 0630. These two flights did **not** include the accident flight.
[13] According to company records the pilot operated 11 total flights beginning with his first flight on the 8th that began about 1400. Of those 6 flights were operated as Part 135 flights and 5 were operated as Part 91 flights. None of these flights included the accident flight.

Previous 90 days[14]	65.1
Previous 12 Months[15]	267.2
Total Hours C90A	615.6
Total Instrument Hours[16]	1100.0
Total Night Hours	592.2
Total Flight Experience	7668.2

3.5 Training

The pilot's training records were provided by Guardian Flight LLC and an excerpt of the most recent training events are below:

Date of Hire	December 2, 2019
Initial Ground Training in the C90A[17]	December 23, 2019
Initial Operating Experience in the C90A – Completed	January 18, 2020
Most Recent 6-month Pilot Proficiency Check[18]	July 21, 2022
Most Recent Recurrent 135.293, .297, and .299 Check[19]	February 3, 2022
Most Recent Recurrent Ground	January 7, 2022
Most Recent Crew Resource Management	January 7, 2022
Most Recent Hazardous Materials	January 7, 2022
Emergency Training	January 7, 2022
Aircraft Ground – BE-9L	January 7, 2022

A review of the pilot's training record indicated that during initial AATD[20] training, which consisted of 6 training sessions dated December 13, 16, 17, 18, 19, 20

[14] During the approximate 90 days prior to the accident the pilot flew 59.1 hours as pilot in command in the C90 and 6.0 hours as PIC in a B200.

[15] During the preceding 12-months the pilot flew 245.2 hours in the C90, 21.3 hours in the B200 and 0.7 hours in the PC-12

[16] Total Instrument Hours included 883.1 actual, 16.9 hours "hood" or simulated in flight instrument conditions and 200.0 hours of Simulator. Source: Attachment 4 - "Pilot's Annual Resume".

[17] The training concluded on the above date but included initial ground training and AATD training but did **not** include initial operating experience in an actual aircraft.

[18] Company provided 8410-Form 200 indicated that the pilots 135.297 check event include an unsatisfactory rating for "Missed Approach." The remarks stated "*Applicant failed to properly configure aircraft. Retrained and rechecked Missed Approach Satisfactory.*"

[19] Company provided 8410-Form 200 indicated that the pilot had two unsatisfactory events, "*ILS Approach(s)*" and "*Holding*." The remarks stated "*ILS unsatisfactory applicant exceeded standard. ILS restrained and rechecked satisfactory. Holding Unsatisfactory applicant failed to use standard entry. Holding retrained and rechecked satisfactory.*"

[20] Advanced Aviation Training Devices. Source: FAA Approved Aviation Training Devices (ATD) as of 05/28/2021

2019. The pilot had five unsatisfactory ratings. Of those, two were on the last training event. The pilot was given two additional training sessions on January 13 and 14, 2020 and all training areas indicated satisfactory.

Additionally, records indicated that the pilot's recurrent 135.293, 135.297, and 135.299 proficiency check on February 9, 2021 was unsatisfactory. The flight maneuvers that were graded unsatisfactory were "*Landing with simulated powerplant failure.*"

According to the Assistant Chief Pilot (ACP) of the Hawaii Life Flight Division of Guardian Flight, LLC, he had conducted some of the accident pilot's checkrides. The ACP recalled that in July of 2020 the accident pilot unsatisfactory completed two maneuvers. "*The first one was an unsatisfactory non-precision RNAV three approach. Failure to follow correct approach procedure. Descent below authorized altitude before the final approach fix. And then I put satisfactory on the next non-precision approach, correct altitude procedure on the next approach. His second …maneuver that was unsatisfactory. Landing from a circle approach, bank angle exceeded 30 degrees from base to final. Satisfactory on the next landing from circle approach. And then that was a satisfactory check*[21]*.*"

The ACP conducted a second checkride with him, about a year later, that checkride was marked as "*unsatisfactory.*" According to the ACP "*it was a missed approach. Unsatisfactory missed approach. Failure to stop climb at authorized given altitude. The second unsatisfactory I put in there was ILS power plant failure. Improper airplane configuration before DA or DH. Yeah, I remember he went full flaps before that that. He put full flaps after the final approach fix…and a third one was again on the second missed approach failure to ensure proper airplane configuration during missed approach. So we were at miss on that one and he didn't clean the airplane up. We were, we were already headed out with the hold and the gear was still down and everything was still configured for landing.*[22]*"* Furthermore, the ACP provided the accident pilot with his recheck event, which was satisfactory.

The Guardian Flight, LLC, Flight Standards Manual provided the following about what would be conducted in all pilot training:

> *All pilot training shall be conducted in accordance with the most recent and current FAA Approved Guardian Flight Training Manual. Pilots are expected to become familiar with all available information in preparation for a training or checking event. Guardian Flight will place special emphasis on ADM (Aeronautical Decision Making), SRM (Single Pilot Resource Management), CRM*

[21] Source: Operational Factors/Human Performance – Attachment 2 - Hawaii Life Flight Personnel Interviews pg. 843 lines 1-11.
[22] Source: Operational Factors/Human Performance – Attachment 2 - Hawaii Life Flight Personnel Interviews pg. 843 line 21 through pg.844 line 12.

(Crew Resource Management), Stall/Spin awareness, positive aircraft control, Runway Incursion Avoidance, Checklist Usage, and adherence to the company policies, procedures, as well as all applicable FAA rules and regulations.

3.5.1 Multiple Consecutive Training/Checking Failures

The Guardian Flight, Flight Standards Manual Chapter 3 "*Administration,*" provided the following in regard to multiple consecutive training or checking failures:

If a pilot fails a training or checking event on two successive attempts then the pilot will either be placed into a comprehensive retraining process or employment may be terminated. This comprehensive retrain process may consist of the following:

1. *Being placed into an initial/recurrent/remedial training class for a final attempt to complete the required training*
2. *Conducting a final evaluation to determine future training and checking requirements. Pilot Improvement plan as directed by the Chief Pilot and ACP.*

3.6 Pilot Schedule

The pilot's schedule consisted of two weeks on, two weeks off rotational cycle to where the pilot was on call at his personal residence for a 12-hour period. The shifts would alternate between day shift (0500 – 1700) for the first week and night shift (1700-0500) for the second. The pilot was working his second week at the time of the accident.

Guardian Flight, LLC has three normally assigned scheduled rotations[23]:

- *Two weeks on, two weeks off;*
- *One week on, one week off; or*
- *Another rotation approved by the Chief pilot or designee.*

3.6.1 Pilot's 72-hour History

The pilot's next-of-kin was unwilling to participate in either an in-person or virtual interview therefore a questionnaire was drafted and yielded the following summation of the pilot's 72-hour history preceding the accident. The pilot was in the second week (the night week) of his two-week rotation when the accident occurred. The rotation started Dec 7, 2022 and would have terminated Dec 20, 2022. In the preceding 72 hours the pilot was on day shift from Dec 12 -13, however he did not receive a call out during that time. His next-of-kin wrote that typically they would retire for the night at

[23] Source: Operational Factors/Human Performance – Attachment 10 - Flight Standards Manual Excerpts

around 2000-2030 and would arise around 0530 if no call outs occurred during the night to disrupt that schedule. On Dec 14, the pilot moved to the night shift and received a call out in the morning of Dec 15th. He was actively flying from approximately 0400 to 0630. The pilot then went off shift and returned to his personal residence. According to his next of kin the pilot was active in the morning, had lunch and was active again in the afternoon. They had dinner together and were ready to retire for the evening about 1930 when he later received the call out for what resulted in the accident flight.

3.6.2 Other Flying[24]

At the time of the accident, the pilot was also flying for a local sightseeing helicopter operator. According to that operator's pilot duty log, the accident pilot's most recent activity with them occurred on December 5, 2022, which indicated 0.9 hours of flight time in the EC130 helicopter[25] and in the remarks, section listed "*molo.*" Prior to that flight, the only other flight in December for Sunshine Helicopters was on December 3, 2022 in which the accident pilot flew 2.7 hours. A further review of the accident pilot's training records since October 2022 indicated that he had flown an EC130 and an AS350[26] helicopter for a total of 38[27] total hours of flight experience. Additionally, the records indicated that the pilot had flown 24.4 hours in the first quarter of 2022, 15.9 hours in the second quarter of 2022, and 44.7 hours in the third quarter of 2022.

On November 3, 2022, the Sunshine Helicopters Pilot's Duty Log indicated he had flown 0.3 hours. The "*remarks"* section indicated that this flight was *"training"* and was considered a "*Non-Rev"* flight.

3.7 Pilot's Personal Effects

Found within his personal effects at the accident site was a handwritten note addressed to the pilot. It advised he should not be "forced to fly through the clouds by any person in the back" [of the airplane][28]. It was confirmed the author of the letter was the pilot's next-of-kin and was written in March of that same year. The pilot's cell phone and a company iPad were also found within the wreckage. Video documentation later

[24] Source: Operational Factors/Human Performance – Attachment 8 - "*Pilot Other Employer Previous 90-Day Work Schedule*"
[25] An EC-130 (now known as an H130) and was considered an *intermediate single-engine helicopter.* Source: H130 | Airbus
[26] An AS350 (now known as an H125) and was a single-engine light utility helicopter. Source: H125 | Civil helicopters | Airbus
[27] Records indicated that the pilot flew 2.7 hours in December, 9.4 hours in November, and 25.9 hours in October.
[28] Source: Operational Factors/Human Performance – Attachment 17 – "*Letter Found in Pilot's Personal Effects*"

showed that the pilot used his cell phone to play music while in flight and the iPad to access GPS map imagery.

4.0 Airplane Information

The aircraft was a Raytheon Aircraft Company C90A, serial No. LJ-1590 and was manufactured in 2000 and a standard airworthiness certificate in the normal category was issued on June 16, 2003. It was powered by two Pratt & Whitney Canada PT6A-21 engines each capable of producing 750 shaft horsepower.

The aircraft was purchased by Guardian Flight LLC on September 12, 2017 from Guardian Flight Inc. FAA records show that an Appareo Vision 1000 cockpit camara data monitoring system was installed on December 11, 2018.

Figure 3. Accident airplane (Source: ASN - Aviation Safety)

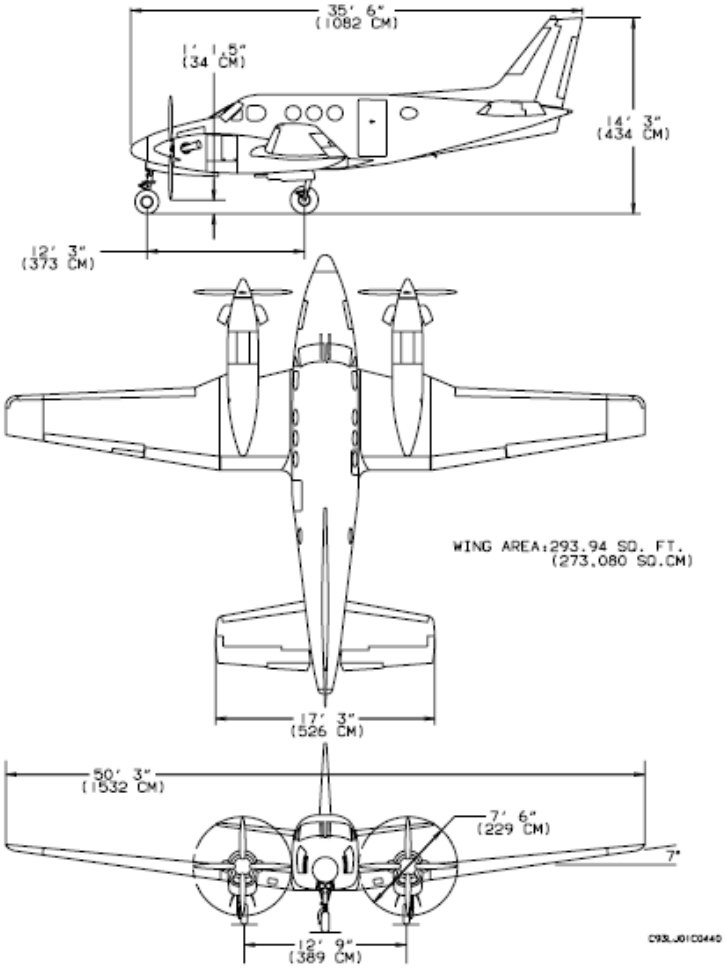

Figure 4: Airplane Dimensions (Source: Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual)

4.1 Weight and Balance

The following information was based on the weight and balance paperwork of the airplane and estimated weights of the occupants. Airplane limitations are indicated in **bold** type. All weights below are in pounds (lbs.).

Table 1: Accident Flight Calculated Weight and Balance

	Weight
Aircraft Empty Weight[29]	7,289
Cargo	180
Zero Fuel Weight	7,469

[29] The aircraft's most recent weight and balance was completed on November 10, 2020 following an alteration of the cabinet shelf located in the cargo compartment.

Maximum Zero Fuel Weight	**No Structural Limit**
Fuel	661
Ramp Weight	8,130
Maximum Ramp Weight	**10,160**
Taxi fuel	60
Takeoff Weight	8,070
Maximum Takeoff Weight	**10,100**
Enroute Fuel Burn	256
Estimated Landing Weight[30]	7,814
Maximum Landing Weight	**9,600**

4.2 Cockpit Voice Recorder

The accident airplane was equipped with a Fairchild/L3 A-100S cockpit voice recorder (CVR). The CVR was required to record a minimum of 30 minutes of audio recording, which was stored in the solid-state memory module. The audio was successfully downloaded by the NTSB Recorders Laboratory (see CVR Specialist's Factual Report). The downloaded recording contained communication between the pilot and air traffic control as well as ambient noises from with the airplane.

4.3 Cockpit Video Recorder

The accident airplane was equipped with an Appareo Vision 1000 video recording system. According to their website[31], it is a flight data recorder that can provide performance and safety data typically via an SD[32] card. According to interviews with Guardian Flight LLC and HLF personnel, the Appareo was installed with the intent of being part of their flight operational quality assurance (FOQA) program; however, at the time of the accident FOQA had not been brought to fruition. The device was located within the wreckage after recovery and was sent to the NTSB Vehicle Recorders Laboratory in Washington D.C.

The Appareo Vision 1000 was able to capture both video and audio recordings. The camera was mounted in a position that captured the entire instrumentation for both the left seat and right seat, as well as the center pedestal and overhead panel. The video recording captured during the accident flight included in part: the pilot utilizing a phone to listen to music after takeoff, the Collins MFD being inoperative for the duration of the flight, the Electronic Flight Instrument System, which included the EADI[33], on the captain's (or left side) going black or inoperative approximately 13 minutes into the flight. Additionally, the Appareo system captured audible sounds

[30] Of note, the weight and balance paperwork indicated an estimated landing weight of 7,874 lbs.
[31] https://appareo.com/aviation/vision-1000/
[32] Secure Digital
[33] Electronic Attitude Director Indicator.

including the autopilot disconnect, master caution, altitude alert tones, and the sound of a loud metallic bang.

4.4 Instrument Panel

The Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual, Section VII – "Systems Description" provided the following description and drawing of a "*Typical Instrument Panel*" for the aircraft with serial numbers LJ-1361, LJ-1363 and after:

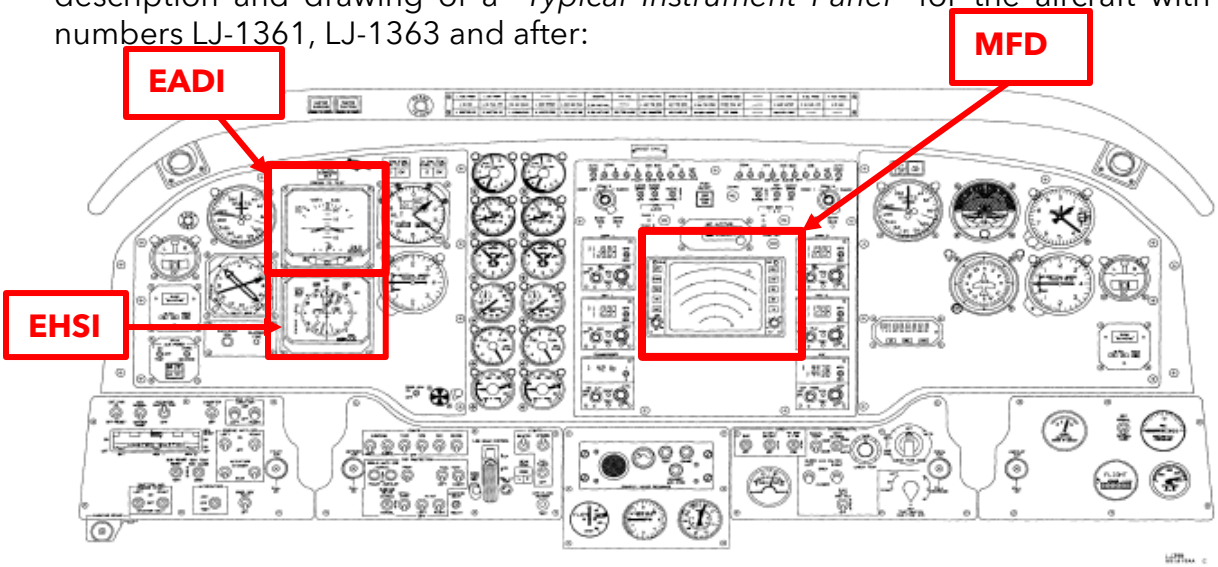

Figure 5: Typical Instrument Panel for the accident airplane. (Source: Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual)

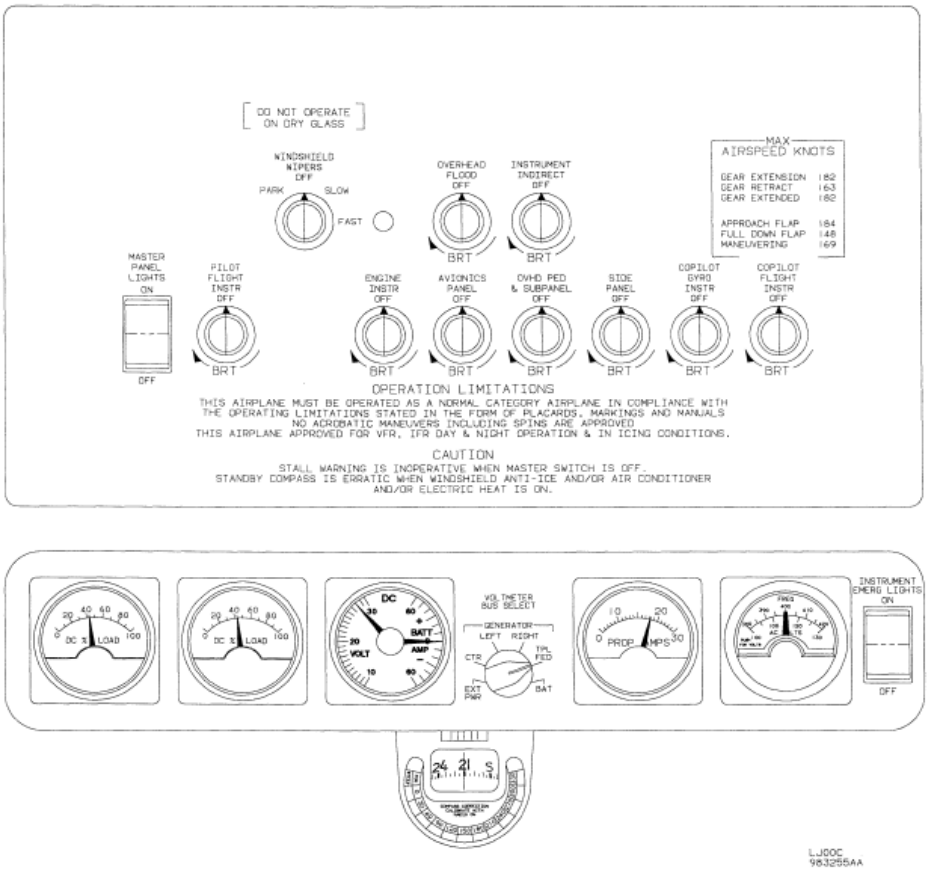

Figure 6: Overhead Panel for Serial Number LJ-1534 and after (Source: Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual)

4.5 Electrical System

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual, Section VII “Systems Description” provided, in part, the following on the avionics and electrical system:

> *The electrical system of the King Air C90B is a 28-volt direct current (vdc) negative ground system. The power sources include one battery and two generators. Power from these sources is distributed to the individual electrical loads with a multi-bus system as depicted in the Power Distribution Schematic. The distribution system consists of a hot battery bus, left generator bus, right generator bus, center bus, and a triple-fed bus. The power sources are connected to the distribution system through line contactors and relays. A voltmeter in the overhead instrument panel is provided to monitor battery, external power and individual bus voltages.*
>
> ***BATTERY***

The battery is a 34-ampere-hour, air-cooled, 20-cell nickel-cadmium battery (airplanes prior to LJ-1534) or a 42-amperehour, sealed, lead-acid battery (airplanes LJ-1534 and after).

The battery is controlled by a battery switch located in the pilot's outboard subpanel and placarded BAT-OFF/ON. The battery switch controls the battery relay and the battery bus tie. When the battery switch is in the ON position, the battery relay closes to apply power to the triple-fed bus and the battery bus tie closes to apply power to the center bus. In the OFF position, the battery relay and the battery bus tie open to disconnect the battery from all buses except the hot battery bus…

On airplanes LJ-1534 and after, the battery voltage and current can be monitored with the voltmeter and battery ammeter located in the overhead instrument panel. A battery ammeter reading of 10 amps or less prior to takeoff indicates the battery is approaching a full charge…

GENERATORS

There are two engine-driven, 250-amp starter-generators installed on the airplane. Individual control switches are provided in the pilot's subpanel and are placarded GEN 1 and GEN 2 – OFF/ON/GEN RESET. The generators are self-excited and do not require battery power for operation. To bring a generator online, the generator switch should be momentarily placed in the GEN RESET position, then released to ON. In the GEN RESET position, the generator voltage builds up to 28 volts and the line contactor is open...

Reverse current protection circuitry opens the line contactor and disconnects the generator if a reverse current condition occurs. If the condition corrects itself, the line contactor will re-close automatically.

The paralleling circuit provides load equalization between both generators. The cross-start current limiting circuit limits the generator output during engine cross-start operation.

The overvoltage protection circuit senses the generator output voltage and de-excites the generator and opens the line contactor if an overvoltage occurs. If the generator is disconnected for overvoltage, it will be necessary to select GEN RESET, then ON to reset the generator.

L DC GEN and R DC GEN annunciators are provided. Illumination of the L or R DC GEN annunciator indicates that the line contactor is open and the generator is off line. Loadmeters in the overhead instrument panel indicate the load applied to each generator as a percent of generator rating.

BUS TIES

The generator buses are connected to the center bus with the left and right bus tie relays. A three-position generator bus tie control switch is located in the pilot's subpanel. It is placarded GEN TIES - OPEN/NORM/MAN CLOSE. The OPEN position causes both the left and right bus tie relays to open and isolate the generator buses from the center bus. The NORM position allows the automatic closure of the left and right bus tie relays when either generator or the external power comes on line. If the battery is the only source on line, both generator bus ties open to isolate the left and right generator bus loads from the battery. In addition, the normal and max electric head and air conditioner are also disabled. Equipment, which remains operational during only operation, is identified with a white ring around the control switch. Momentarily selecting the MAN CLOSE position during battery operation closes both generator bus ties to power the generator buses from the battery. However, this will severely limit the battery duration.

The battery bus tie connects the battery to the center bus. The battery switch closes the battery bus tie when the battery switch is in the ON position, making the battery available for center bus loads or for recharging.

Bus current sensors are installed which sense current to each generator bus from the center bus and to the center bus from the battery. If either generator bus sensor detects a high current condition, it opens the corresponding bus tie to isolate the bus from the rest of the system. If the battery bus sensor detects a high battery discharge current, it opens the battery bus tie to isolate the battery. The battery bus sensor is defeated during engine starts and landing gear operation.

The bus current sensors are controlled with the three position bus sense control switch placarded BUS SENSE - TEST/NORM/RESET. Momentarily selecting the TEST position tests the bus current sensors causing the generator bus ties and battery tie to open. Momentarily selecting the RESET position will reset the bus current sensors if they have been tripped either as a result of a test or an actual high current condition.

L GEN TIE OPEN, R GEN TIE OPEN, and BAT TIE OPEN annunciators are provided to indicate the positions of the bus ties. Illumination of these annunciators indicate that the corresponding bus tie is open. The MAN TIES CLOSE annunciator indicates that the generator bus ties have been manually closed during battery operation and generator bus loads are applied to the battery…

INVERTERS

Two solid-state inverters are installed, The inverters convert dc input power to single-phase 400 Hz ac at 115 volts and 26 volts. The inverters are connected to the center bus during battery operation. The No. 1 inverter transfers to the left generator bus and the No. 2 inverter transfers to the right generator bus when one or both generators is on line. The inverters are controlled by a single switch in the pilot's outboard subpanel placarded INVERTER - NO.1/OFF/NO. 2.

Only one inverter can be selected at a time. Either inverter can provide power to all ac loads. The 115-vac output of the operating inverter can be monitored with the volt/frequency meter in the overhead instrument panel. The volt/frequency meter normally indicates frequency but voltage can be selected by depressing the button in the lower left corner of the meter. Illumination of the INVERTER annunciator indicates that the selected inverter is inoperative.

LEFT GENERATOR BUS

AVIONICS
Avionics No. 2 Bus
DSP
DSPL PRCRP
EADI
EFIS Fans Normal
EHSI

ELECTRICAL
Inverter No. 1

ENGINE
L Chip Detector
L Main Engine Anti-Ice
R Stby Engine Anti-Ice Control

ENVIRONMENTAL
R Bleed Air Control
Vent Blower

FLIGHT CONTROL
Flap Control Indicator
Flap Motor

FUEL
R Boost Pump
R Firewall Valve
R Fuel Pressure Warning
R Fuel Quantity Indicator
R Transfer Pump

FURNISHINGS
Cigar Lighter

LIGHTS
Avionics & Engine Instrument Lights
Flashing Beacon
Flight Instrument Lights
L Landing Light
Tail Flood Lights (Opt)

PROPELLERS
Propeller Balance
Propeller Sync

WEATHER
L Fuel Control Heat
L Fuel Vent Heat
Pilot Windshield Heat

RIGHT GENERATOR BUS

AVIONICS
Avionics No. 3 Bus
Copilot Audio
EFIS Fan STBY

ELECTRICAL
Inverter No. 2
R Generator Bus

ENGINE
R Engine Chip Detector
R Main Engine Anti-ice
L Stby Engine Anti-Ice Control

FLIGHT CONTROL
Elevator Trim
Rudder Boost

FLIGHT INSTRUMENTS
Copilot Turn & Slip

FUEL
Crossfeed Valve
L Boost Pump
L Firewall Valve
L Fuel Pressure Warning
L Fuel Quantity Indicator
L Transfer Pump

FURNISHINGS
Furnishings Master Control
Electric Toilet (Opt)

LIGHTS
R Landing Light
Recognition Lights (Opt)
Side Panel Lights
Strobe Lights (Opt)
Subpanel, Overhead & Console Lights

WARNING/ANNUNCIATORS
NO SMOKE & FSB Signs

WEATHER
Copilot Windshield Heat
R Pitot Heat
Stall Warning Heat

CENTER BUS

AVIONICS
Inverter No. 1
Inverter No. 2
ELECTRICAL
Generator Reset
ENVIRONMENTAL
Air Conditioner Motor
Maximum Electric Heat
Normal Electric Heat
LIGHTS
Taxi Light
Ice Light
LANDING GEAR
Landing Gear
PROPELLERS
Propeller Deice
WARNING/ANNUNCIATORS
Avionics Annunciation
WEATHER
Surface Deice
Windshield Wiper

TRIPLE-FED BUS

AVIONICS
Avionics Master Power
Avionics No. 1 Bus
ELECTRICAL
Bus Tie Control
ENGINE
Autofeather (Opt)
Fire Detector (Opt)
L Igniter Power
L Start Control
R Ignitor Power
R Starter Control
ENGINE INSTRUMENTS
L Engine Fuel Flow
L Engine Oil Pressure
L Engine Temperature
R Engine Oil Flow
R Engine Oil Pressure
R Engine Oil Temperature
ENVIRONMENTAL
Cabin Air Temp
Cabin Pressure Control
L Bleed Air Control
FLIGHT INSTRUMENTS
Outside Air Temp
Pilot Encoding Altimeter
Pilot Turn & Slip
LANDING GEAR
Landing Gear Control
LIGHTS
Cabin Floor Lights
Instruments Indirect Lights
Navigation Lights
PROPELLERS
Propeller Governor Test
WARNING/ANNUNCIATORS
Annunciator Indicator
Annunciator Power
L Oil Pressure Warning
Landing Gear Position Indicator
Landing Gear Warning Horn
R Oil Pressure Warning
Stall Warning
WEATHER
L Pitot Heat

HOT BATTERY BUS

AVIONICS
RNAV Memory
ELECTRICAL
Battery Relay Power
Battery Voltmeter
ENGINE
L Engine Fire Extinguisher (Opt)
R Engine Fire Extinguisher (Opt)
FUEL
Fuel Crossfeed Valve
L Fuel Boost Pump
R Fuel Boost Pump
FURNISHINGS
MOD (Stereo)
LIGHTS
Entry Light

LEFT GENERATOR AVIONICS BUS No. 2

ADF 1
AFCS
AP Servo
Comm 2
DME 2
Radar
Radio Altimeter
Radio Phone
RMI 2
Transponder 2

RIGHT GENERATOR AVIONICS BUS No. 3

Air Data
Compass 2
DME 1
GPS
Hazard Avoid
MFD
Nav 2
RMI 1
Transponder 1

TRIPLE-FED AVIONICS BUS No. 1

Comm 1
Compass 1
Nav 1

Figure 7: Electrical System Components (Source: Hawker Pilots Operating Handbook)

4.6 Standby EFIS Power Supply

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual, Section VII "Systems Description" provided the following in regard to the standby EFIS[34] power supply:

A standby EFIS power supply system is provided to prevent the pilot's EFIS displays from blanking during flight conditions where voltage to the system may drop momentarily below 28 VDC. Such conditions may include gear operations and airstarts. The system consists of an EFIS auxiliary battery located in the aft fuselage avionics compartment, an EFIS AUX POWER control panel located on the pilot's instrument panel, a 15-amp circuit breaker, placarded EFIS AUX BAT, located on the right circuit breaker panel, and a relay activated by the left squat switch which inhibits the ability of the standby battery to power the pilot's EFIS on the ground. The EFIS AUX PANEL contains an ON-OFF-TEST switch, a HORN SILENCE button, and a cluster of annunciators which provide the following information to the pilot.

AUX ARM (Green)	*Illuminates when the standby battery is selected on, the avionics switch is on, and the pilot's EFIS displays are being powered by the Left Generator Bus through the No. 2 Avionics Bus.*
AUX ON (Amber)	*Illuminates when voltage to the pilot's EFIS has dropped below 18 VDC and operating power has switched to the standby battery power supply. A beeping warning horn will sound in conjunction with this annunciator.*
AUX TEST (Green)	*Illuminates when the ON-OFF-TEST switch is held to the TEST position. The test switch should not be held longer than 5 seconds, and released as soon as the AUX TEST annunciator illuminates. The annunciator may illuminate only momentarily, or as long as the switch is held to the TEST position. Either situation indicates the auxiliary battery has a sufficient charge. Refer to BEFORE ENGINE STARTING in Section 4, NORMAL PROCEDURES.*

The EFIS auxiliary battery is continually charged by the No. 2 Avionics Bus.

A beeping warning horn is provided to alert the pilot that the standby battery is supplying power to the pilot's displays. This horn will activate in conjunction with the illumination of the AUX ON annunciator. The horn may be silenced by

[34] Electronic Flight Instrument System

pressing the HORN SILENCE button. The horn and the annunciator will activate during shutdown if the avionics switch is turned off before the auxiliary battery is turned off.

The standby EFIS power supply is intended for only short periods of use such as during the momentary drops in operating voltage. It should not be relied upon to maintain operation of the EFIS if the normal power supply should fail.

4.7 Instrument Vacuum Air

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual, Section VIII "*Handling, Servicing & Maint*" provided, in part, the following:

Vacuum for the flight instruments is obtained by operating an ejector with bleed air from the engines. (Air at a pressure less than atmospheric is commonly referred to as a vacuum.) During operation, the ejector draws air in through the instrument filter and the gyros. A vacuum relief regulator valve regulates instrument air pressure.

4.8 Automatic Autopilot Disengagement

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual Supplement for the Collins FCS[35]-65H Automatic Flight Control System with Collins EFIS-84 (2-Tubne System with Single Date Processor Unit) Electronic Flight Instrument System, provided the following on automatic autopilot disengagement:

The following conditions will cause the autopilot to automatically disengage. Disengagement will normally be accompanied by the aural warning.

1. *Electrical Power…….MAJOR DEGRADATION, INTERRUPTION, OR LOSS*
2. *Vertical Gyro (ATT Flag on EADI)……....FAILURE*
3. *Roll Attitude……...…….More than 50°*
4. *Pitch Attitude…….….GREATER THAN ±40*
5. *A/P FAIL Annunciator……...…….……ILLUMINATED*

5.0 Operator

The operator, Guardian Flight, LLC, based in South Jordan, Utah, was part of the Global Medical Response Solution company, which included Hawaii Life Flight. Hawaii

[35] Flight Control System

Life Flight[36] had been providing air medical transportation in Hawaii since 2010 and consisted of six bases[37].

Guardian Flight LLC consisted of 31 C90A, 10 BE-200-B200, 1 CE208-208, 5 LR-45-45, and 24 PC-12-45 aircraft. The operation had a FAA *CFR* Part 135 certificate for the operations of patient transport through Med-Trans Corporation, which managed the fixed wing aircraft fleet.

According to the Guardian Flight, Flight Standards Manual, Chapter 2.1 the Guardian Flight, LLC, mission was "*Guardian Flight provides highly skilled and experienced teams for safe, compassionate, efficient medical transportation and health care solutions.*"

5.1 Guardian Flight, LLC Headquarter Relocation

Guardian Flight, LLC made the decision to move their headquarters from South Jordan, UT to Lewisville, TX in March of 2022. The FAA was notified of the decision on July 05, 2023. The intent was for the company's Principal Base of Operations, Aircraft Maintenance Records, and Communications Center to be fully relocated by November 31, 2023 when the company expected to terminate its residency in South Jordan. According to the Director of Operations (DO), the reason for the move was to better align their certificates under the North Texas Flight Standards District Office (FSDO) thereby standardizing who they would work with and to "*create a uniform understanding of operations from the FAA's perspective.*"[38]

5.2 Director of Operations for Guardian Flight, LLC.

Prior to and following the accident, the Director of Operations (DO) position at Guardian Flight, LLC was in the process of changing. Prior to the accident occurring, the DO had been told he would assume the Assistant DO position and a new person would be appointed over him to the role of DO. However, once the accident happened, the DO was retained in his original position to manage the aftermath.

The DO was interviewed on March 22, 2023[39] and at the time of the interview the DO was a direct report to the Chief Operating Officer (COO); a position that had changed occupancy in the year proceeding the accident. The DO was responsible for operational compliance and interfacing with the FAA. He had been in the role since 2017; however, he had previously been a DO for a company that GMR[40] acquired. He

[36] Source: Guardian Flight - Safety
[37] Source: Hawaii Life Flight | Service Area
[38] Source: Operational Factors/Human Performance – Attachment 1 - Guardian Flight Personnel Interview Transcripts, pg. 461, line 15-17.
[39] Source: Operational Factors/Human Performance – Attachment 1 - Guardian Flight Personnel Interview Transcripts.
[40] Global Medical Response

oversaw two chief pilots: one over the C-90 and PC-12 fleets and the second over the Lear 45, King Air 200 and 208 fleet that primarily worked out of Alaska. Together, those individuals were responsible for 47 bases spread across the continental United States, Alaska, and Hawaii. He also oversaw the Director of Training and had some level of involvement in pilot hiring for Guardian.

When reviewing potential pilot candidates, the DO said it typically was the assistant chief pilot who would have reviewed the person's training records and Pilot Records Improvement Act (PRIA) data. At the time of the accident, the basic qualifications to be a pilot with Guardian Flight, LLC were 2,000 total flight hours, 1,000 hours of pilot-in-command time, and 500 hours in a turbo prop aircraft. The Director of Safety later added, "*we dropped the limit to 2,000 hours and then we dropped it even more on a case by case basis*[41]." In addition, the applicant would undergo an AATD evaluation and an interview to ensure that the individual had the interpersonal skills required to work in an aeromedical environment. After the accident, the overall flight hour requirement was raised to 2,500.

The DO stated he had a good working relationship with the Director of Safety and the Director of Training. He admitted his relationship with the previous COO had been somewhat strained, but he worked well with the person who was in the position at the time of the accident. The DO stated his primary method of communication to the bases was via his Chief Pilots (CPs) down to the ACPs. He stated he relied heavily on the relationship between his CPs and the ACPs to manage oversight of the bases and their respective operations. Communication was typically through telephone conferencing, or an internal software called the Baldwin system (see Section 9.7.1 Baldwin Report for further information). Through the Baldwin system they had the ability to send out communiques and to solicit feedback. The Baldwin system was also the primary means for employees to voice concerns or offer feedback to the management teams. He said prior to the accident, he would receive brief summaries on Baldwin reports but that had recently changed and at the time of the interview, the Safety Department was responsible for managing the process.

The DO took part in a series of bases visits and visited Hawaii Life Flight (HLF) a few months prior to the accident flight. The goal of that trip was to highlight some "*human error damage issues*" and discuss various trends they were seeing across the system.

When specifically asked about the accident pilot, the DO said he could not say for certain if he was directly involved with the pilot's hiring. After the accident, the DO reviewed the pilot's training records and said there were some concerns, and it wasn't

[41] Source: Operational Factors/Human Performance – Attachment 1 - Guardian Flight Personnel Interview Transcripts, pg. 192 lines 7-8.

"*what* [he] *would consider a normal training record*.[42]" The DO said he believed there was "*missed communication*" between Hawaii Life Flight's ACP and the CP on how the accident pilot was performing. The DO said he believed there was a desire for HLF leadership to take care of performance or interpersonal issues autonomously rather than involve others from the Guardian level. He believed because HLF had their own AATD and, prior to the accident, largely conducted all their training in-house, it likely reinforced that desire to remain autonomous. The DO said while any ACP had the authority to ground a pilot for any reason, he or she would not be able to go through a full termination process without higher involvement from Guardian, and that he would be part of that process.

When asked about staffing, the DO said he felt the staffing levels were at around 80% and that pilots were in "*short supply*". He did note staffing at HLF was relatively good and most of their bases were fully staffed most of the time. When asked whether he felt he had the correct tools in place to do his job, the DO responded they had what they needed to maintain the minimum standards but above the standard was the goal. He said the training department was in a state of flux due to the relocation and the resignation of the Director of Training and that it was possible in two years [from the time of the interview] there would be potential for positive change. He also stated because Guardian was in the processes of removing him from the DO position, it was difficult for him to remain objective about any changes. He said after the accident, he believed Guardian did the right thing by "*put*[ting] *the brakes on everything*" and they were slow to press anyone back into service to ensure those individuals were ready to go back to work. The company also conducted a records review of their pilots to identify anyone who might have had training deficiencies and set up remedial training programs to ensure standards were being met. An additional change was the mandate that all training was to be conducted at the headquarters facility to ensure standardization across all bases. For more substantive changes, Guardian was in the process of installing backup avionics systems within their aircraft – particularly within the C-90 fleet – however, the DO did not know where the company was in that process.

5.2.1 Post Accident Director of Operations

On 23 May 2023, the human performance investigator interviewed Guardian Life Flight's new DO whose FAA Part 119 certification was approved on April 19, 2023. His work history included being the director of operations and a chief pilot for a Part 135 aeromedical company that Guardian LLC had acquired, an air safety inspector for the FAA, and a line pilot for both a Part 135 and a Part 121 operator, respectively. During the interview, the DO discussed planned changes for the company. This included establishing a centralized operational control center that would be responsible for managing dispatch and flight following for the entirety of the Guardian LLC fleet. The DO was also focused on getting their voluntary Safety Management

[42] Source: Operational Factors/Human Performance – Attachment 1 - Guardian Flight Personnel Interview Transcripts, pg. 405 lines 13-15.

System program approved by the FAA. Lastly, the training department would have two directors: one responsible for pilot training oversight and the other for course development and training standards.

5.3 Chief Pilot

The investigative team interviewed the CP over the C-90s and the PC-12s fleets, on March 21, 2023. He had been in the position since 2016 and was a direct report to the Director of Operations although he stated he had a strong working and communications relationship with the Directors of Training and of Safety (respectively) as well. Prior to the accident, the plan was for the CP to continue to report to the Director of Operations once the latter stepped down into the Assistant DO role. At the time of the interview, the CP was uncertain who he would report to once the restructuring occurred. Reporting to the CP were six ACPs, to include the ACP for Hawaii Life Flight.

The CP stated that HLF was one of his better staffed regions but there were open positions at that time of the interview. His role in the hiring process was that of high-level review. The ACPs were the ones responsible for interviewing applicants and HR was responsible for creating the offer package. The CP would then review the interview notes and the package and then either approve or disprove the offer. When asked about the accident pilot, the CP stated he had reviewed the accident pilot's records and noted there were some deficiencies in training listed on the PRIA and that the pilot had "*a lot of helicopter hours and the fixed wing hours were low.*[43]" The CP said the accident pilot's two previous jobs were flying fixed wing professionally; that information combined with his interview and AATD performance made the pilot a candidate to consider.

According to the CP, the main projects that were in work at the time of the interview was the updating of the C-90 fleet to the Garmin 600 avionics suite, acquiring additional manpower resources for the safety department, and staffing the lead pilot program. The lead pilot would serve as a point of contact for the ACP (and indirectly for the CP and DO) for communication about scheduling, base issues, and/or local concerns. At the time of the accident and of the interview, HLF bases did not have a lead pilot. Approximately 85% of other bases did.

5.4 Hawaii Life Flight Assistant Chief Pilot

The ACP for HLF was responsible for the Hawaii region of Guardian Flight, LLC. HLF had six locations consisting of seven bases that the ACP oversaw. The ACP was originally hired in 2008 to a company that was bought out by Hawaii Life Flight, and then again by Guardian Flight, LLC. The ACP said he had been in that position for about

[43] Source: Operational Factors Human Performance – Attachment 1 – Guardian Personnel Interview Transcripts pg. 223, lines 1-3.

four years and was responsible for supervision of the line pilots, managing the pilot schedule, and attending to the needs of the operation. In addition to managing the Hawaii locations, the ACP was also a check airman for the C-90 fleet. He worked in conjunction with HLF's program director who managed the clinician side of the aeromedical mission.

The ACP was responsible for reviewing pilots' applications for HLF and did so for the accident pilot's application, although he said the final approval had to come from the chief pilot. HR was responsible for clearing the applicant's work history and for drafting the offer letter. The ACP could not remember any specifics about the accident pilot's hiring process but did remember he was referred to the company by another line pilot. When asked what he looked for in an applicant, the ACP said he would make inquires with the applicant's previous employer and consider their overall experience and performance in the AATD.

The ACP said the accident pilot was very vocal about what he considered was an aging fleet and continued avionics issues. Two of the aircraft in the Hawaii fleet did have history of multiple maintenance discrepancies, however both aircraft had been retired prior to the accident occurring.

5.5 Director of Training

The Director of Aviation, Training and Standardization (DT) had been with the company for seven years and was in the position for four years at the time of the interview. He had originally been a line pilot for the company and moved from the line to instructor pilot, check airman, and assistant chief pilot, culminating in Director of Training (DT). The position was a direct report to the Director of Operations and had nine training positions that directly reported to it, however at the time of the interview not all nine positions were filled or were full-time employees. Approximately three days after the interview, the DT left Guardian Flight, LLC to pursue an opportunity with another company.

In an overview of his duties, the DT said he was responsible for a group of full-time instructors for the PC-12 and the King Air 90, an instructor in Alaska for the King Air 200, and an instructor in Hawaii for the C-90. He managed new-hire training, the onboarding of new hires, and recurrent training for current pilots. He was also responsible for the check airmen and contract training provider agreements. For the flight standards aspect of his job, the DT states he was responsible for ensuring the pilots were held to the FAA's mandated standards and to those of Guardian. For new hires, the DT said he was directly involved in evaluating single-pilot performance and instrument proficiency using their AATD and that they trained to standards delineated in the Airman Certification Standards (ACS). The DT said he was not involved in reviewing past training histories of applicants.

The director stated that he met with the other directors at least once a week, and with the assistant chief pilots on a biweekly basis. There they would discuss operational and training issues of concern. He would also meet with the entire training department once a month. If an issue should arise with a line pilot, that information was typically brought up through the assistant chief pilots, to the chief pilot, and then to the Directors of Operations and of Training, respectively. The training individuals in the field would also help to inform the process and the entire team works to build a resolution to the problem.

When asked about the accident pilot, the DT stated that he conducted a records review post-accident and noted there were "*multiple unsatisfactory remarks, repeat unsatisfactory remarks on similar or same tasks, [and] failed check rides*[44]" and that he was not made aware of the pilot's performance. The exception was when the pilot was hired initially, the DT was part of an additional panel convened to assess the pilot's past training deficiencies denoted on his PRD[45]. A performance and training plan was created to which the accident pilot successfully completed.

Post accident, the training department did an internal audit of the training practices at Hawaii Life Flight and noted some deficiencies in how HLF managed their training events and their AATD. Specifically, the DT felt the training staff at HLF was treating training events as though they were check rides, and downplaying pilots' unsatisfactory results because their AATD was not an approved simulator. Guardian developed a policy for identifying pilots with unsatisfactory events up for communicating that information up to the chief pilot and to the training department. Guardian also mandated that all AATD training sessions were to happen at the headquarters level. Special emphasis was placed on developing training programs for basic attitude instrument flight and unusual attitude recovery techniques.

5.6 Director of Safety

At the time, the Director of Safety (DoS) had been with the company for a little over three years. He was a direct report to the COO with a line to GMR's Vice President of Safety. He was responsible for safety processes for the aircraft, clinicians, maintenance personnel and pilots, as well as establishing Guardian Flight, LLC's Safety Management System (SMS) (still in work at the time of the interview). The DoS oversaw three operations safety officers: one each in the pilot, clinician, and maintenance disciplines. He also worked with 12 program safety officers; a voluntary position distributed among Guardian subsidiaries. Hawaii Life Flight had one safety officer assigned to them at the time of the interview.

[44] Source: Operational Factors Human Performance – Attachment 1 – Guardian Flight Personnel Interviews Transcripts pg. 344, lines 11-12.
[45] Pilot Record Database

The director stated Guardian had an Aviation Safety Action Program (ASAP) with an event review committee consisting of an FAA representative and employee nominated flight operations and maintenance representatives. Central to Guardian's safety program was their Baldwin reporting system. The system was the main repository for pilot reported discrepancies, flight risk assessments and anonymous reporting. The flight risk assessment produced a numerical value which then determined whether a flight was to proceed as designed, it required higher level assessment, or if the flight was considered too high a risk to proceed. That information would then be given to the communication specialist for tracking and archival purposes. A score of 1 or 2 and the flight could proceed. A score of 3 or 4, or if a specific criterion was met independent of the aggregate score, required the crew to contact the pilot manager on call (PMOC) to help mitigate the risks. A score of 5 immediately disqualified the flight. The accident flight risk assessment score was a "2" (on a scale of 1-5) indicating the flight was able to proceed as planned.

In the time between the accident and the interview, the safety department in conjunction with the training and operations departments, conducted a pilot records audit, pilot qualifications assessment, aircraft inspections, partook in base visits and enacted a safety shutdown for HLF. There were no changes to the programs inherent to the safety department specifically. When asked whether there were any issues that were identified, the DoS stated it seemed there was potential for the pilots not writing aircraft discrepancies up until they landed at the base where their heavy maintenance was situated. The pilot records audit identified three pilots that needed reevaluation due to deficiencies noted in their training and/or performance. Once identified, those pilots were brought to Guardian to be retrain and reassessed, however all three pilot ultimately resigned their positions. The DoS said the accident pilot's records also had documented training deficiencies that had been managed internally by HLF (see section 3.5 Training).

6.0 Airport Information

Waimea-Kohala Airport was located about one mile southwest of Kamuela, Hawaii. It was owned by the State of Hawaii Airports Division. The airport elevation was 2,671 ft msl and had one paved landing surface designated as runway 4/22. The paved surface is 5,197 ft long and 100 ft wide. The airport was not serviced by an ATC tower; however, approach service was provided by the Honolulu Control Facility. The airport had a beacon that operated from sunset to sunrise. Runway 4 was equipped with a 4-light VASI[46] located on the right side of the paved surface; however, the VASI was unusable beyond 8° left of the centerline. Additionally, it was equipped with REILs[47].

[46] Visual approach slope indicator
[47] Runway end identifier lights

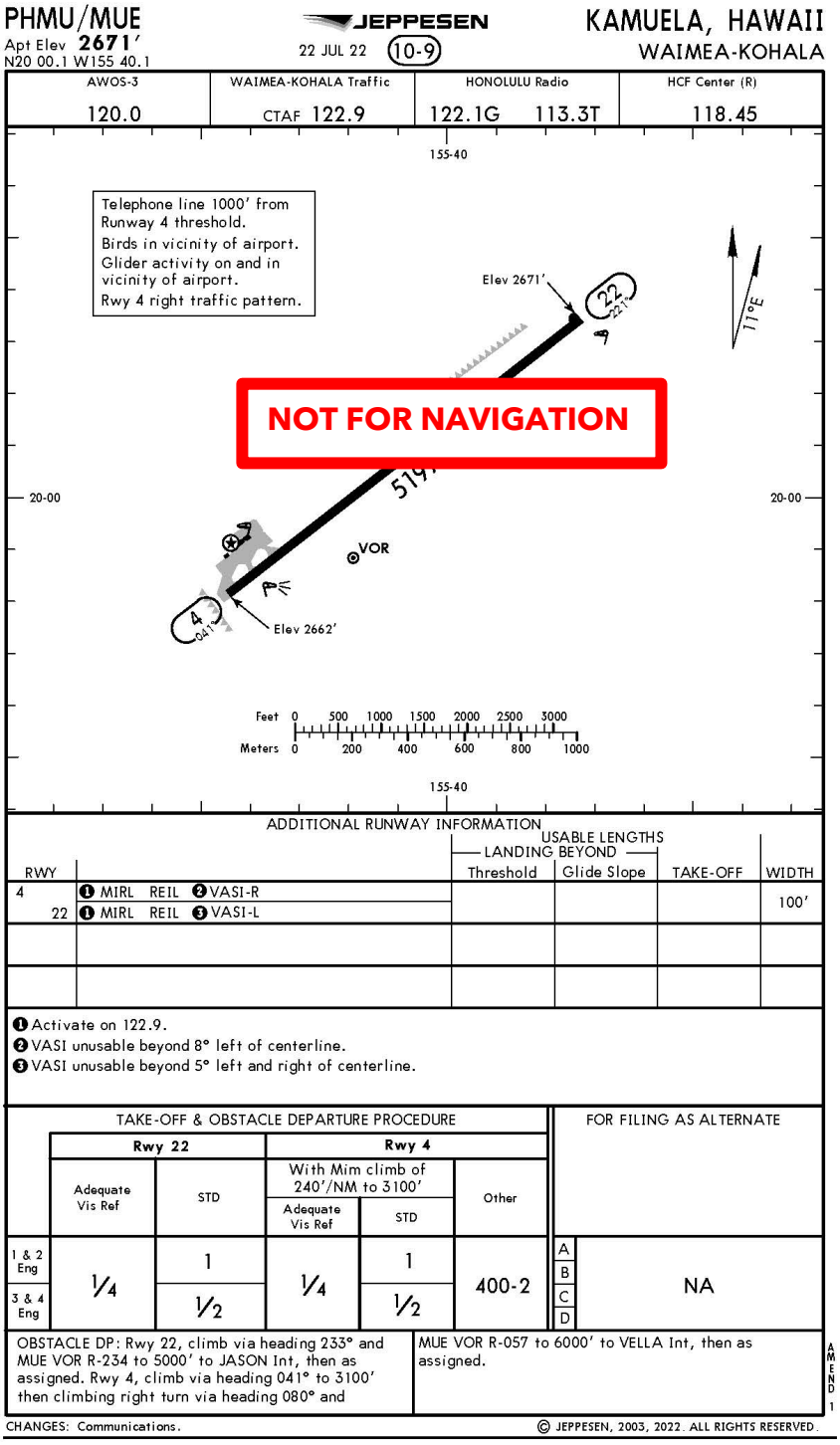

Figure 8: Kamuela, Hawaii Airport Diagram (Source: Jeppesen)

6.1 RNAV (GPS) 4

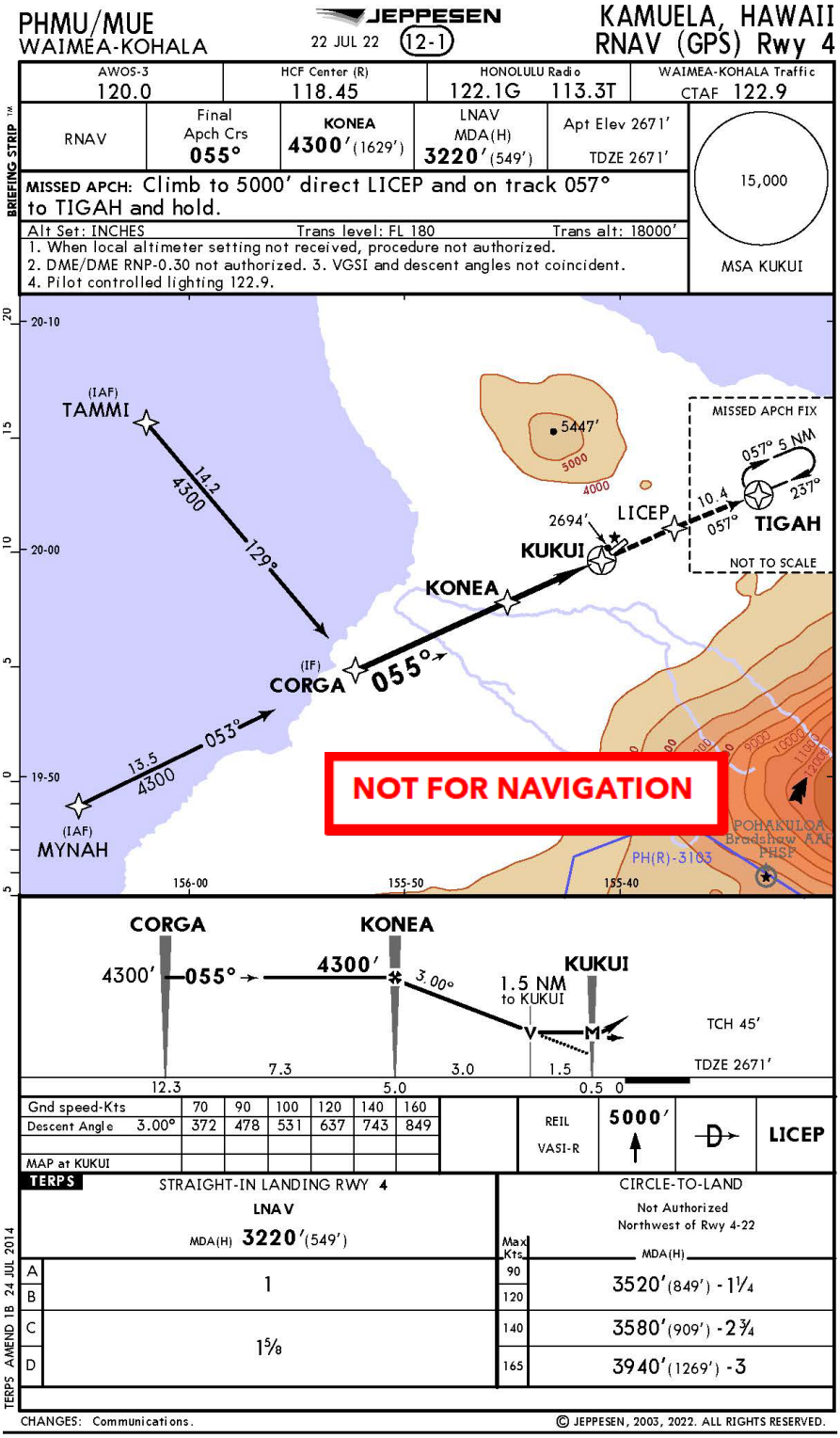

Figure 9: RNAV (GPS) 4 Kamuela, Hawaii. (Source: Jeppesen)

7.0 Meteorological

Meteorological information was obtained from the Kahului Airport located approximately 24 nm to the northwest of the accident location:

METAR PHOG 160854Z 18004KT 10SM CLR 21/17 A2990 RMK AO2 SLP129 T02110167 50004 $=SA16/12/2022 07:54->
METAR PHOG 160754Z 00000KT 10SM CLR 22/17 A2990 RMK AO2 SLP129 T02170172 $=SA16/12/2022 06:54->
METAR PHOG 160654Z 00000KT 10SM CLR 22/18 A2989 RMK AO2 SLP127 T02220178 $=

At the time of the accident the moon was approximately 38° below the horizon[48] and was due to rise at midnight local time.

8.0 Route of Flight

The flight departed from OGG with a destination of MUE. The figure below is based on a straight-line distance between the two airports. The distance was 69 nm on a 132° course. The flight plan provided by the operator indicated that the time enroute was 21 minutes and the route of flight was filed as direct. Additionally, the flight plan indicated a temporary flight restriction south of the destination airport. The restriction was due to volcanic activity and was restricted from the surface to 1,500 feet above ground level.

PHZH
!FDC 2/2425 ZHN HI..AIRSPACE MAUNA LOA, HI...TEMPORARY FLIGHT
RESTRICTIONS WI AN AREA DEFINED AS
194256N1552922W (KOA079031.4) TO
194122N1552844W (KOA082032.1) TO
194047N1552325W (KOA082037.1) TO
192851N1553012W (KOA104033.8) TO
193134N1553617W (KOA104027.4) TO POINT OF ORIGIN
SFC-1500FT AGL VOLCANIC ACTIVITY. PURSUANT TO 14 CFR SECTION
91.137(A)(1) TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT. ONLY
RELIEF AIRCRAFT OPERATIONS UNDER DIRECTION OF HAWAII VOLCANOES
NATIONAL PARK ARE AUTHORIZED IN THE AIRSPACE. HAWAII VOLCANOES
NATIONAL PARK TELEPHONE 808-985-6170 IS IN CHARGE OF ON SCENE
EMERGENCY RESPONSE ACTIVITY. HONOLULU /ZHN/ ARTCC TELEPHONE
808-840-6204 IS THE FAA COORDINATION FACILITY. EFFECTIVE 2212090000
UTC UNTIL 2212170400 UTC.
2212090000-2212170400

[48] Source: MoonCalc - moon phase, lunar eclipse, moon position, lunar calendar, moon calculator, moon calendar, map, moon rising, moonset, moon shadow, moon height, full moon, new moon

Figure 10. Flight restriction near destination.

According to the preflight planning report the departure, route, and destination were all VFR, with a report 10 miles visibility and the lowest reported clouds were at 7,500 ft, which was at the destination airport.

Figure 11. Straight Line Distance between Airports (not the actual route of flight).

9.0 Company Guidance

9.1 Flight Team Responsibilities

Guardian Flight Standard Operating Procedures Manual, Section 1 "*Operations*" provided, in part the following guidance:

1.1.1 Flight Team Responsibilities
Purpose: To define the roles and responsibilities of each member of the Flight Team.
Policy: The Flight Team members are the front-line service representatives and are responsible for safely and efficiently affecting a transport request.
Procedure:
1. The standard Guardian Flight, LLC Flight Team composition consists of a Pilot in Command (PIC) Second in Command (SIC if applicable) and two Medical Crew members.
2. The PIC is responsible for and in charge of the aircraft and the safe completion of all aspects of flight operations.

3. The Medical Crew consists of two clinically trained healthcare professionals.
a. The Primary Contact will be designated each duty day from the Medical Crew. The Primary Contact will typically be an independent status provider. The primary contact will:
i. Ensure smooth day to day operations of the base.
ii. Ensure safe and efficient completion of all transports.
iii. Be responsible to the Program Director for all decisions made by the Medical Crew (the Flight Team remains accountable as a team for all decisions made during a duty shift).
b. The Secondary Contact will work in support of the Primary Contact to ensure the operational expectations of the Flight Team are met.
4. Rotorcraft medical crew members will remain awake and alert during all phases of flight. At least one fixed-wing medical crew member will remain awake and alert during all phases of flight.

9.2 Pilot in Command Duties

Guardian Flight's General Operations Manual, section 2.15 "*Pilot in Command*" provided the following:

1. *The Pilot in Command of the aircraft is at all times directly responsible for, and is the final authority as to, the operation of that aircraft. Prior to flight, each Pilot in Command is responsible for familiarizing him or herself with all available information concerning that flight, including the current maintenance inspection status of the aircraft.*

2. *Each pilot who has not flown over a route and into an airport within the preceding 90 days will, before beginning the flight, become familiar with all available information required for the safe operation of that flight required by §135.299(c).*

3. *ALWAYS operates the aircraft in a safe, comfortable and efficient manner.*

4. *Reports for duty being adequately rested and in proper dress. Each pilot shall at the beginning of his or her assigned shift, if not already activated for a mission should contact the Communication Center to verify that he or she and his or her assigned aircraft are ready for a flight or report to the shift change meeting held by the Communications Center.*

5. *Notifies Ops Control as soon as practical in the event he or she is unable show up for or complete a scheduled shift.*

6. *Unless assigned to be stationed at the aircraft hangar, the Pilot in Command shall report to the aircraft within 20 minutes of being activated for flight.*

7. *When stationed at the aircraft hangar, the Pilot in Command shall report to the aircraft within 5 minutes of being activated for a flight.*

8. *For each flight, obtains briefing information from the Communications Center regarding purpose of the flight, destination, special instructions, and release.*

9. *Responsible for certain aspects of Operational Control including:*

    - *Obtain access to the necessary information for the safe conduct of the flight (such as weather, NOTAMS, and airport analysis).*
    - *File a flight plan with an appropriate FAA facility or company flight plan (considering such factors as altitude, terrain, weather, range, aircraft weight, fuel requirements, airport facilities and navigational aids).*
    - *Ensures the altitude and route to be flown is free of both terrain and other potential hazards.*

10. *Provide Operation Risk Management number to the Communications Center.*

11. *Receive Flight Release from Communications Center.*

12. *Ensure that pilot is in compliance with flight and rest requirements before departing on a flight.*

13. *Cancels and or delays flight assignments for weather or safety reasons.*

14. *Closes flight plans.*

15. *Contacts Communications Center <u>prior to</u> and at the end of each flight segment. At the conclusion of the mission notify dispatch of the appropriate current aircraft status information.*

16. *Ensures that a proper flight kit is aboard including pertinent and current aeronautical charts. For IFR operations, each pertinent navigational enroute, terminal area, and approach chart and other material as required by §135.83(a).*

17. *Ensures aircraft is properly inspected before flight as described by applicable AFM. A proper inspection shall include verifying all aircraft discrepancies are closed or on MEL and maintenance deferrals are not exceeding or will not exceed due dates during flight.*

18. *Ensures proper loading, securing, and distribution, of cargo and passengers and determines that weight and center of gravity is within prescribed limitations per applicable AFM. For multi- engine aircraft, ensures that the aircraft has been weighed in compliance with §135.185.*

19. *Direct and assist in the active loading of passengers and cargo.*

20. *Complete company Load Manifest as required for each FAR Part 135 flight segment.*

21. *Ensures that proper emergency equipment is on board the aircraft.*

22. *Operates aircraft at favorable altitudes taking into account turbulence, oxygen requirements and comfort of passengers during flight.*

23. *Responsible for refueling and parking of assigned aircraft after each flight.*

24. *Maintains a valid pilot's certificate and a 1st or 2nd class medical certificate. Some bases require 1st class medical certification due to hospital contractual requirements and/or eligible on demand operations - check with your Chief Pilot.*

25. *Meets the training and checking requirements of 14 CFR Part 135.*

26. *Immediately notifies the Chief Pilot (or the Director of Operations if the Chief Pilot is unavailable) in writing of any change in pilot certification and/or medical certificate status.*

27. *Immediately notifies the Chief Pilot (or the Director of Operations if the Chief Pilot is unavailable) in writing of any drug and/or alcohol related citation, arrest or conviction.*

28. *Notifies the Chief Pilot (or the Director of Operations if the Chief Pilot is unavailable) whenever a medical deficiency exists that would affect the safety of flight.*

29. *Notifies the Director of Operations or the Chief Pilot whenever a regulatory or policy deviation may have occurred.*

30. *Updates aircraft and base copies of the Company General Operations Manual, aircraft documentation and navigational chart*

publications as directed by the Chief Pilot and/or the Director of Operations.

31. *If a flight is going to be delayed or cancelled for a mechanical irregularity, weather or any other Pilot in Command decisions, it is the Pilot in Command's responsibility to contact the Communications Center as soon as possible.*

32. *The Pilot in Command will notify on-call Ops Control immediately any time a flight request cannot be completed for any reason and send an email to the Chief Pilot and Director of Operations within 24 hours with a brief explanation of the inability to complete the flight request.*

33. *The Pilot in Command, if needed, may assign emergency evacuation duties to Company medical attendants. For passengers needing additional aid in the event of an aircraft evacuation the Pilot in Command may assign a medical attendant or passenger to such passengers in need.*

34. *The Pilot in Command must be highly knowledgeable of the Company General Operations Manual, Federal Aviation Regulations, Flight Manuals etc.*

35. *Supervises flight planning and flight preparation of the Second in Command if an SIC has been assigned to the flight.*

36. *Ensures all passengers have been given a proper safety briefing.*

37. *Ensures all maintenance discrepancies are written properly and communicated to the Director of Maintenance or his designee, as well as the Communication Center.*

38. *The on-duty Pilot in Command will stay with the aircraft when maintenance functions are being performed away from a Guardian Flight maintenance base, unless permission to leave is granted from the Chief Pilot or the Director of Operations.*

39. *Completes required Company documentation including GPS Mileage Forms and Duty Logs.*

40. *The Pilot in Command is ultimately responsible for the safety of his or her passengers. He or she may delegate functions to other trained personnel but retains responsibility. He or she shall ensure all*

passengers are briefed before each flight in accordance with 14 CFR Part §135.23(k) as described by the passenger briefing section of this manual. If there is a passenger on board in need of assistance, in the event of evacuation, an attendant (or passenger) shall be assigned to that person and be briefed on procedures by the Pilot in Command to aid that individual.

9.3 Duty Day – First Hour

Guardian Flight's C90 Standard Operations Procedures, Chapter 1, Section 1.10 "*Duty Day*" dated July 11, 2022 provided the following:

1.1.10.1 First hour

Purpose: To define the minimal procedural expectations and timeline for the first hour of a duty shift.

Policy: The Flight Team will complete the most essential and operationally significant daily duties within the first hour of their assigned shift.

Procedure

1. *The on-coming Flight Team will present fit for duty at the start of the shift.*
2. *Controlled substance count/handoff for Medical Crew, Narcotics will be counted daily and count documented, if off going medical crew, a minimum of one oncoming and one off going medical crew member will count and document all controlled substances. (Please reference GMR Controlled Substances Unified Policy located in Policy Tech.).*
3. *The off-going Medical Crew will provide pass down to the on-coming Medical Crew, to include:*
   a. *The hand-off of assigned phones and/or radios if applicable.*
   b. *The off-going crew shall report any significant information from the prior duty shift that may have an immediate impact on operations for the on-coming Flight Team. This will include:*
      i. *Oxygen status of both aircraft and portable supplies.*
      ii. *Known equipment or supply deficiencies, to include out-going broken equipment status.*
      iii. *Any required follow-up from off-going duty-day events or flights.*
      iv. *Any known customer relations events scheduled for the coming duty shift.*
4. *The off-going PIC will provide a (face to face report) pass down to the on-coming PIC to include any aircraft related operational issues and hand-off the assigned phone and/or radio.*
5. *Pass down will be completed within the first ten minutes of the shift.*
6. *The PIC will perform the required beginning of shift pre-flight duties (as defined by GOM).*

7. *The Flight Team and AMT (if applicable) will meet for the Duty Shift Briefing to include:*
    a. *The Flight Team and AMT scheduled for shift.*
    b. *The PIC or AMT (if applicable) should report on any aircraft maintenance issues, limitations (MEL), and scheduled/unscheduled OOS time to the Medical Flight Crew.*
    c. *The PIC will perform a safety briefing to include:*
        i. *Expected weather during the next 12 hours.*
        ii. *Aircraft weight/performance limitations (RW only).*
        iii. *Regional flight restrictions or known issues (e.g., TFRs, NOTAMs).*
8. *The PIC will make contact with the Communications Center via phone to communicate and confirm:*
    a. *Aircraft manifest and designated Medical Flight Crew.*
    b. *Unit service status (e.g., in service vs. out of service).*
    c. *Any known operational limitations to the Flight Crew or aircraft.*
9. *The Medical Crew will perform an aircraft inspection to include:*
    a. *Confirmation of adequate aircraft and portable oxygen supply levels.*
    b. *Confirmation of aircraft medical supply inventory levels set to par.*
    c. *Confirmation that all airframe specific inventory items are accounted for.*
    d. *Completion of an aircraft decontamination/wipe-down as needed.*
    e. *Confirmation that the primary CDE (clinical diagnostic equipment) is fully charged and operational to include:(clinical diagnostic equipment) is fully charged and operational to include:*
        i. *Completion of a cardiac monitor defibrillator check and cycle of the battery.*
        ii. *Powering on the ventilator and performing a system check.*
        iii. *Powering on the medication pump and confirming all channels as operational.*
    f. *Confirmation that all handheld radios/phones/iPad are fully charged and operational.*
10. *The Medical Crew will perform a primary bag check to include:*
    a. *All airway management/medical equipment and supplies are present.*
    b. *In order to be compliant with state mandated air ambulance minimum equipment/supply lists, the Medical Crew will be allotted no more than 30 minutes to verify that the essential medical equipment/supplies are present and functional.*

9.4 Fatigue

Guardian Flight's C90 Standard Operations Procedures, Chapter 1, Section 1.11 "*Fatigue/Time-Out Policy*" dated July 11, 2022 provided the following:

Purpose: To define the fatigue management system and provide standard direction to the Flight Team for the utilization of the fatigue stand-down/time out process.

Policy: In the event of physical exhaustion secondary to prolonged or continuous flight duty, the Flight Team will time out, and the unit's service status will be evaluated per the Risk Assessment for Medical Crew. The Program Director or designee will be contacted either by the Medical Crew or Dispatch to receive notification of the time out.

Procedure:

1.1.11.1 Mitigation

1. *Flight Team members will report to their base rested and fully capable of standing duty for the duration of their assigned shift. The following pre-shift rest requirements will be observed:*
   a. *Medical Crew will have at least ten hours of rest before standing duty on an assigned shift.*
   b. *Pilots will have at least ten hours of rest, or in accordance with regulations before standing duty on an assigned shift.*
   c. *Flight Team members working a secondary job sill have at least ten hours off between the end of their non-Guardian Flight LLC work period and the beginning of an assigned duty shift.*
2. *To minimize the time it takes a Flight Team member to enter a beneficial sleep state, Guardian Flight LLC will provide a private crew rest area that is:*
   a. Quiet
   b. Temperature controlled
   c. Light controlled
   d. Comfortable and conducive to sleep

1.1.11.2 Time Out

1. *The team member who identifies that they are fatigued to the point of no longer being able to safely perform their assigned duties will immediately self-report to the other Flight Team member(s).*
2. *The Flight Team member(s) will make immediate contact with the Program Director (PD) and/or Communication Center (CC) to advise the unit service status has changed secondary to crew fatigue.*
3. *The fatigued Flight Team member(s) will immediately or if on a flight, at the completion of the flight, begin the duration of the allotted time out period. During this time out period, the fatigued Flight Team member(s) will not be disturbed except in the case of an emergency and is required to utilize this time for rest.*

4. *The Time Out Flight Team member(s) should rest in a location that can be free of interruptions for the duration of the Time Out.*
5. *CC will notify the PD/Clinical Manager that the unit's service status has changed to out of service secondary to a time out.*
6. *CC will automatically return the unit to in-service status at the end of the time out period.*
7. *During the Time Out period, Flight Team member(s) must remain at their designated rest area until the end of their shift. If the allocated rest period goes beyond the end of their shift, Flight Team member(s) are highly encouraged to remain at their designated rest area until they are fit to travel.*
8. *CC must be notified as soon as possible when a Flight Team member(s) is going to Time Out. a. Flight Team member(s) MUST notify CC if they are going to Time Out PRIOR to departing the accepting facility/airport. This is to prevent being assigned another flight while on the return leg back to home base.*

It is unacceptable to Time Out after being dispatched on a flight/mission unless the Flight Team member(s) has an emergency. Consultation with the PD or on-call Guardian Flight Executive in this case is MANDATORY…

1.1.11.9 Monitoring and Review
The Program Director will be notified of each use of the Time-out procedure and the Crew Rest and Time-out Form on Ninth Brain must be completed. The Program Director must be made aware of and approve any shift extensions. Shifts longer than each base's maximum and use of the Time-Out procedure will be reported and reviewed as part of Guardian Flight LLC QM process.

It is considered inappropriate to use the time-out policy after being assigned a flight that results in a decline. This policy and its application is predicated on accumulated fatigue and not predictive fatigue. The use of the flight risk analysis program is the appropriate location for such risk elements.

9.5 Flight Deck Discipline

The Guardian Flight, LLC C90 Standard Operating Procedure, Revision #3, dated 04/18/2019 provided the following policy in regard to flight deck discipline:

Sterile cockpit:

1) *Guardian Flight defines "critical phase of flight" as any time the engines are running on the ground, the aircraft is moving on the ground, take-off, landing and flight below 10,000 feet excluding cruise.*
2) *Guardian Flight shall not require, nor may any flight crewmember perform any duties during a critical phase of flight except those duties required for the safe operation of the aircraft.*

3) No flight crewmember may engage in, nor may any PIC permit, any activity during a critical phase of flight which could distract any flight crewmember from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties.
4) It is the responsibly of the PIC to brief medical team members on the definition of a sterile cockpit and the associated procedures if they appear to be unfamiliar with this policy.

Maintaining outside vigilance:

1) It is the PIC's responsibility to maintain outside vigilance anytime the aircrafts engines are running.
2) It is the PIC's responsibility to maintain outside vigilance anytime the aircraft is operating in VMC flight conditions regardless of the type of flight plan the PIC is operating under.

***Use of music players**:*
1) Shall not be used during any critical phase of flight.
2) Shall not be used at a volume that would interfere with ATC communications.

9.6 Aircraft Systems Checks

The Guardian Flight, LLC King Air BE-90 Standard Operating Procedures Manual, Revision #3 provided, in part, the following in regard to the various aircraft system checks:

Current Limiter Check (every flight)

***CURRENT LIMITER CHECK** (every flight)*
After first engine start, Voltmeter — Verify 28V for side not started
After second engine start;…
…Generator for 1st Engine Start — Hold Reset. While holding verify 28V

Electrical System Test (every flight)

***ELECTRICAL SYSTEM TEST** (every flight)*
Inverters — CHECK (105-120V, 380-420 Hz)

GEN Ties — OPEN
-Verify L GEN TIE & R GEN TIE lights on

Voltmeter – TPL (27V), R&L Gen Bus (28V), Center (>24V)

GEN Ties — NORMAL
-Verify L GEN TIE and R GEN TIE lights out

Bus Sense Switch *TEST*
-Verify L GEN TIE, R GEN TIE, BAT TIE lights on

Voltmeter – TPL (27V), R&L Gen Bus (28V), Center (28V)
-Verify L GEN TIE, R GEN TIE, BAT TIE lights out

Voltmeter Selector Switch *SELECT TPL*

Generator Load *Parallel within 10%*

…

EFIS TEST *(every flight)*
Press to test; wait for all letters to stop flashing on EADI

9.7 Risk Assessment

The Guardian Flight, Flight Standard Manual, Chapter 4 "Operations" provided the following guidance on ascertaining the risk involved with flight operations:

It is imperative to ascertain the risk involved with flight operation to determine the safety of the flight. At GFL a risk assessment found on the Baldwin Aviation Website is used to translate the amount of risk associated with each flight into a number. This number must be determined accurately and communicated to the communications specialist prior to every flight.

If the risk assessment is calculated at a 3 or lower, it is the crew's decision as to whether to proceed with the flight. If the risk assessment is 4, the PIC must contact the PMOC (Pilot Management on Call) or Alaska Ops Manager on Call (AKOPS) and discuss the flight with them to determine whether to proceed with the flight. A risk assessment of 5 also requires consult with PMOC. This conversation will focus on attempts to mitigate the risk back to a 4. If the risk is not able to be mitigated to a 4, the flight will likely be cancelled. Acceptance of a flight in RA 5 is only at the agreement of both the pilot(s) AND PMOC. If the RA is 4 or 5, the pilot must relay to the communications specialist that a conversation with PMOC has occurred and that either:

- *both are in agreement with the go determination or;*
- *No-go decision has been made.*

NOTE: 14CFR 91 reposition flights outside of a scheduled 14-hour duty period require a call to PMOC for approval. PMOC notification is also required If anticipated flight time totals exceed the following during any 24-hour window:

- *7.5 hours or greater for single pilot operations or*
- *9.5 hours or greater for dual pilot operations*

9.7.1 Baldwin Report

Guardian Flight, LLC provided a copy of a blank Baldwin. The report, which was typically completed online using the company provided electronic flight bag, was about six pages in length and each page is listed in order below:

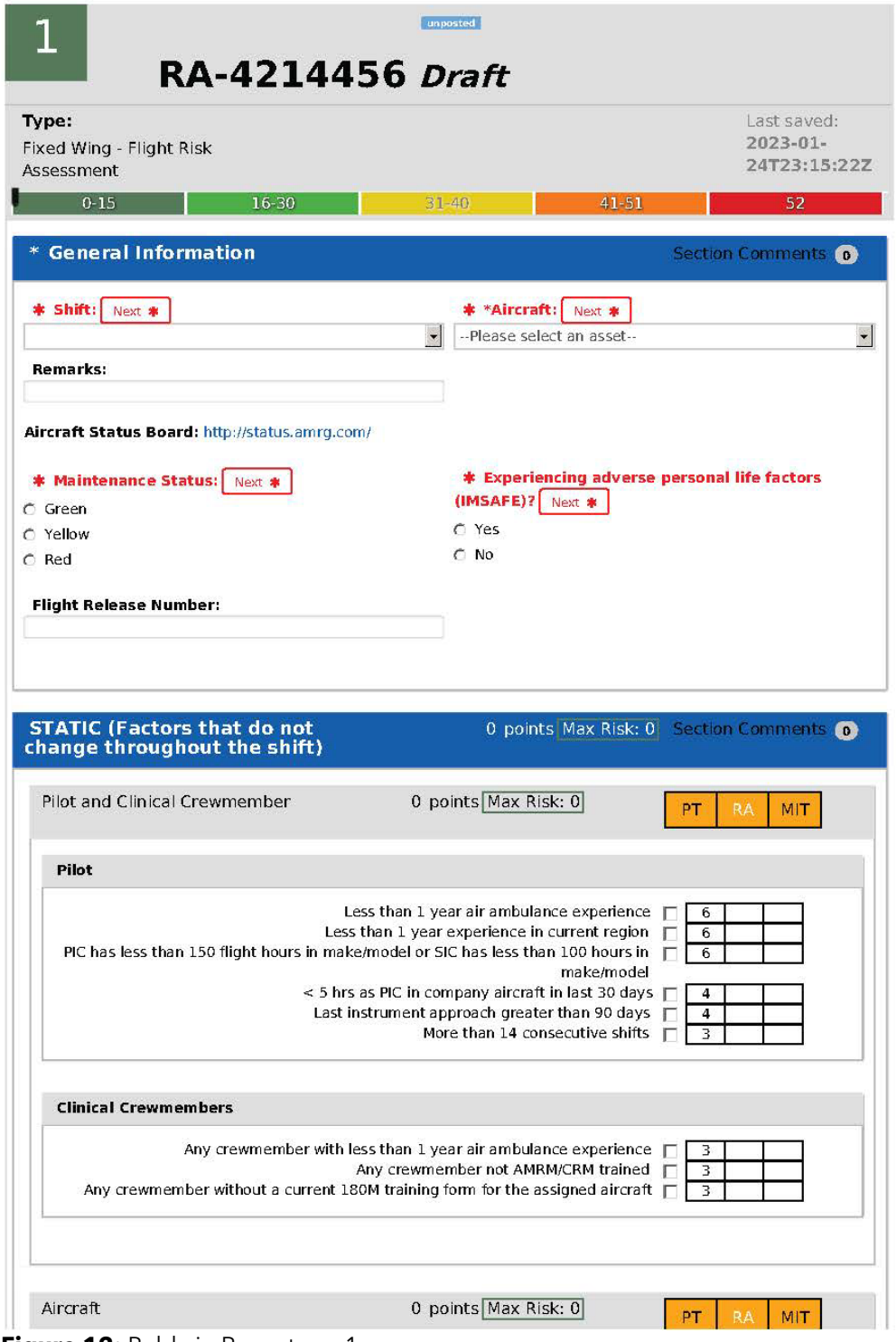

Figure 12: Baldwin Report pg. 1

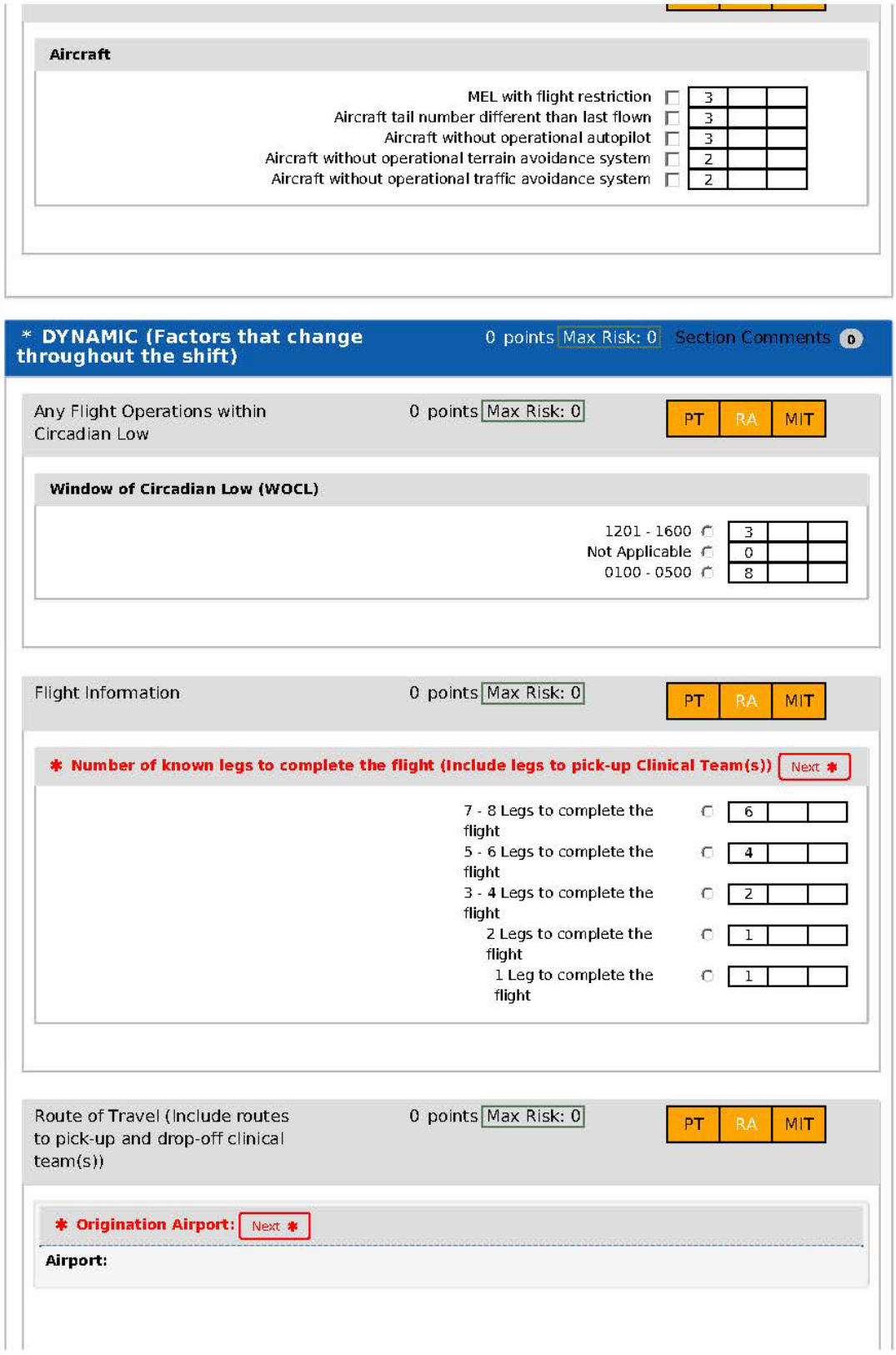

Figure 13: Baldwin Report pg. 2

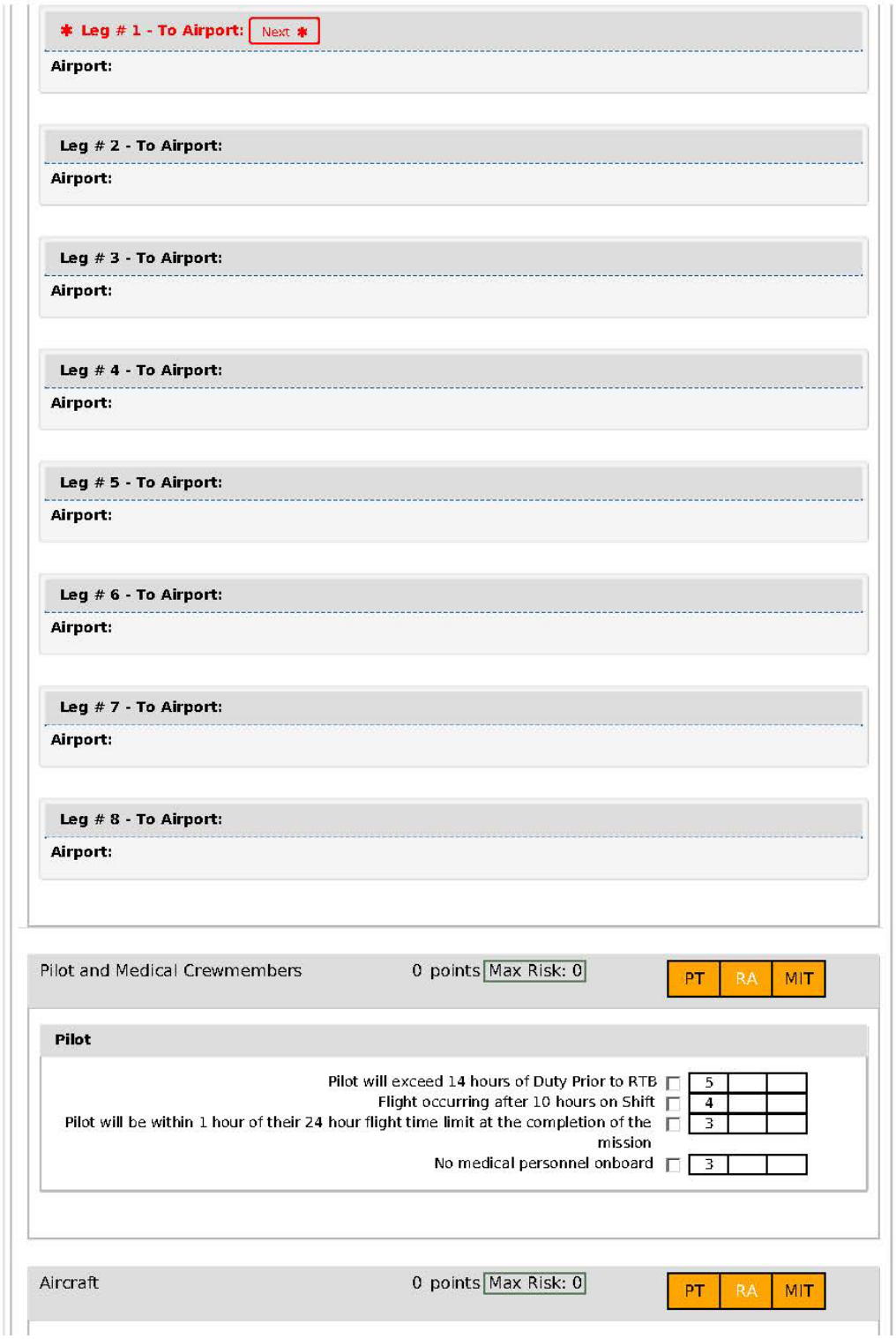

Figure 14: Baldwin Report pg. 3

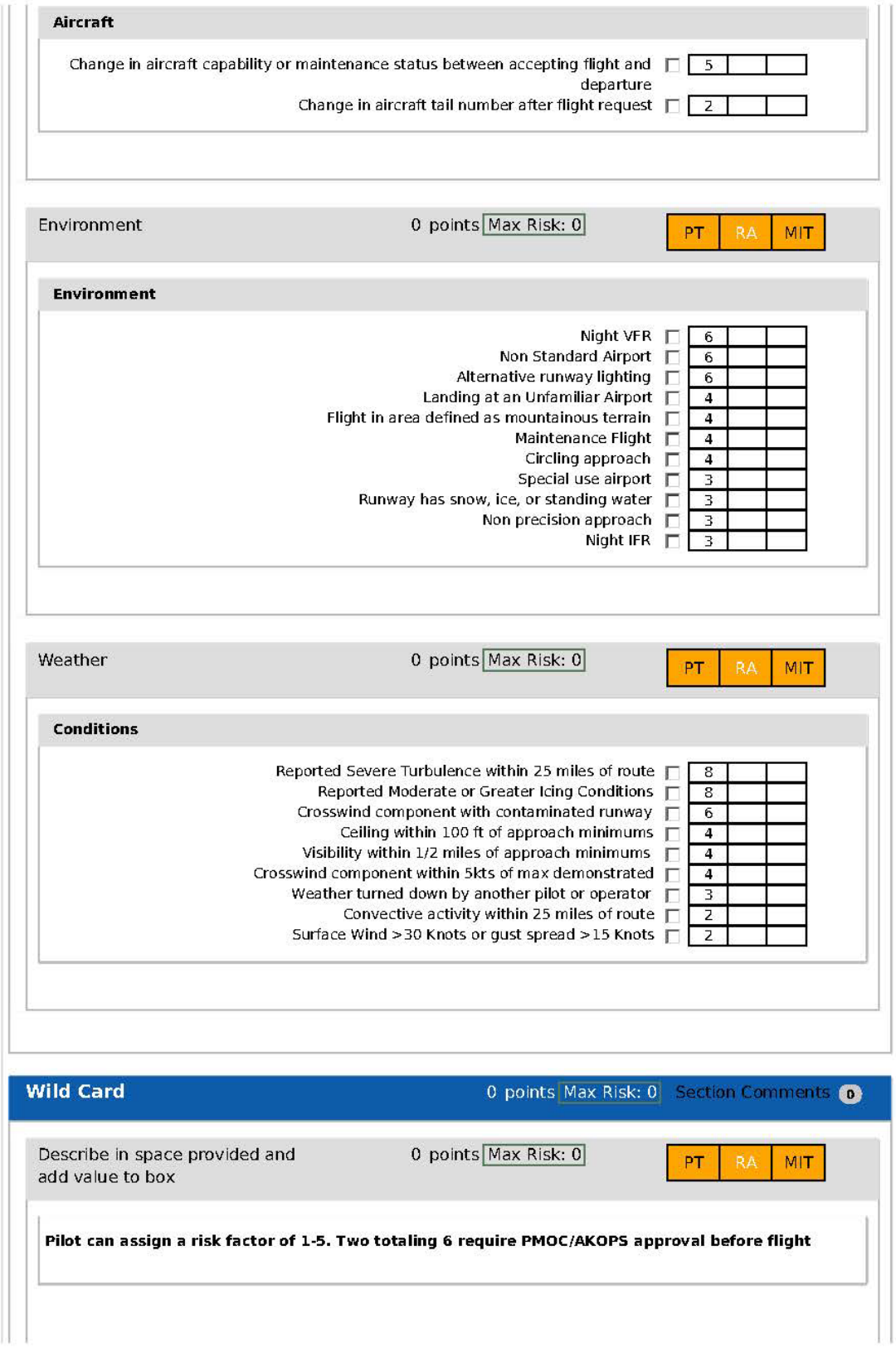

Figure 15: Baldwin Report pg. 4

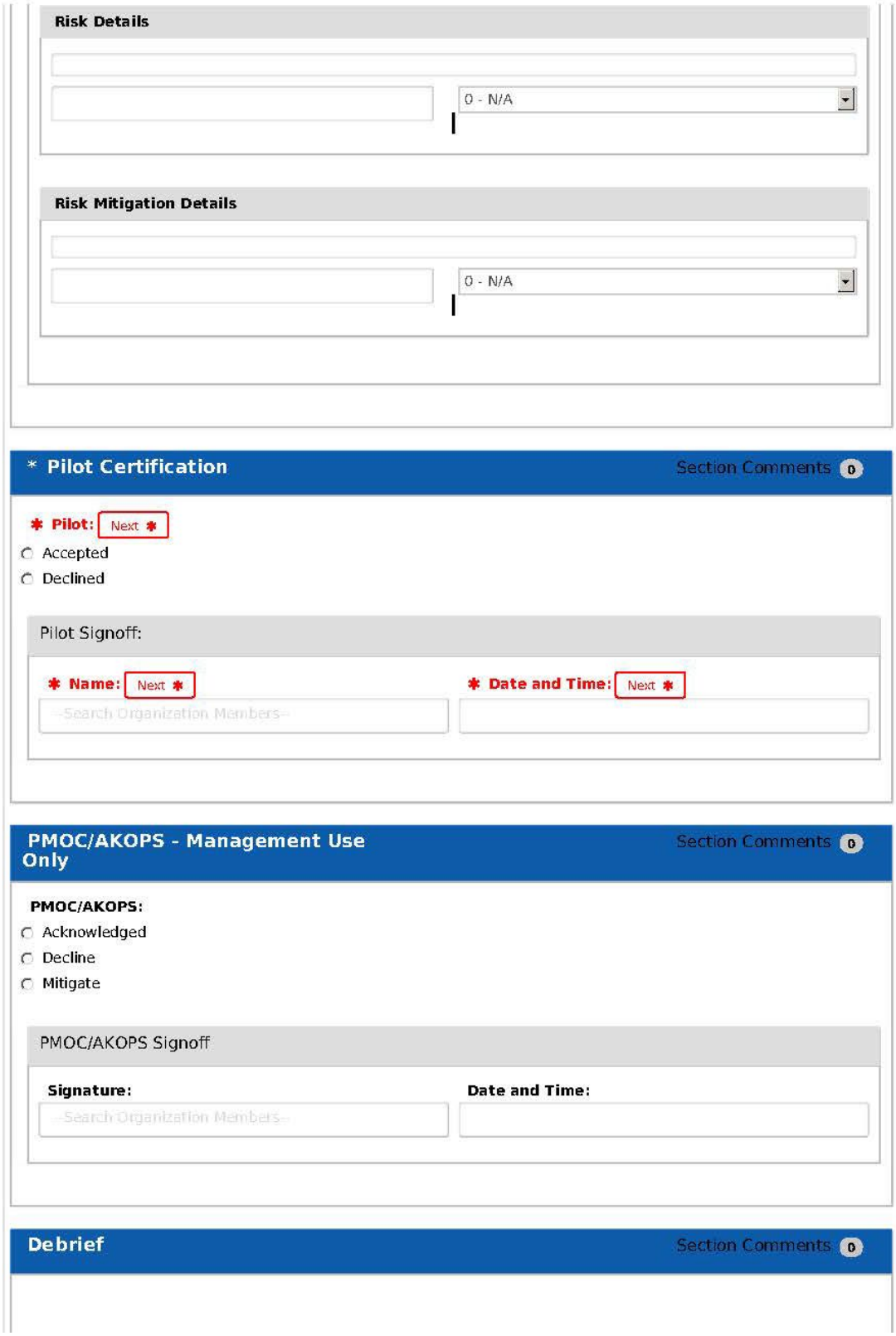

Figure 16: Baldwin Report pg. 5

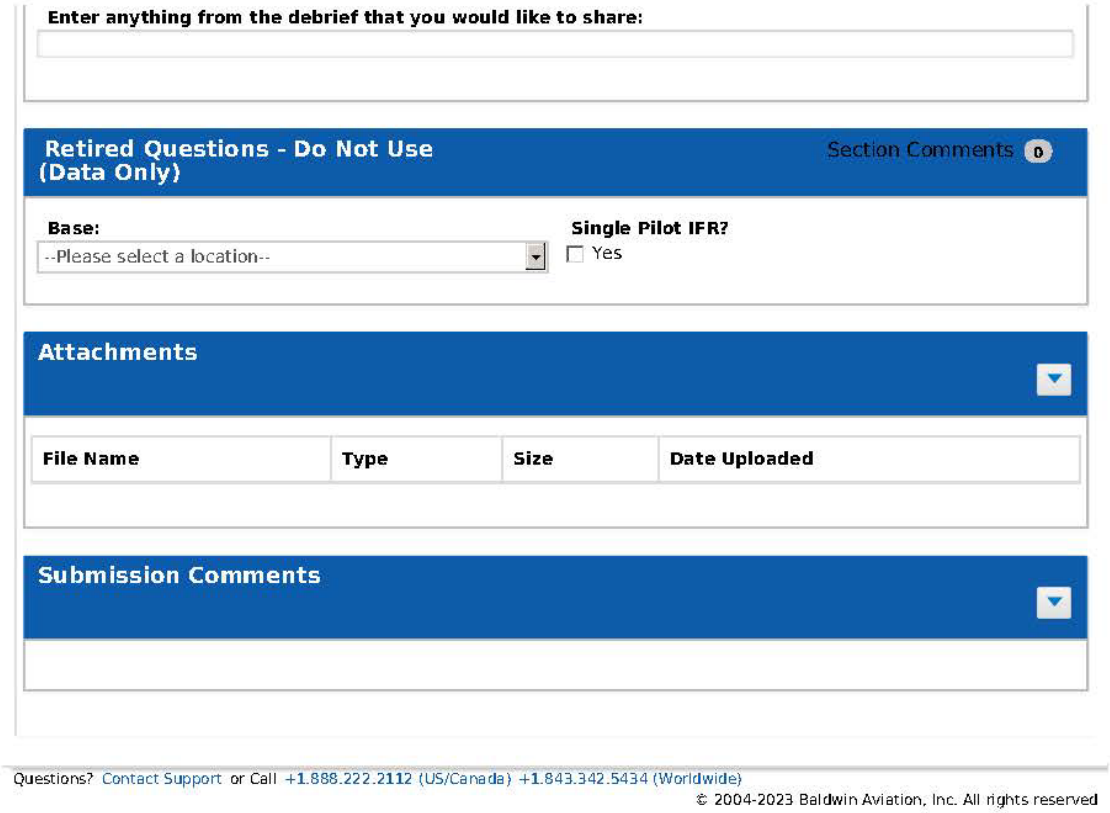

Figure 17: Baldwin Report pg. 6

9.8 Guardian Normal Takeoff Profile

The Guardian Flight King Air BE-90 Standard Operating Procedures, pg. SOP-57, Revision 3, dated April 18, 2019 provided the following profile graphic for a normal takeoff profile:

Normal Takeoff Profile:

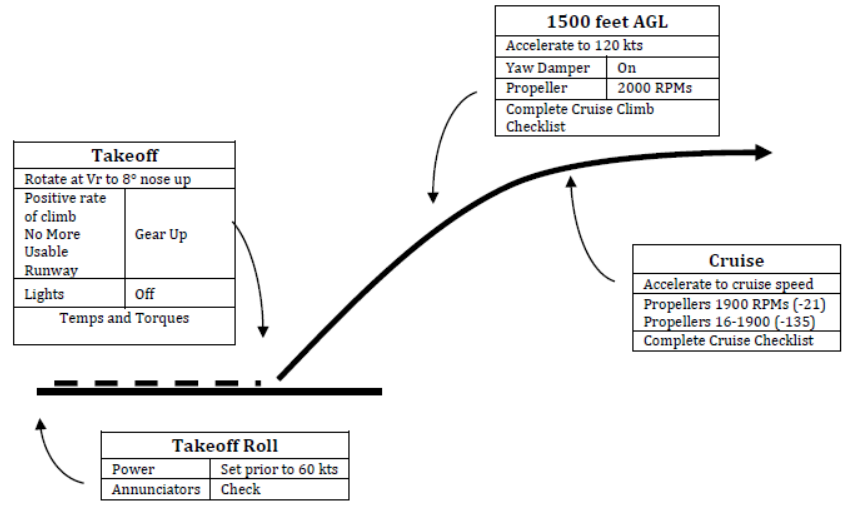

Figure 18: Guardian Flight Takeoff Profile Guidance (Source: Guardian Flight)

10.0 Textron Procedures

10.1 EFIS Malfunction

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual Supplement for the Collins FCS[49]-65H Automatic Flight Control System with Collins EFIS-84 (2-Tubne System with Single Date Processor Unit) Electronic Flight Instrument System, provided the following on EFIS Malfunctions:

> *If the EFIS displays are blank or abnormal, refer to alternate instruments for usable data. The copilot's instruments are approved as alternates to the pilot's instruments. Refer to EFIS MALFUNCTIONS in the ABNORMAL PROCEDURES section of this supplement.*

[49] Flight Control System

10.1.1 Abnormal Procedures

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual Supplement for the Collins FCS[50]-65H Automatic Flight Control System with Collins EFIS-84 (2-Tube System with Single Date Processor Unit) Electronic Flight Instrument System, provided the following abnormal procedure for EFIS Malfunctions:

DISPLAY PROCESSOR UNIT (DPU) FAILURE

Display Processor Unit (DPU) failure is indicated by the red DPU FAIL flag on the EADI and EHSI or by the EADI and/or EHS blanked and disabled.

- *Disengage autopilot.*
- *Use alternate attitude and/or navigation instruments.*

DISPLAY SELECT PANEL (DSP) FAILURE

Display Select Panel (DSP) failure is indicated by the red DSP flag on the EADI and EHSI.

1. *Disengage autopilot if engaged.*
2. *Use alternate navigation instrument for navigation information.*

NOTE

Failure of the DSP does not affect heading information displayed on the EHSI.

EADI FAILURE

1. *If the EAOI fails, select the composite switch to CMPST. A composite display will be presented on the operating tube.*
2. *Pull the appropriate circuit breaker for the affected indicator.*

EHSI FAILURE

1. *If the EHSI fails, select the composite switch to CMPST. A composite display will be presented on the operating tube.*
2. *Pull the appropriate circuit breaker for the affected indicator.*

ATTITUDE FAILURE

Attitude failure is indicated by a red ATT flag on the EADI.

- *Use copilot's attitude indicator.*

[50] Flight Control System

NOTE

The autopilot will disengage if it is selected ON.

HEADING FAILURE

Heading failure is indicated by a red HDG flag on the EHSI.

1. *Use instrument displaying compass No. 2 data.*
2. *Monitor the affected unit for performance degradation. If a system component failure occurs, pull the appropriate circuit breaker.*

10.2 Electrical System Failure

10.2.1 Inverter Inoperative

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual, Section 3 "*Emergency Procedures,"* dated July 2005, the following guidance was provided:

ELECTRICAL

INVERTER INOPERATIVE [INVERTER]
1. Other inverter . . . . . SELECT
2. Voltage/Frequency . . . . . .CHECK
(volts = 105 - 120, f = 380 - 480)

10.2.2 Electrical System

According to the Beechcraft King Air C90B Pilot's Operating Handbooks and FAA Approved Airplane Flight Manual, Section 3A *"Abnormal Procedures"* date July 2005, the guidance on Electrical System abnormal indications were as followed:

ELECTRICAL SYSTEM

GENERATOR INOPERATIVE [L DC GEN] or [R DC GEN]

14. *Generator . . . . . RESET, THEN ON*

If Generator Will Not Reset:

15. *Generator . . . . . OFF*
16. *Operating Generator . . . . . DO NOT EXCEED 100% LOAD*

BATTERY CHARGE RATE [BATTERY CHARGE] (Airplanes Prior To LJ-1534)
Ground Operations:

Illumination of the [BATTERY CHARGE] indicates an above-normal charge current.

The [BATTERY CHARGE] should extinguish within 5 minutes after a battery start.

If the [BATTERY CHARGE] does not extinguish, or it re-illuminates, the battery charge current should be checked every 90 seconds using the procedures below until the [BATTERY CHARGE] extinguishes.

No decrease in charging current between checks indicates an unsatisfactory condition.

Remove battery and check prior to flight. Do not takeoff with the [BATTERY CHARGE]

illuminated unless a decreasing charge current is confirmed.

3. *Either Generator . . . . . OFF*
4. *Voltmeter. . . . . VERIFY INDICATION OF 28 VOLTS*
5. *Battery. . . . . OFF MOMENTARILY, NOTING DECREASE IN LOADMETER*
6. *Battery. . . . . ON*

If Decrease in Loadmeter Exceeds 2.5%:

7. *Battery. . . . . CONTINUE TO CHARGE, REPEATING STEPS 3 & 4 EVERY 90 SECONDS*
8. *[BATTERY CHARGE]. . . . . EXTINGUISHED WHEN DECREASE IN LOADMETER IS LESS THAN 2.5%.*

In Flight:

In-flight illumination of the [BATTERY CHARGE] indicates a possible battery malfunction.

3. *Battery. . . . . OFF*
4. *[BATTERY CHARGE] Extinguished . . . . . CONTINUE TO DESTINATION*
5. *[BATTERY CHARGE] Still Illuminated . . . . . LAND AT NEAREST SUITABLE AIRPORT*

GENERATOR TIE OPEN [L GEN TIE OPEN] or [R GEN TIE OPEN]

1. *Appropriate Load Meter . . . . . MONITOR*
   a. *If Less Than 100% . . . . BUS SENSE SWITCH TO RESET*
   b. *If Greater Than 100%. . . . . TURN APPROPRIATE GENERATOR OFF (monitor opposite loadmeter; not to exceed 100%)*
2. *If Gen Tie Will Not Reset . .. . MONITOR LOADMETERS*

BOTH GENERATOR TIES OPEN [L GEN TIE OPEN] and [R GEN TIE OPEN]

1. *GEN TIES . . . . . MAN CLOSE*
2. *If Gen Ties Will Not Close . . . . . .MONITOR LOADMETERS*
   a. *Batter* [sic] *will not charge*
   b. *Battery will be depleted by equipment on center bus*

BATTERY TIE OPEN [BAT TIE OPEN]

1. Center Bus Voltage. . . . . .MONITOR

If Center Bus Voltage is Normal (27.5 - 29.0 vdc):

2. BUS SENSE Switch . . . . . RESET

[BAT TIE OPEN] – EXTINGUISHED

If Center Bus Voltage is Zero:

3. *GEN TIES . . . . . OPEN*
   - *Battery will not charge*
   - *Systems powered by the center bus will not be operational*
   - *Landing gear will have to be manually extended*
4. *LANDING GEAR RELAY Circuit Breaker (Pilot's Subpanel).. . . . . PULL*

CIRCUIT BREAKER TRIPPED

1. *Nonessential Circuit. . . . . DO NOT RESET IN FLIGHT*
2. *Essential Circuit*
   - *Circuit Breaker (after allowing to cool for a minimum of 10 seconds). . . . .PUSH TO RESET*
   - *If Circuit Breaker Trips Again . . . . . .DO NOT RESET*

AVIONICS MASTER POWER SWITCH FAILURE

If the Avionics Master Pwr Switch fails to operate in the ON position:

6. *Avionics Master circuit breaker . . . . .PULL*

NOTE

Turning on the Avionics Master Pwr switch removes power that holds the avionics relay open. If the switch fails to the OFF position, pulling the Avionics Master circuit breaker will remove power to the relay and should restore power to the avionics busses.

11.0 FAA Guidance

11.1 "Fly Safe: Prevent Loss of Control Accidents"

On July 26, 2018, the FAA issued a press release titled "*Fly Safe: Prevent Loss of Control Accidents.*[51]". The following guidance, in part, was provided to all readers as part of the FAA's "*Fly Safe*" campaign:

> *A Loss of Control (LOC) accident involves an unintended departure of an aircraft from controlled flight. LOC can happen when the aircraft enters a flight regime that is outside its normal flight envelope and quickly develops into a stall or spin. It can introduce an element of surprise for the pilot.*
>
> ***What does it Mean to "Fly the Aircraft First?"***
>
> *Eliminate distraction. How often have we heard that phrase when it comes to operating dangerous or heavy equipment, especially driving a car? How tempting is it to pay less attention to your aircraft and more attention to an air traffic control (ATC) transmission, app, or conversation while in the cockpit?*
>
> *NTSB data suggests that distraction is a significant cause of accidents. These accidents can be avoided. We remind you to maintain aircraft control at all times. This might mean a short delay in responding to ATC communications or passenger requests. In other words, Fly the Aircraft First!!*
>
> ***Aviate, Navigate, Communicate***
>
> *Do you remember that lesson from your first days in pilot ground school? Aviate, Navigate, Communicate. Three top priorities, but the leader of them all is Aviate. That means to fly the airplane by using the flight controls and flight instruments to direct the airplane's attitude, airspeed, and altitude. The instruments directly in front of you provide important information about your control of the aircraft. They give you critical information about airspeed, attitude, altitude, vertical speed and rate, magnetic heading, and turns and coordination.*
>
> *Rounding out the top three is Navigate (figuring out where you are and where you're going), and Communicate (talking with ATC or someone outside the cockpit). It seems very simple, but it's easy to forget when you become distracted.*
>
> ***Disconnect from Distraction***
>
> *This example demonstrates how deadly distractions can be. Do all that you can to minimize distractions from every source. Explain sterile cockpit procedures to*

[51] Fly Safe: Prevent Loss of Control Accidents | Federal Aviation Administration (faa.gov)

your passengers. Self-brief if you are alone. Establish the focused, no-nonsense mindset you need for critical phases of flight.

Staying ahead of the airplane is another good practice. That way, if something comes up, you'll have more time to assess its impact on safety and determine an appropriate course of action.

Emergency Practices

Finally, if you think you might be in an emergency situation, this is no time to go it alone. Use the pilot-in-command's authority and declare an emergency. It's always better to explain your actions from a safe place on the ground than to have this become your final flight. A good way to prepare for emergencies is to practice your emergency procedures regularly. Brush up on your short and soft-field takeoffs and landings, as well as your power-off approach and landings. And, be sure to practice these maneuvers at your planned mission weight to improve your chances for success should a real emergency occur.

D. ATTACHMENTS

Attachment 1 – Guadian Personnel Interview Transcripts
Attachment 2 – Hawaii Life Flight Personnel Interview Transcripts
Attachment 3 – FAA Personnel Interview Transcripts
Attachment 4 – Pilot Annual Resume and Prior Experience
Attachment 5 – Pilot Training Records – Guardian [Excerpts]
Attachment 6 – Pilot Previous 90-Day Work Schedule
Attachment 7 – Pilot Other Employer Training [Excerpts]
Attachment 8 – Pilot Other Employer Previous 90-Day Work Schedule
Attachment 9 – Accident Flight Preflight Planning and Weather Briefing
Attachment 10 – Guardian Flight Standards Manual [Excerpts]
Attachment 11 – Guardian Standard Operating Procedures [Excerpts]
Attachment 12 – Guardian C-90 Standard Operating Procedures [Excerpts]
Attachment 13 – Guardian Operation Specification [Excerpts]
Attachment 14 – Guadian General Operations Manual [Excerpts]
Attachment 15 – Baldwin Report – Blank
Attachment 16 – King Air C90B Pilot Operating Handbook and FAA Approved Airplane Flight Manual [Excerpt]
Attachment 17 – Letter Found in Pilot's Personal Effects
Attachment 18 – Email Correspondence between HP Investigator and Guardian Flight LLC Director of Safety

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