

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



DCA21FA174

OPERATIONAL FACTORS/HUMAN PERFORMANCE

Group Chairs' Factual Report

July 20, 2022

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A. ACCIDENT

Location: Honolulu, Hawaii
Date: July 2, 2021
Time: 0145 Hawaiian standard time¹
1145 coordinated universal time
Airplane: Boeing 737-275C; N810TA, Rhoades 810

B. OPERATIONAL FACTORS/HUMAN PERFORMANCE GROUP

Group Chair	Shawn Etcher - Operational Factors National Transportation Safety Board Washington, DC 20594
Group Chair	William Bramble - Human Performance National Transportation Safety Board Washington, DC 20594
Group Member	Clarence Kanae Federal Aviation Administration Honolulu, HI 96820
Group Member	Rich Lee The Boeing Company Seattle, WA 98124
Group Member	Robert Navario-Lightholder Rhoades Aviation, Inc. Honolulu, HI 29239

C. SUMMARY

On July 2, 2021, at about 0145 local, Rhoades Aviation, Inc. dba Transair², flight 810, a B737-200, N810TA, reported engine anomalies in both engines and subsequently ditched into Mamala Bay shortly after takeoff from Daniel K. Inouye International Airport (HNL), Honolulu, Hawaii. The two flight crew members were rescued, and the airplane was substantially damaged. The flight was operating under Title 14 *Code of Federal Regulations* Part 121 as a cargo flight from HNL to Kahului International Airport (OGG), Kahului, Hawaii.

¹ All times in this report are Hawaiian standard time unless otherwise noted.

² The FAA operating certificate listed Rhoades Aviation Inc as the operator; however, at the time of the accident the flight was doing business as Transair. Either name used in this report the name could be synonymous throughout.

D. DETAILS OF THE INVESTIGATION

On July 2, 2021, the group chairmen were notified of the accident. The group requested records from the Rhoades Aviation, Inc. and submitted a list of personnel to be interviewed. The group obtained information about the flight crew, who were reported as being in a Surgical Intensive Care Unit (SICU) in Honolulu with unknown injuries.

On July 3, 2021, the group chairmen traveled to Honolulu via commercial airlines and participated in an organizational meeting at the NTSB command post at 1800 HST. An FAA and a Boeing investigator were added to the Operational Factors / Human Performance Group, bringing the number of group members to four. The NTSB asked Rhoades Aviation to provide a line pilot to serve on the group, but none were made available.

On July 4, 2021, the group convened at the Rhoades Aviation, Inc. operations center, also known as Hanger 1. The group received a tour of the operations offices, crew lounge, and flight planning / flight following office. The group inspected N809TA, a Rhoades Aviation, Inc. airplane that was similar to the accident airplane, and took photos of its flight deck, cargo area, and exterior. The group scheduled interviews with company personnel for the following days. The group obtained cargo and fuel loading records for the accident airplane, documented the refueling area and truck, and obtained information about refueling procedures.

On July 5, 2021, the group interviewed the accident first officer, a captain that had previously flown with the accident first officer, a first officer who had flown with the captain the night before, and the chief pilot. The group also coordinated the collection of flight crew blood and urine samples from Queen's Medical Center in Honolulu, Hawaii, and arranged their shipment to the forensic toxicological laboratory at the FAA's Civil Aerospace Medical Institute.

On July 6, 2021, the group interviewed the Rhoades Aviation, Inc. flight follower who was responsible for monitoring the accident flight, the accident captain, the load supervisor, and a first officer who had flown with the accident captain the night before the accident.

On July 7, 2021, the group interviewed the accident flight's load supervisor/cargo administrator, and Rhoades Aviation, Inc.'s director of operations, director of safety, and the chief executive officer (CEO).

On July 8, 2021, the group interviewed the FAA front-line manager who oversaw the Rhoades Aviation, Inc. certificate management team (CMT) and the FAA principal operations inspector (POI) for Rhoades Aviation, Inc. The group also documented

Rhoades Aviation, Inc.'s cargo scales³ at Hangar 1, and visited and documented the Rhoades Aviation, Inc. maintenance hangar, Hangar 2.

On July 9, 2021, the group completed its field notes for the initial launch. Rhoades Aviation, Inc. made a pilot available to serve as a group member, and he was invited to participate in subsequent group activities.

September 23, 2021, the group reconvened in Honolulu, Hawaii for follow-up investigative activities. On that day, the group interviewed the former FAA POI for Rhoades Aviation, Inc. and a former Rhoades Aviation, Inc. captain.

September 24, 2021, the group interviewed a former Rhoades Aviation, Inc. safety management system (SMS) auditor, a former Rhoades Aviation, Inc. line check airman, and a former FAA front-line manager who had previously overseen the Rhoades Aviation, Inc. CMT.

September 27, 2021, the group interviewed three Rhoades Aviation, Inc. first officers.

September 28, 2021, the group interviewed two Rhoades Aviation, Inc. captains, including one line check airman. The group also reinterviewed the chief pilot.

September 29, 2021, the group interviewed the Rhoades Aviation, Inc. vice-president and reinterviewed the CEO. This concluded the group's on-scene follow-up activities.

January 23, 2022, Rhoades Aviation, Inc. made another pilot available to the group, as the pilot who was originally assigned had left the company.

February 15, 2022, Rhoades Aviation, Inc. made a third pilot available to the group, as the second pilot was no longer available.

March 17, 2022, the group reinterviewed the accident captain by video conference.

March 30, 2022, the group reinterviewed the accident first officer by video conference.

³ The 20,000 lbs. scale was checked on April 8, 2021 and was most recently calibrated on August 12, 2020. The 5,000 lbs. scale was checked on May 14, 2021 and was most recently calibrated on May 14, 2021. Source: Operational Factors/Human Performance - Attachment 10 - Scale Calibration and Inspection.

E. FACTUAL INFORMATION

1.0 History of Flight

The flight crew, consisting of a captain and a first officer, arrived at the Rhoades Aviation, Inc. flight following office at HNL by their assigned report time of 0015 for a planned departure time of 0100 for a flight from HNL to Kahului Airport (OGG), Kahului, Hawaii. According to crew interviews, they briefed the weather and other flight related information.⁴ The captain then determined the performance limitations of the airplane and provided them to the flight follower who gave them to the cargo load manager.

The first officer conducted an external preflight inspection. He found everything was *"normal except on the left main gear there was a lot of fluid that was...it wasn't currently leaking but it had recently leaked, it was all over the tire, all over the ground..."*.⁵ The first officer took a photo and sent it to the captain and a mechanic. After doing so, the first officer moved on to performing the cockpit preflight inspection. The captain and mechanic examined the area of spilled fluid. They determined that the fluid was dry. They checked the level of fluid in a hydraulic reservoir in the gear well and found that it was in the acceptable range. They turned on the hydraulic pumps, energized the ground interconnect, and saw nothing leaking. According to the accident captain the leak *"was nothing...it was not of any concern to me."* He then stated that he informed maintenance that he would write it up after the current night's flights were complete. He also provided that it *"...was dry, it wasn't wet, fresh..."*.⁶

The crew monitored cargo loading activities and the cargo load supervisor gave them the weight and balance paperwork. The airplane had been loaded with 6 ULD⁷s and one PBJ⁸, enough to fill all of the airplane's cargo positions. The captain recalled thinking that the airplane was *"very heavy,"* and the resulting takeoff power setting was *"pretty high."* The mechanic closed the cargo doors. The crew confirmed that all the cargo doors were indicating closed on an indicator panel in the galley area, and the first officer secured the cargo door switch. The crew then closed the entry and cockpit doors, settled into their seats, and put on their seatbelts. They agreed that the first officer would serve as pilot flying.

⁴ Information provided by the crew and other company personnel during interviews is contained in Operational Factors / Human Performance - Attachment 1 - Flight Crew Interview Transcripts and Statements.

⁵ See Section 1.1 of this report for the photograph of the fluid.

⁶ Source: Operational Factors/Human Performance - Attachment 1 - "Flight Crew Interview Transcript and Written Statements" page 17.

⁷ Universal Loading Device

⁸ A PBJ is a 1.1-inch flat metal sheet that is 88 inches by 108 inches and was certified for a max weight of 10,000 lbs.

The first officer told investigators that he and the captain performed the Before Engine Start checklist. After exchanging signals with the marshaller, they performed the Engine Start checklist. The captain recalled that both engines started normally. The crew called for and received clearance to taxi to runway 8R. The captain recalled that oil pressure and other engine indications looked normal. Company records indicated that the flight departed the ramp area at 0123. The airplane began broadcasting ADS-B data at 0122:23. These data indicate that it began its taxi at 0123:37. The flight follower and the flight crew told investigators that cargo loading was the reason the airplane left behind schedule.

The captain recalled that as he taxied the airplane to the hold short line for runway 08R, he brought up the power and he checked the engine instruments, hydraulic pressure, and hydraulic quantity indications. Everything looked normal. The crew then checked the brakes, set flaps 5 (captain's preference), performed flight control checks (the first officer checked the yoke, the captain checked the rudder pedals), and completed the Taxi checklist. Air Traffic Control (ATC) issued a clearance to take off, turn right heading 155 degrees, and climb to 5,000 feet.

The captain taxied the airplane to runway 08R. The first officer recalled that he brought the power up to an engine pressure ratio (EPR) setting of 1.4 and then put both hands on the yoke. The captain informed him that thrust was stabilized, and then the first officer asked him to set thrust. The captain adjusted thrust until the EPR indications were at the "*carats*" (an EPR setting of 2.01, according to the first officer). EPR setting stabilized and the captain informed the first officer that power was set.

The captain told investigators he spoke with ATC, scanned the flight instruments, looked at the airspeed, scanned the runway for obstacles or debris, and examined the engine indications. Exhaust gas temperature (EGT) indications for both engines were at the line separating the green and the yellow ranges on the display. He stated during his initial post-accident interview that he had seen that before, so he considered it normal.

Next, the captain recalled monitoring airspeed and keeping his hand on the thrust levers until V1. He called out "*V1, rotate*", "*positive rate*", and "*gear up*" (as the landing gear were raised). The first officer recalled rotating the airplane to the "*V-bars*," and then to a pitch attitude of 18 degrees nose-up. Approximately 0133:46, according to ADS-B data, altitude began increasing, indicating the airplane was in a climb.

The first officer told investigators that about the time the landing gear retracted he heard a "*pop*" emanate from the area of the left engine. He recalled that the airplane yawed right and then left as he corrected with the rudder pedals. He told investigators that immediately after he heard the pop, "*all the gauges on the left side, the Number 1 just dropped.*" When asked what he thought had happened, he recalled:

Initially I heard the pop and... I thought I knew it was the left engine except the airplane yawed to the, to the right, which shouldn't have been the case... but that may just be I stepped on the rudder or something, I don't know. But it pulled to the right but pretty quickly we realized it was the Number 1 engine just by looking at the indications...

In a follow-up interview, he told investigators the airplane yawed left immediately after the pop, and that he corrected by applying right rudder. During that interview he recalled *"very clearly that my initial thought was we've lost the number one engine."* He recalled subsequently feeling that the airplane as *"pulling to the left"* which indicated to him that the number 1 engine was *"not producing thrust."* He did not recall the captain saying anything about which engine had failed. The first officer recalled the captain offering to take the controls at that time, but he declined. The captain told him to fly a heading of 220 and level off at 2,000 feet and he complied. The first officer told investigators he did not adjust the thrust levers during the climb.

The captain told investigators that as the airplane was climbing through 900 feet, immediately after his *"gear up"* callout, he heard a *"whoosh"*. He recalled that the airplane rolled and yawed to the right and then back to the left. His feet were resting on the rudder pedals, and he recalled feeling the first officer counteracting the right yaw with the pedals. He thought the initial right yaw resulted from the engine anomaly and the left yaw resulted from the first officer's rudder pedal inputs. The captain told investigators he scanned the engine indications and noticed that both the EPR indications were *"about two tick marks"* below where he had set power on the EPR gauge.⁹ He told investigators that he informed the first officer they had lost engine number 1, but then noticed the number 2 EPR was a *"few ticks lower"* than the number 1, so he said, *"No, never mind, I think it's Number 2."* In a follow-up interview he affirmed that, *"The noise, the yaw and the roll, and the fact that the EPR was lower than what I had set, led me to believe that the problem [was] number 2."* The captain recalled telling the first officer they needed to clean up the airplane because 800 feet was the emergency flap retraction altitude. He reduced the flaps to 1 and then zero.

The captain told investigators that he informed the first officer he was going to set maximum continuous thrust (MCT). He recalled moving *"both power levels to MCT."* He added, *"I think it was already MCT since it had dropped."* He further stated, *"MCT, I have to tweak it to a much lower power, yeah. So, I just brought it back slightly referencing the tick mark. So, I just put it back slightly where it would normally be. But I didn't have a specific number for it. So long as it is not above the tick mark, we're okay, yeah, we're not going to overheat it."* The captain estimated that he reduced power *"about two tick marks"* on the EPR gauge. During a follow-up interview, investigators asked the captain to clarify whether he pulled the thrust levers back in unison or moved them one at a time. He said he pulled them back individually, first the number 1 and then the number

⁹ One tick mark on the EPR gauge is equivalent to 0.02 EPR.

2. He described these inputs as "*brief but deliberate.*" He could not recall the airplane's altitude when he did this, but he was confident that the airspeed was 190 knots. He could not recall whether he pulled one lever back farther than the other or if the levers were symmetrically positioned after his adjustments. The captain told investigators that he never subsequently touched the number 1 thrust lever after he made this adjustment.

The captain recalled telling the first officer he would speak with ATC. He later told investigators, "*It took a while for ATC to know what was going on. It was a little bit of confusion.*" He said there was another airplane with a similar call sign and the pilots, and the controller were stepping on each other's radio transmissions. The captain told investigators that the controller seemed too busy to pick up on what was happening and trying to communicate with the controller took too much of his attention away from the cockpit. However, he was eventually able to speak with the controller, declare an emergency and advise the controller of their intentions. During a follow-up interview, he said that he might have heard the whoosh sound again as he was talking with ATC, perhaps as the airplane was climbing through 1,500 feet. However, he was not certain, adding, "*I had the radar picture in my head and I was trying to follow what [the controller] was saying and all that stuff, where everybody else was. I was pretty busy.*"

The captain recalled that his intention was to continue at 2,000 feet msl on a 220 degree heading to the ALANA intersection¹⁰ and stay about 15 miles from the airport to avoid other traffic and give them "*time to take care of the issue.*" He told investigators his understanding of the situation at that time was that they were not on fire, an engine was running, and there was no need to rush. After leveling off he intended to turn the auto pilot on and figure out what to do, however he said that they never subsequently engaged the autopilot because the airplane was never stabilized in altitude, heading and speed.

The first officer recalled that when he leveled off at 2,000 feet the airplane accelerated, and they were going fast. He told investigators that he pulled "*the power lever, thrust levers back to try to slow down a little.*" He told investigators, "*I do remember bringing the thrust levers back a little.*" In a follow-up interview, investigators asked if he pulled the levers back in unison or one at a time, and he said that he moved them together because he had been trained to fly with both until a failed engine had been identified. He told investigators that after he pulled the levers back during the level-off, he did not touch them for the rest of the flight.

The captain told investigators that after he finished explaining their situation and intentions to ATC he told the first officer, "*I'm back with you.*" He recalled asking the first officer, "*What is the situation - what do you have?*" and he remembered the first

¹⁰ ALANA was defined by the 171° radial from the HNL Very High Omnidirectional Range (VOR) at 14 miles.

officer telling him that they had lost the number 1 engine. The captain recalled looking at the number 1 EPR, seeing that it was "down." During a follow-up interview, investigators asked if he recalled more specifically what the EPR gauge was indicating, and he stated, *"I cannot tell you exactly way it was, but wherever it was, it was not going to sustain flight."* He stated that it was *"not in flight position."* Asked to clarify whether the EPR indication or the thrust lever was not in a flight position, he said, *"You know, those things, I just ignored it. We don't have number 1, we don't have number 1, so I didn't pay attention to number 1 engine. My focus was on the engine running, which was number 2."*

During his follow-up interview, the captain was asked whether he recalled at that time remembering that he initially thought the number 2 engine had failed. He stated, *"Yeah, that came across my mind. I did think about that... But Greg had been flying the airplane. He would be the one who would know which engine has failed. He is the best person to ask which one."* He said he did not think the first officer had pulled back the number 1 thrust lever while he was busy speaking with ATC. Asked whether he would have expected the first officer to tell him if he had done so, the captain said yes, *"Why would he tell me number 1 has failed if he has brought the power back?"* He said that he did not consider that possibility at the time, adding, *"He says number 1 has failed; I see number 1 has failed. Okay."*

The captain recalled taking control after the first officer told him the no. 1 engine had failed, telling the first officer, *"I have the airplane, I have the radios. Let's run the QRH, you read the QRH, I'll fly the airplane, I'll work the radios."* The captain recalled finding that he did not have to depress a rudder pedal to maintain coordinated flight.¹¹ He recalled saying to the first officer, *"But before you do that, take a look at Number 2 engine because that's all we have, how is it doing?"* He remembered the first officer stating that the number 2 engine was *"hot."* The captain acknowledged, and he again directed the first officer to run the Engine Failure Shutdown checklist.

The first officer told investigators he recalled the captain taking control of the airplane. He recalled suggesting to the captain that they turn back to the airport, which he could see out his right window, but the captain said they would follow the engine out departure procedure. He recalled the captain asking him to run the engine failure checklist. He recalled the captain advancing the no. 2 thrust lever. He recalled seeing the no. 2 EGT indication at or above the red line, and he recalled seeing that they were continuing to lose airspeed. He recalled that captain asking him to check the landing gear, to see if that could explain why they were losing airspeed. He confirmed that the landing gear were up, the flaps were up, and the spoilers were stowed. The first officer recalled that at 13 DME from HNL he again urged the captain to turn back, and the captain agreed. The first officer said that because of the situation with the deteriorating

¹¹ When asked whether he recalled seeing the first officer apply rudder trim, he said he could not recall seeing the first officer do that.

airspeed, he *"didn't get very far into the checklist."* The airplane was losing altitude and airspeed as the captain was turning back toward the airport and he recalled thinking that they were not going to make it back.

During a follow-up interview, the first officer was asked to clarify how far he made it through the Engine Failure Shutdown checklist, and he stated, *"Maybe a third or less, I think. I think at that point I noticed we were slowing or we were low. And I became concerned and I recall -- I don't know now why, but I recall [the captain] seemed to be focused on -- I guess I got the thought that he wasn't focused on flying the airplane. And so I remember saying to him, [Captain], fly the airplane. And I'm not being critical of him. I just... recall that's what I was thinking. And I think that's what -- I stopped the checklist at that point and -- I shouldn't have. I mean, I should have continued on through... but we didn't."* Asked whether he read the step in the checklist that states, *"thrust lever, affected engine, confirm close,"* he said he did not. When investigators asked if he could recall the position of the no. 1 thrust lever at that time or at any time thereafter, he said he could not.

The captain recalled hearing the first officer reading a few lines from the Engine Failure Shutdown checklist and seeing the number 2 EPR and the airspeed dropping. He told investigators that he pushed the no. 2 thrust lever to the forward stop (where it remained for the rest of the flight) but airspeed continued *"dropping."* He recalled seeing the no. 2 EGT *"pegged"* at the top of the indicator and the EPR coming down, so he told ATC they were going back to the airport. He recalled telling the first officer to forget the QRH and set up an approach. They were struggling to maintain 2,000 feet as he began turning back toward the airport.

During the captain's initial post-accident interview, investigators asked him to clarify whether he and the first officer ever completed the Engine Failure Shutdown checklist, and he said that when he saw the number 2 EPR indications decreasing, and then told the first officer that performing the checklist was *"useless"*. He explained to investigators, *"I'm looking at number 1 EPR, there's nothing coming out, I'm looking at number 2, EPR is going down. Why are we going to the checklist because it's a shutdown checklist? So, which engine [are] you going to shut down, they already shut themselves down."* He added, *"We just have to stay in the air, figure out we're going to get this thing back like this, without power. So, that became our primary focus."* The captain told investigators that from that point forward, his focus was on keeping the wings level, avoiding a stall, and heading toward lights on the island as the first officer urged him to concentrate on flying the airplane.

Asked whether he ever considered pushing the number 1 thrust lever forward after taking control of the airplane, he said, *"No. Uh-uh. At this point I was wrestling the... stick shaker. And I was trying to get the wings level. So my hands were busy. The power has hit the stop and it was there, so I knew I didn't have any more power. That*

was the only power I had. I didn't -- I never thought about that." He felt the stick shaker activate more than once as the airplane descended.

After reversing course, the crew was no longer able to see the airport and ATC radio recordings indicate that the captain asked ATC to provide vectors back to the airport and to notify airport fire rescue and the Coast Guard about their situation. ATC provided vectors, first to HNL and then to Kalaeloa Airport (John Rodgers Field) (JRF). The first officer stated that about 400 ft above the water he determined that they were not going to reach land. The first officer suggested that they extend the flaps to 1 because the airplane was slow. The captain agreed. He focused on keeping the wings level and the pitch slightly nose-high until the airplane impacted the water.¹²

¹² For information on crew's injuries and the details of the ensuing search and rescue, see the survival factors group chair's factual report.

1.1 First Officer's Photograph of Preflight Fluid Leak



Photo 1: Fluid on left main landing gear tire and surrounding ground.¹³

2.0 Flight Crew Information

2.1 Captain

The captain, age 58, held an Airline Transport Pilot (ATP) certificate with a rating for multiengine land, commercial pilot privileges for airplane single-engine land, and type ratings on the B-737, DHC-8, ERJ-170, and ERJ-190 which included limitation of B-737 Circling approach - VMC Only, and English Proficient. Prior to working at Rhoades Aviation, Inc. he was employed by Horizon Airlines in Seattle, Washington. Before that, he flew for various companies in the Middle East, India, Republic Airlines and US Airways. He had an expired flight instructor certificate with ratings for airplane single and multiengine and instrument airplane, a ground instructor certificate with

¹³ Source: Accident first officer.

rating of ground instructor advanced, and a mechanic certificate with ratings for airframe and powerplant. He held an FAA first-class medical certificate dated February 4, 2021, with limitation of must wear corrective lenses. He was based at HNL. The captain stated he was wearing his glasses at the time of the accident.

2.1.1 Captain's Pilot Certification Records

FAA Records of the captain indicated the following:

Private Pilot - Airplane Single-Engine Land certificate issued on July 10, 1987.

Mechanic - Powerplant only certificate issued September 24, 1991.

Mechanic - Airframe and Powerplant certificate issued October 9, 1991.

Private Pilot - Airplane Single-Engine Land, Instrument Airplane certificate issued on May 26, 1993.

Notice of Disapproval - Commercial Pilot Airplane Multiengine Land was issued on September 3, 1993. Unsatisfactory items: Areas of Operation VI, VIII, and IX. (Failure via approaches).

Commercial Pilot - Airplane Multiengine Land, Instrument Airplane; Private Privileges - Airplane Single-Engine Land certificate was issued on September 8, 1993.

Ground Instructor - Advanced certificate issued August 10, 1994.

Commercial Pilot - Airplane Single and Multiengine Land, Instrument Airplane certificate was issued August 17, 1994.

Flight Instructor - Airplane Single-Engine certificate issued August 17, 1994.

Flight Instructor - Airplane Single and Multiengine certificate issued August 16, 1996.

Flight Instructor - Airplane Single and Multiengine, Instrument Airplane certificate issued September 23, 1996.

Airline Transport Pilot - Airplane Multiengine Land; Commercial Privileges Airplane Single-Engine Land certificate was issued on December 21, 1997.

Airline Transport Pilot - Airplane Multiengine Land, DHC-8; Commercial Privileges-Airplane Single-Engine Land certificate issued August 30, 2001.

Airline Transport Pilot - Airplane Multiengine Land, DHC-8, ERJ-170, ERJ-190; Commercial Privileges - Airplane Single-Engine Land; Limitations - ERJ-170 ERJ-190 SIC¹⁴ PRIVILEGES ONLY - CIRC APCH VMC ONLY certificate issued October 4, 2005.

Airline Transport Pilot - Airplane Multiengine Land, B-737, DHC-8, ERJ-170, ERJ-190; Commercial Privileges - Airplane Single-Engine Land; Limitations B-737, ERJ-170, ERJ-190 CIRC APCH - VMC ONLY certificate issued May 24, 2008.

Airline Transport Pilot - Airplane Multiengine Land, B-737, DHC-8, ERJ-170, ERJ-190; Commercial Privileges - Airplane Single-Engine Land; Limitations B-737 CIRC APCH - VMC ONLY certificate issued September 20, 2014.

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

AIRPLANE TRANSPORT PILOT (issued September 20, 2014)

Airplane Multiengine Land

B-737, DHC-8, ERJ-170, ERJ-190

Commercial Privileges - Airplane Single-Engine Land

FLIGHT INSTRUCTOR (dated September 23, 1996)

Airplane Single-Engine

Airplane Multiengine

Instrument Airplane

MEDICAL CERTIFICATE FIRST CLASS (issued February 4, 2021)

Limitations: Must wear corrective lenses

2.1.3 Captain's Training and Proficiency Check Completed

A summary of the captain's recent training events at Rhoades Aviation, Inc. was as follows:

Table 1: Captain's training and proficient checks

Date of Hire - Rhoades Aviation, Inc.	February 18, 2019
Initial Proficiency Check	May 20, 2019
Most Recent Recurrent Ground Training ¹⁵	May 26, 2021

¹⁴ Second-in-Command

¹⁵ Recurrent Ground Training concluded with a 25-question exam; the pilot received a score of 96% corrected to 100% on the examination.

Most Recent Recurrent Pilot Proficiency Check ¹⁶	June 9, 2021
Most Recent Line Check	December 24, 2020
Most Recent Line Oriented Flight Training (LOFT)	December 4, 2020
Initial Operating Experience (IOE) ¹⁷	August 9, 2019
Most Recent Recurrent Ground	November 15, 2020
Most Recent Crew Resource Management	May 7, 2021
Most Recent Emergency Training	May 4, 2021
Most Recent Hazardous Materials	May 3, 2021
Most Recent FAA Observation	December 18, 2019
Upgrade Ground Training	November 15, 2019
Upgrade Oral Evaluation	November 16, 2019
Upgrade Simulator Checkride	November 20, 2019

2.1.4 Captain's Flight Times

The captain's approximate flight times¹⁸ were based on pilot interviews and Rhoades Aviation, Inc. provided records:

Previous 24 hours ¹⁹	3:32
Previous 48 hours	8:59
Total Hours B737 ²⁰	800

¹⁶ The captain's pilot proficiency check included 30 satisfactory items including, in part, "Takeoffs with engine failure after V1 before V2" and "Judgement." The proficiency check did not contain any unsatisfactory grading on the first attempt and the check was marked as "Satisfactory."

¹⁷ IOE began May 29, 2019 and was as a first officer position which included 60 landing and 68.2 hours of flight experience. In addition, the captain had accumulated 107.6 total hours of flight experience on September 17, 2019. On December 13, 2019, the captain completed IOE as a captain.

¹⁸ Flight times do not include the accident flight.

¹⁹ The previous 24 hours included 3 round trip (6 legs) flights from HNL to Kahului Airport (OGG), Kahului HI to HNL in the accident airplane.

²⁰ Although he could not recall exactly the captain estimated that he had between 800 and 900 hours on the B737. Source: Attachment 1 - "Flight Crew Interview Transcript." According to the captain's resume provided to Rhoades Aviation he about 14,015 total hours of flight time, 9,988 hours as pilot-in-command, and had been a first officer on the B737 prior to Rhoades Aviation from April 2008 until November 2008.

Total Flight Hours²¹

16,000

2.1.5 Captain's 72-Hour History

The captain's recent work schedule at Rhoades Aviation, Inc. is shown in the table below.

Table 2: Captain's 72-hour history

Date	Duty Start	Duty End	Duty Time	Legs	Flight Time
June 29, 2021	0015	0730	7:15	6	3:26
June 30, 2021	0015	1202	11:47	8	5:17
July 1, 2021	0015	0723	7:08	6	3:32
July 2, 2021	0015	-----		1	0:22

The captain resided in Honolulu. He said that he was unable to estimate how much sleep he needed to feel rested because shiftwork made his sleep unpredictable. He stated that his activities in the 72 hours before the accident involved working, sleeping, eating meals, and maintaining personal hygiene. He could not recall how much sleep he obtained in the days before the accident, but said he obtained some sleep each day and did not feel sleep deprived when he arrived for work on the night of the accident. Asked to identify periods between work shifts when he might have slept, he said Tuesday, June 29, he had a sleep opportunity between 1000 and 2000. Wednesday, June 30, he had a sleep opportunity between 1500 and 2100. Thursday, July 1, he had a sleep opportunity between 1000 and 2000. A Rhoades Aviation, Inc. flight follower said the captain seemed normal when he arrived for work. The accident first officer said the captain seemed alert.

2.1.6 The Captain's Previous Abnormal and Emergency Situations at Rhoades Aviation, Inc.

The captain said he had experienced about five engine failures while working at Rhoades Aviation, Inc., and that he had performed about three rejected takeoffs and seven precautionary or emergency landings. Asked for examples, he said that about three or four months before the accident, he heard a "pow" sound while climbing through 700 feet and he immediately turned around and went back to the airport due to an issue with the number 1 engine. He said that the chief pilot chastised him "very severely" for immediately returning to the airport without performing the associated abnormal checklist. A former Rhoades Aviation, Inc. SMS auditor also recalled hearing about the chief pilot's reaction to this event.

²¹ The captain estimated his total hours during his interview. Source: Attachment 1 - "Flight Crew Interview Transcript", pg. 7.

2.1.7 Colleagues' Impressions of the Captain

The first officer had flown with the captain many times and said that he was a *"good pilot."* He described him as very methodical and consistent in his use of checklists and standard operating procedures. He also said that the captain was direct, articulate, and open to discussion.

A second first officer who crewed the captain's previous flight and had flown with him many times before described him as, *"pretty solid"* and *"cautious."* He stated that, *"compared to the other captains he's the slowest."* He added, *"He's thorough. He's a checklist guy, definitely a checklist guy."* The night before the accident, the captain's use of checklists has been *"Complete, like, from before start -- or before takeoff -- or before start checklist all the way to after landing checklist -- or parking checklist."* Asked if he thought the captain would be able to think on his feet if something unexpected happened, he said, *"Yeah, definitely."* He also stated that the captain was professional, polite, and open to suggestions.

A third first officer who flew with the captain on several flights before that and had also flown with the captain many times before described him as *"pretty standard"* and *"proficient."* They got into a disagreement because the captain wanted her to move the flight controls through their full range of motion when they did the flight control check. This led to some interpersonal tension and a switch of first officers at the direction of the chief pilot.

A fourth first officer who had flown with the captain described him as *"mild mannered"* and *"not very excitable."* He stated that the captain was *"pretty company oriented"* and tried *"to do everything by the book."* He followed proper procedures.

A fifth first officer who had flown with the captain described him as *"a fairly good captain"* who *"always followed everything by the book."*

A sixth first officer who had flown with the captain many times said the captain was *"good,"* adding *"He was thorough, very knowledgeable. I also had him for sim partner probably about a month before the crash, and we studied together prior to the sim at my apartment. And we were just going over the general questions of things that we might see during our sim session. He seemed to know everything pretty thoroughly."*

A Rhoades Aviation, Inc. captain who had previously been a Rhoades Aviation, Inc. first officer and flown with the accident captain said the captain was a *"pretty by the book guy."*

The Rhoades Aviation, Inc. flight follower on duty the night of the accident described that captain as *"very thorough,"* and stated, *"he looks at everything."* The flight follower explained that the captain would carefully review the flight release and

maintenance records and make sure they were correct. The captain was friendly and other pilots seemed to get along with him.

The chief pilot, who provided training and line checks to the captain, described him as *"by the book, methodical, ...very thorough, slow."*²² He stated that the captain took *"a while"* to conduct briefings, and a little bit longer than others to get everything set up in the simulator because he was checking and doublechecking things. He said that from what he had observed during the captain's simulator training, the captain had good crew resource management and situational awareness, and he followed company procedures.

A mechanic on duty the night of the accident said that engine oil servicing was the captain's *"pet peeve."* The captain would write it up at the end of the day if the oil level dropped below *"3"*, and he sometimes got into arguments with the mechanics about it. However, that mechanic said he got along well with the captain. He said the captain would write up maintenance issues about 70% of the time when they occurred, otherwise the captain just called maintenance staff. Two lead mechanics said the captain got along well with mechanics. The director of maintenance said mechanics thought the captain as *"a little weak"* on airplane systems and that the captain's maintenance write-ups could be hard to decipher.

The captain, a licensed mechanic, said he sometimes had differences with the maintenance staff regarding their procedures and analysis, and he had experienced some friction with them. This had included frequent disagreements about when to top off the engine oil; however, he said that the last time one of these disagreements had occurred was three or four months before the accident. Asked how receptive maintenance was in general to flight crew write-ups, the captain said, *"Generally not the best, because nobody likes working."* He said that when he wrote up a maintenance issue, the mechanics would say, *"Oh, man, what did you break?"* Eventually they would fix the issue, so he considered them receptive.

2.2 First Officer

The first officer, age 50, held an ATP certificate with a rating for multiengine land, private pilot privileges airplane single-engine land, and a type rating in the B-737, with limitations of English Proficient and B-737 CIRC. APCH. - VMC ONLY. He held an FAA second-class medical certificate dated June 2021 with a limitation of must wear corrective lenses. The first officer stated he was wearing his corrective lenses the night of the accident. Prior to flying for Rhoades Aviation, Inc., his most recent flying employment was in 1995 and was with Mesa Airlines. Since then, the first officer practiced law. He was based at HNL.

²² Source: Operational Factors/Human Performance - Attachment 2 - Rhoades Aviation/Transair Personnel Interview Transcripts, pg. 538.

2.3 First Officer's Pilot Certification Record

FAA Records of the first officer indicated the following:

Private Pilot - Airplane Single-Engine Land certificate issued May 19, 1990.

Private Pilot - Airplane Single-Engine Land, Instrument Airplane certificate issued on November 9, 1990.

Commercial Pilot - Airplane Multiengine Land, Instrument Airplane. Private Privileges Airplane Single-Engine Land certificate issued on May 25, 1991.

Airline Transport Pilot - Airplane Multiengine Land; Private Privileges Airplane Single-Engine Land certificate issued May 23, 1994.

Airline Transport Pilot - Airplane Multiengine Land, B-737; Private Pilot Privileges Airplane Single-Engine Land B-737 Circ. Aprch - VMC Only certificate issued on July 16, 2019.

2.3.1 First Officer's Pilot Certificates and Ratings Held at Time of the Accident

AIRLINE TRANSPORT PILOT (issued July 16, 2019)

Airplane Multiengine Land

B-737

Private Pilot Privileges Airplane Single-Engine Land

MEDICAL CERTIFICATE SECOND CLASS (issued June 22, 2021)

Limitations: Must wear corrective lenses

2.3.2 First Officer's Training and Proficiency Checks Completed

A summary of the first officer's recent training events at Rhoades Aviation, Inc. was as follows:

Table 3: First officer's training and proficiency

Date of Hire - Rhoades Aviation, Inc. ²³	May 9, 2019
Initial Proficiency Check	July 16, 2019

²³ Source: Transair Flight Crew Badge. Training began on May 10, 2019. Source: Federal Aviation Administration Airman Certificate and/or Rating Application.

Most Recent Recurrent Ground Training ²⁴	June 15, 2021
Most Recent Recurrent Pilot Proficiency Check ²⁵	June 16, 2020
Most Recent Line Check ²⁶	N/A
Most Recent Line Oriented Flight Training (LOFT)	July 18, 2019
Initial Operating Experience (IOE) ²⁷	September 5, 2019
Most Recent Crew Resource Management	August 5, 2020
Most Recent Emergency Training	June 15, 2021
Most Recent Hazardous Materials	June 14, 2021

2.3.3 First Officer's Flight Times

The first officer's approximate flight times²⁸ were based on pilot interviews and Rhoades Aviation, Inc. provided records:

Previous 24 hours ²⁹	0:00
Total Hours B737 ³⁰	907
Total Flight Hours ³¹	5,200

²⁴ Recurrent Ground Training included 3 written examinations in Emergency, Security, and HazMat. The first officer's Security and HazMat exams received a score of 100% and the Emergency exam received a score of 92% but was corrected to 100%.

²⁵ The first officer's pilot proficiency check included 44 satisfactory items including, in part, "Takeoffs with engine failure after V1 before V2" and "Judgement." The proficiency check did not contain any unsatisfactory grading on the first attempt and the check was marked as "Satisfactory."

²⁶ 14 CFR 121.440 (a) No certificate holder may use any person nor may any person serve as pilot in command of an airplane unless, within the preceding 12 calendar months, that person has passed a line check in which he satisfactorily performs the duties and responsibilities of a pilot in command in one of the types of airplanes he is to fly... (c) A pilot in command line check for supplemental operations must-

(1) Be given by a pilot check airman who is currently qualified on the airplane; and
(2) Consist of at least one flight over a part of a Federal airway, foreign airway, or advisory route over which the pilot may be assigned.

²⁷ IOE began August 11, 2019 and was as a first officer position which included 32 landing and 38.4 hours of flight experience.

²⁸ Flight times do **not** include the accident flight.

²⁹ The First Officer reported his most recent flight, prior to the accident, was on June 20, 2021. Source: Attachment 1 - "Flight Crew Interview Transcript" pg. 127.

³⁰Source: Attachment 1 - "Flight Crew Interview Summaries" pg. 90.

³¹ The first officer's resume provided to Rhoades Aviation Inc indicated 4,344.7 total hours of flight time.

2.3.4 First Officer's 72-Hour History

The first officer's recent work schedule at Rhoades Aviation, Inc. is shown in the table below.

Table 4: First officer's 72-hour history

Date	Duty Start	Duty End	Duty Time	Legs	Flight Time
June 29, 2021	Not recorded	Not recorded	Not recorded	0	Office Day
June 30, 2021	N/A				
July 1, 2021	N/A				
July 2, 2021	0015	-----		1	0:22

The first officer was an attorney and owned a family law practice in Honolulu. He did legal work Monday through Friday and half the day on Saturday when he was not flying. He normally went to sleep at 2200 or 2300 and woke between 0600 and 0700. He could not recall the hours he slept on the nights of Tuesday, June 29, and Wednesday, June 30, but he thought it was consistent with his normal schedule. On Tuesday, June 29 between 0700/0800 and 1700/1800 he worked on manual revisions for Rhoades Aviation, Inc. at his office. On Wednesday, June 30, he did legal work from 0700/0800 to 1700/1800. He also went to the gym and exercised for about 45 minutes on each of those days. He recalled no other off-duty activities. On the morning of Thursday, July 1, he did legal work at his residence. He went to bed at 1400 to rest before reporting for duty at Rhoades Aviation, Inc. He could not recall exactly when he fell asleep. He did recall waking up a couple of times (about 15-30 minutes each time), but he said that the quality of this sleep was good. At 2330, he got up, showered, dressed, and drove to Rhoades Aviation, Inc. at HNL. A Rhoades Aviation, Inc. flight follower said that the first officer's behavior seemed normal on the night of the accident, and the captain said that the first officer seemed alert.

2.3.5 The First Officer's Previous Abnormal and Emergency Situations at Rhoades Aviation, Inc.

The first officer stated that he had once aborted a takeoff while flying for Rhoades Aviation, Inc. with a different captain. The number 2 engine lining had come loose, gotten sucked into the engine, and caused several loud backfires. He said he had not experienced an in-flight engine failure since joining Rhoades Aviation, Inc., but he had experienced one at a previous airline.

2.3.6 Colleagues Impressions of the First Officer

The accident captain said the first officer was a good pilot who knew what he was doing, and that he trusted him.

Another captain who had recently flown with the first officer said the first officer was *"pretty educated"* and he was knowledgeable about the company's policies and procedures. This captain was amazed at how good the first officer's flying skills were, because he had heard the first officer was out of flying for many years before Rhoades Aviation, Inc. hired him. He enjoyed flying with the first officer.

A second captain who had flown with the first officer many times said he was *"very good."* He said that the first officer was *"very dependable and reliable,"* and would catch any mistake the captain made.

A third captain who was a Rhoades Aviation, Inc. line check airman and had flown with the first officer during some of his initial operating experience said the first officer was *"Very observant, by the book, knows his stuff, and great to get along with. Good pilot, and he enjoys flying."* A fourth captain and line check airman stated that the first officer was *"Really sharp."*

The chief pilot, who had provided training and line checks to the first officer, described him as *"very capable."* He said the first officer was *"to be upgraded next... He just needed 100 [more] hours."* Asked whether he was concerned about the first officer's ability to obtain adequate rest, given his non-aviation work, the chief pilot said, *"Not at all."* The first officer had assured him that he employed others who ran his law practice. The first officer just monitored it.

The director of operations knew the first officer well because the first officer was helping Rhoades Aviation, Inc. revise their manuals. The first officer sometimes did that work in the office next door to the director of operations. The director of operations would check in with the first officer every day when he came in. The director of operations had flown with the first officer about five times. He said the first officer was intelligent and an above-average pilot.

The dispatcher who interacted with the crew on the night of the accident described the first officer as very thorough, stating, *"He'll go through the flight release and also the logbooks... If he finds something, he'll bring it up to the captain. He's a very sharp guy."* He said that the first officer seemed to get along well with everyone.

One of the lead mechanics described the first officer as *"likeable"* and said he got along well with the mechanics. The other lead mechanic agreed.

2.3.7 Flight Crew Trip Pairing

The following trip pairing was the original pairing for the flight crew at the time of their report in HNL on July 2, 2021. All flight pairings at Rhoades Aviation, Inc were out and back flights and did not require a layover:

Table 5: Flight crew trip pairing

Departure	Arrival	Flight Number ³²	Scheduled Departure	Scheduled Arrival
HNL	OGG	810	0100	0138
OGG	HNL	810	0213	0251
HNL	OGG	810	0300	0338
OGG	HNL	810	0413	0451
HNL	OGG	810	0515	0553
OGG	HNL	810	0628	0706

2.4 Duties, Responsibility, and Authority

The Rhoades Aviation, Inc. Administration Manual, dated February 13, 2020, provided the following information about the Duties, Responsibilities, and Authority for each of the pilots and other personnel at Rhoades Aviation, Inc., (see Section 9 of this report for other pertinent personnel at Rhoades Aviation, Inc.). The manual also provided that the pilot in command was to “report to the Chief Pilot.” The first officer was “administratively responsible to the Chief Pilot and functionally responsible to the Captain of the flight to which he/she is assigned.”

2.4.1 Pilot in Command

The Captain (Pilot-in-Command) is responsible to the Chief Pilot and jointly responsible with the Director of Operations for the initiation, continuation, diversion and termination of a flight in compliance with the FAR’s, Operations Specifications, and Company Operating Policies. He/she is the direct representative of the Company from departure until return to his/her crew base. When assigned to a flight, the Captain is in total command of the aircraft and crew.

Each Pilot-in-Command of an aircraft is, from block out to block in, responsible for the safety of any persons including crewmembers, cargo and the aircraft. The Pilot-in-Command has full control and authority in the operation of the aircraft, without limitation, over other crewmembers and their duties during flight time.

³² Flight number and airplane ship number were synonymous. Source: Rhoades Aviation, General Operations Manual, Chapter 2 “Normal Operations” section 2.30 “Call Signs”.

In conjunction with or in addition to responsibilities mentioned elsewhere in this manual, the Captain's specific duties and responsibilities shall include;

- 1. Staying current and certificated in all respects with regard to the requirements of 14 CFR 121 and the Company;*
- 2. Exercising command authority and command responsibility;*
- 3. Ascertaining that he/she and his /her crew are in proper uniform and in possession of the required licenses, certificates and documents required for the appropriate flight to be performed;*
- 4. Ascertaining that all of his/her crew and any/ all jump seaters are properly briefed on emergency equipment, procedures and evacuation prior to flight departure;*
- 5. Assigning duties to individual crewmembers if circumstances necessitate deviation from those indicated herein;*
- 6. Approving all flight paperwork, forms and reports required by the FAA and Company to ensure accuracy and proper routing;*
- 7. Ascertaining that the aircraft has been properly closed and is secure for flight;*
- 8. Acting as the Inflight Security Coordinator, and the Ground Security Coordinator when required.*
- 9. Ascertaining that the flight kit, proper equipment, appropriate and current charts, maps, en route and approach manuals, flash light in good working order, etc., are aboard the aircraft prior to departure. Delegation of this duty to the copilot does not relieve the Captain of the responsibility;*
- 10. Conducting a proper preflight weather check for the route(s) about to be flown. If unsatisfactory conditions exist or are forecast, he/she shall inform the Director of Operations or delegated authority of a mutually agreeable alternate route or appropriate action;*
- 11. Securing a flight release from the Director of Operations or delegated authority prior to departure setting forth the conditions of release, and completing a flight release and log form in accordance with flight following procedures. Preflight release information shall include a thorough discussion and review of the route to be flown and all other information pertinent to the flight, including ETD, ETE, ETA, etc.;*
- 12. Familiarizing himself/herself and complying with all procedures, limitations, advisories, NOTAMs, adverse weather phenomena, etc., to ensure the overall safe, efficient and appropriate conduct of the flight;*
- 13. Operating the aircraft within prescribed limits and weight requirements at all times. The PIC also ascertains that the correct and sufficient amount of fuel is aboard according to the fuel gauges, before each departure , and ensure that the Weight and Balance paperwork is accurately prepared and signed;*
- 14. Assure that, through following the approved company procedures in the RAI Aircrew Training Manual (ATM), the aircraft does not operate in a careless or reckless manner so as to endanger life or property during flight or while on the ground;*

15. Logging all discrepancies encountered in flight in the aircraft maintenance log;
16. Checking to see that all maintenance log entries have been cleared or deferred before further flight;
17. Exercising proper use of all aircraft checklist at all times;
18. During a flight, he/she should obtain any additional available information of meteorological conditions and irregularities of facilities and services that may affect the safety of the flight if significant changes from the weather information provided with the flight release are suspected. The flight crew may get weather information from any or all of the following; En route Flight Advisory Service (EFAS), Flight Service, ATIS, ASOS, AWOS, or RAI Flight Following on the company frequency of 129.75 when within range of the PHNL ground facility.
19. Briefing other crewmembers as to radio handling, communication responsibilities, minimums, instrument approach procedures, etc., prior to commencing an instrument approach;
20. Keeping the Company and other contractors constantly informed of the flight progress or delays via Flight Following;
21. Determining that all required crewmembers are present one hour prior to departure. If a crewmember is absent one hour prior to departure, the Captain shall report the crewmembers(s) absence prior to 45 minutes before the scheduled departure;
22. Submitting requested reports and recommendations concerning performance, conduct, and upgrading possibilities of crewmembers;
23. Performing such duties that may be required or assigned by the Chief Pilot or the Director of Operations;
24. Resolve questions or conflicts among crewmembers with the Chief Pilot.

2.4.2 First Officer

The First Officer will perform all duties called out in the appropriate aircraft Operations manuals and any other duties assigned by the Captain. Unless directed otherwise by the Captain, the First Officer's duties and responsibilities shall include:

1. *Staying current and certificated in all respects relating to the flight(s) to be performed;*
2. *Responsible for wearing the proper uniform and having the required licenses, certificates and documents in his/her possession for the appropriate flight(s) to be performed;*
3. *Assisting the Captain in the preparation and completion of the flight in accordance with the FAR's and Company policies;*
4. *Supervising the flight deck in the absence of the Captain to make certain all assigned duties are accomplished in an expedient and efficient manner;*

5. Assuming the duties and responsibilities of the Captain (PIC) until the aircraft arrives at the next point of landing in the event the Captain becomes disabled in flight;
6. Prepare and maintain all required forms; including flight logs, charts, reports, etc., as required by the Captain. Upon completion of these forms, they will be given to the Captain for audit.
7. Advise the Captain of any deviation from standard operating procedure or of any impending action that would result in a diminished margin of safety;
8. Determining that the Captain is present one hour prior to departure. If the Captain is absent one hour prior to departure, the First Officer shall report the Captain's absence prior to 45 minutes before the scheduled departure.

3.0 Airplane Information

The airplane was a B737-275C, Serial No. 21116 and was manufactured in 1975. It was powered by two Pratt & Whitney JT8D-9A engine each capable of producing 14,500 pounds of thrust. The airplane was purchased December 23, 2014, by Rhoades Aviation Inc. from Trans Executive Airlines of Hawaii Inc.



Photo 2: Accident Airplane (Source: flightradar.com)

The airplane's most recent flights occurred on the morning of July 1, 2021 and consisted of three round trip flights to OGG that concluded at 0730.

Prior to the accident flight the airplane was fueled with 975 gallons of fuel, which brought the fuel quantity to 14,000 lbs., the standard fuel load for the round-trip flight. The accident flight's estimated time enroute was 25 minutes. The filed route of flight was *HNL PALAY3 LNY CAMPS3 OGG*.

4.0 Weight and Balance

Rhoades Aviation, Inc. utilized computer-based spreadsheet to calculate the weight and balance of the airplane during routine operations as allowed in their Operations Specification A096 "Actual Weight Program for All Aircraft." The following weight and balance information was taken from the dispatch flight release. Limitations are indicated in **bold** type. All weights below are in pounds (lbs.).

Basic Operating Weight ³³	60,160
Cargo ³⁴	19,897
Zero Fuel Weight	80,057
Maximum Zero Fuel Weight	95,000
Ramp Fuel ³⁵	14,000
Ramp Weight	94,057
Taxi Fuel ³⁶	500
Takeoff Fuel	13,500
Maximum Taxi Weight	120,000
Takeoff Weight	93,557
Maximum Takeoff Weight	119,500
Planned Enroute Fuel Burn	2,786
Planned Landing Weight	90,771
Maximum Landing Weight	105,000

4.1 Fuel Records

Fuel records³⁷ obtained by an FAA inspector indicated that on July 2nd, two other Rhoades Aviation Inc. and one Transair Express airplanes were fueled from the same truck with various amounts from 255 gallons to 1,645 gallons of fuel, prior to the record indicating that the truck was "top off." ³⁸

³³ Basic Operating Weight was the actual airplane empty weight of 59,719.65 lbs. plus 2 standard crewmembers at 190 lbs. each and their bags stored at their duty station at 30 lbs. each. Source: Rhoades Aviation Inc. B737 Weight & Balance Manual Revision 3, pg. 1-4 dated June 17, 2015.

³⁴ The airplane was a seven-position freighter, which included seven main deck zones and six low compartments. The load manifest and personnel interviews indicated that the lower zones were empty at the time of departure.

³⁵ Transair Boeing 737-200 Load Manifest indicated that there was 0 fuel in the center tank and all the fuel was in the wing tanks, each wing tank could hold 9,581 lbs. of fuel and the center tank could hold 15,430 lbs. Source: Operational Factors/Human Performance - Attachment 8 - Accident Flight Load Manifest

³⁶ Taxi fuel burn used a standard 500 lbs. unless otherwise indicated. Source: Rhoades Aviation Inc. Weight and Balance Manual Revision 4, Section 2.1.1.2 *completion of Excel Weight and Balance - INPUTS*, Paragraph 6.g. pg. 2-4.

³⁷ Source: Operational Factors/Human Performance - Attachment 8 - Fuel Record.

³⁸ Source: Operational Factors/Human Performance - Attachment 8 - Fuel Record, pg. 3.

5.0 Meteorological Information

ATIS³⁹ information “Kilo” was current at HNL at the time of the accident. The following transcribed weather and airport information was available to the flight crew⁴⁰:

honolulu international airport a-i-tis information kilo one zero five three zulu wind zero six zero at one three visibility one zero few clouds at two thousand five hundred four thousand five hundred scattered temperature two six dew point one eight altimeter three zero zero four landing and departing runways four and eight expect i-l-s or visual approach lahso in effect advise approach on one one eight point three or one one niner point one if unable to hold short taxiway golf closed between taxiway alpha and (unintelligible) ramp multiple taxiway hold position signs and edge lights out of service read back all control instructions increased bird strike hazards all runways numerous cranes in the vicinity honolulu airport check notams for additional information airmet tango update one valid advise on initial contact you have information kilo

6.0 Flight Following

Rhoades Aviation, Inc.’s flight following office was located in the company hangar and consisted of two wall mounted monitors; one that displayed flight schedules for the calendar day and the other that displayed weather information.

Federal regulations require supplemental operators to have a flight following system in place. The requirements for a flight following system were in 14 CFR 121.125:

- (a) Each certificate holder conducting supplemental operations must show that it has -
 - (1) An approved flight following system established in accordance with subpart U of this part and adequate for the proper monitoring of each flight, considering the operations to be conducted; and*
 - (2) Flight following centers located at those points necessary -
 - (i) To ensure the proper monitoring of the progress of each flight with respect to its departure at the point of origin and arrival at its destination, including intermediate stops and diversions therefrom, and maintenance or mechanical delays encountered at those points or stops; and*
 - (ii) To ensure that the pilot in command is provided with all information necessary for the safety of the flight.***
- (b) A certificate holder conducting supplemental operations may arrange to have flight following facilities provided by persons other than its employees,*

³⁹ Automated Terminal Information Service

⁴⁰ Source: NTSB - Meteorological Factual Report

- but in such a case the certificate holder continues to be primarily responsible for operational control of each flight.*
- (c) A flight following system need not provide for in-flight monitoring by a flight following center.*
 - (d) The certificate holder's operations specifications specify the flight following system it is authorized to use and the location of the centers.*

The Rhoades Aviation, Inc., Administration Manual, provided the following duties, responsibilities, and authority for the flight followers:

Flight Followers report to the Director of Operations. Personnel assigned as Flight Followers must have satisfactorily completed the company training program found in the ATM prior to serving.

- 1. Ensure the proper monitoring of the progress of each flight with respect to its departure at the point of origin and arrival at its destination, including intermediate stops and diversions therefrom, and maintenance or mechanical delays encountered at those points or stops. This will be done through calls, emails, and/ or text messages to the flight crew, and monitoring online flight tracking programs.*
- 2. Provide the pilot in command all available current reports or information on airport conditions and irregularities of navigation facilities that may affect the safety of the flight.*
- 3. Release the flight only after ensuring that the appropriate communication and navigation facilities to be utilized along the flight are in working condition via NOTAM's.*
- 4. Before beginning a flight, provide the pilot in command with all available weather reports and forecasts of weather phenomena that may affect the safety of flight, including adverse weather phenomena, such as clear air turbulence, thunderstorms, and low altitude wind shear, for each route to be flown and each airport to be used.*
- 5. Maintain the necessary knowledge of Rhoades Aviation, Inc. procedures for the proper conduct of operational control and flight following. This will be accomplished through the study of RAI manuals and Operations Specifications, appropriate FAR's concerning en route flight, navigation, and communication procedures; including procedures for the release or continuance of flight if any item of aircraft equipment required for the particular type of operation becomes inoperative or unserviceable while en route;*
- 6. In the absence of the Director of Operations or his/her designee, advising the PIC via phone call or the company Flight Following VHF frequency, 129.75, of emergencies and the determination and recording of his/her decisions; the*

- declaration of an emergency and appropriate action if communication with the PIC is not possible;*
- 7. Release flights only after authorized by the Director of Operations;*
 - 8. Preparing a flight release setting forth the conditions under which the flight will be conducted. This may require coordination with the PIC of the flight;*
 - 9. Recording flight times and crew duty times after the end of every flight day into RAI's computer based tracking program;*
 - 10. By reviewing the duty time sheets, ensure that flight crewmembers have not exceeded any duty times, and proper rest periods have been scheduled prior to assignment of flight; and*
 - 11. Coordinating with the Director of Operations to assure that all flight crewmembers are properly qualified prior to assignment.*
 - 12. Coordinate with the Load Supervisor on duty at each station*

7.0 Airport Information

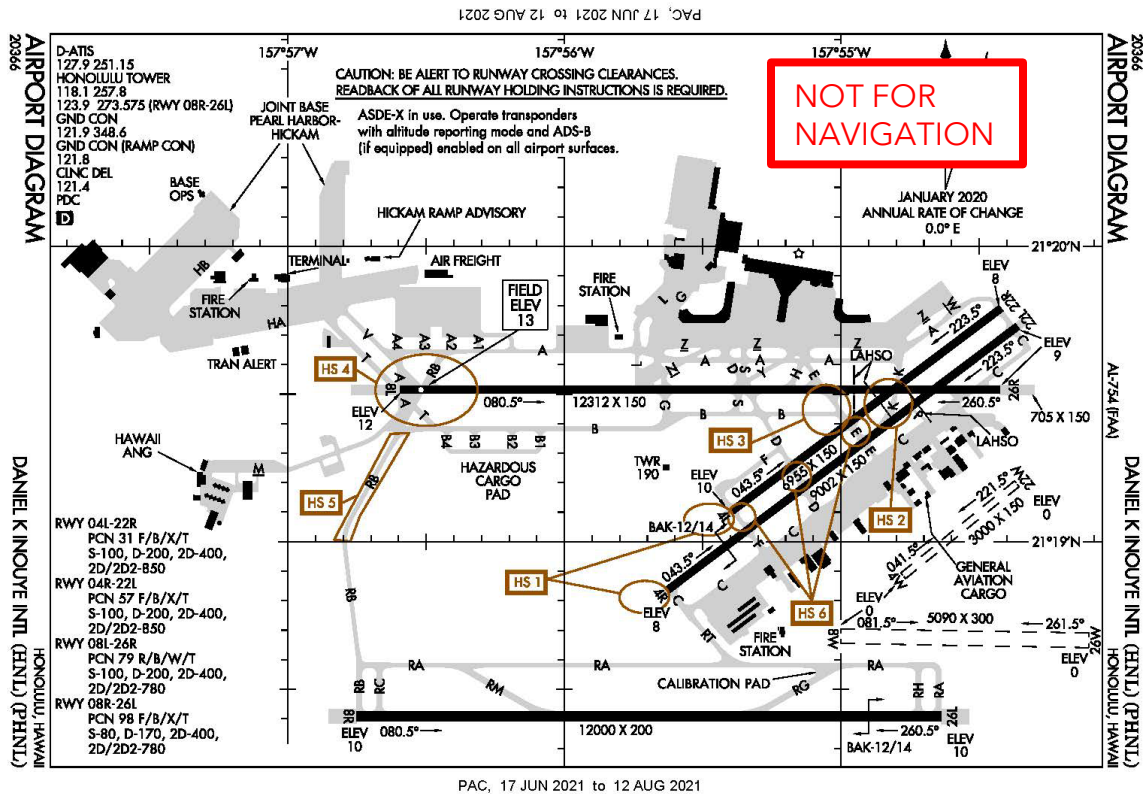
Rhoades Aviation Inc. used the FAA Aeronautical Information Services approach plates.

7.1 Daniel K. Inouye International Airport

Daniel K. Inouye International Airport (HNL) was located about 3 miles northwest of Honolulu, Hawaii, had a field elevation of 12.6 feet msl, and was located at a latitude /longitude of 21°19.04'N/157°55.12W. The airport was serviced by an FAA Air Traffic Control Tower that was in operation 24 hours a day. The airport had four paved landing surfaces designated 8L/26R, 8R/26L, 4L/22R, and 4R/22L and two water landing surfaces designated at 8W/26W and 4W/22W.

The accident flight departed from runway 8R which was a 12,000-foot-long by 200-foot-wide runway. The runway was equipped with a 6-box VASI⁴¹, located on the left side of the runway. The upper VASI provided a 3.25-degree visual approach path, and the lower lights provide a 3.00-degree visual approach path. The runway was also equipped with high intensity runway edge lights, runway end identifier lights and a non-lighted touchdown point.

The airplane impacted the water approximately 5.5 miles southwest of HNL.



7.1.1 PALAY3 Departure

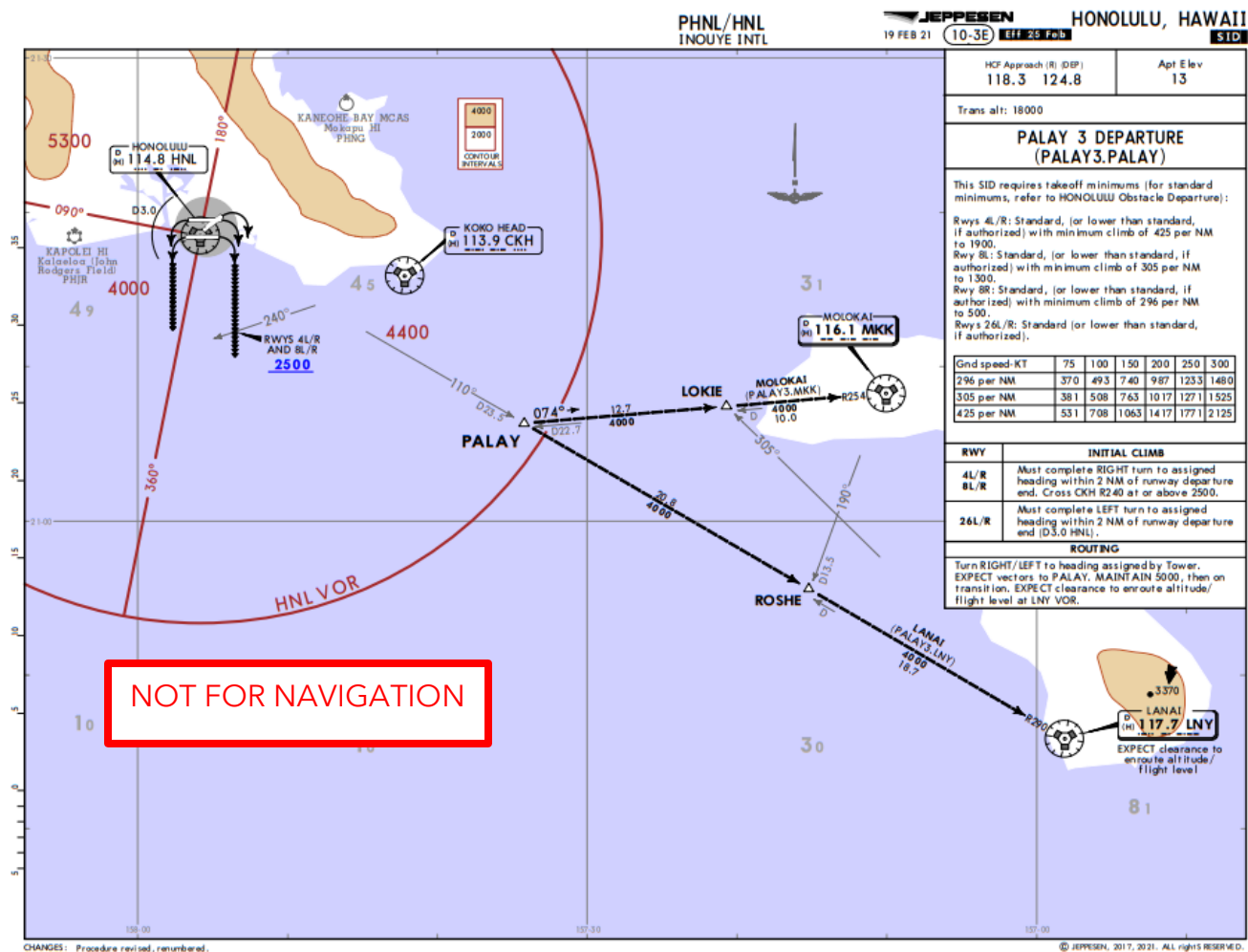
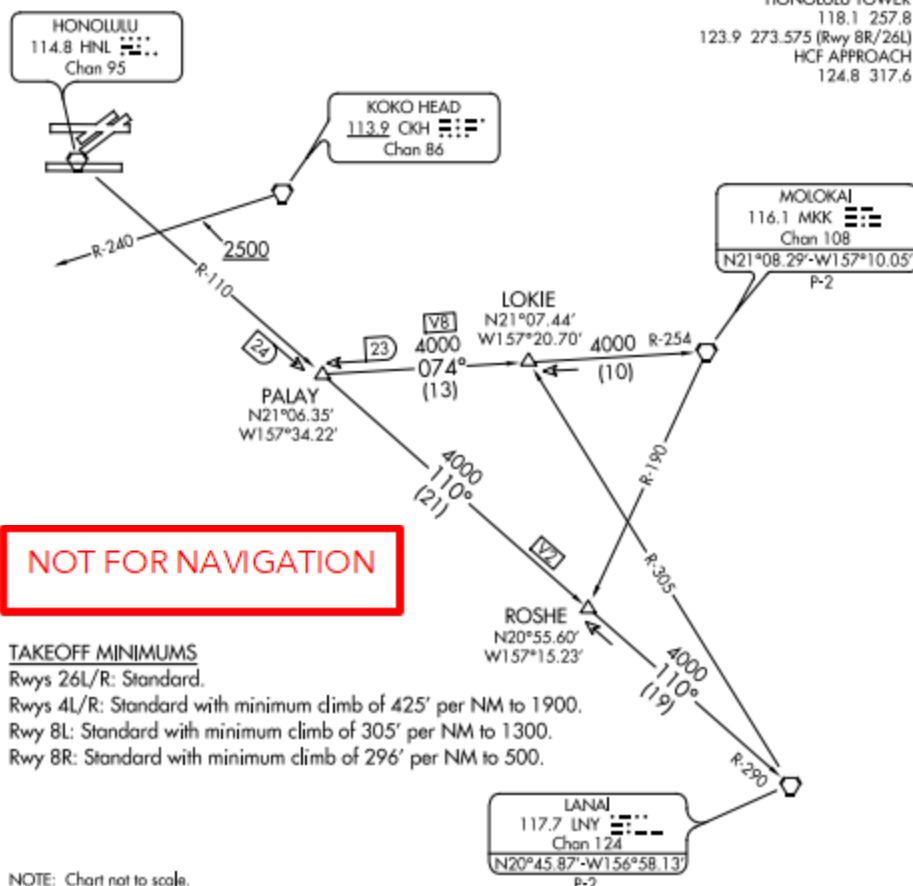


Figure 2: Palay 3 Departure Procedure (Source: Jeppesen)

HONOLULU, HAWAII

	D-ATIS	127.9	251.15
	CNCL DEL	121.4	281.4
	GND CON	121.9	348.6
	HONOLULU TOWER	118.1	257.8
123.9	273.575 (Rwy BR/26L)		
	HCF APPROACH	124.8	317.6



Turn right/left to heading assigned by Tower, expect vectors to PALAY, maintain 5000; then on (transition). Expect clearance to enroute altitude/flight level at LNY VORTAC.

LANAI TRANSITION (PALAY3.LNY): From over PALAY INT on HNL R-110 and LNY R-290 to LNY VORTAC.

MOLOKAI TRANSITION (PALAY3.MKK): From over PALAY INT on MKK R-254 to MKK VORTAC.

HONOLULU, HAWAII
DANIEL K INOUE INTL (HNL) (PHNL)

Figure 3: Palay 3 Departure Procedure (Source: Aeronautical Information Services)

7.2 Kalaeloa-Rodgers Airport

Kalaeloa-Rodgers Airport (JRF) was located about 2 miles south of Kapolei, Hawaii, had a field elevation of 30 feet msl, and was located at a latitude /longitude of 21°18.26'N/158°04.13'W. The airport was serviced by an Air Traffic Control Tower that was in operation from 0600 to 2200 every day. The airport had three paved landing surfaces designated 4L/22R, 4R/22L, and 11/29. The runways, except runway 22R, were equipped with a 4- light PAPI⁴². Runway 22R had a 2-light PAPI.

The airplane impacted the water approximately 2.8 miles southeast of JRF.

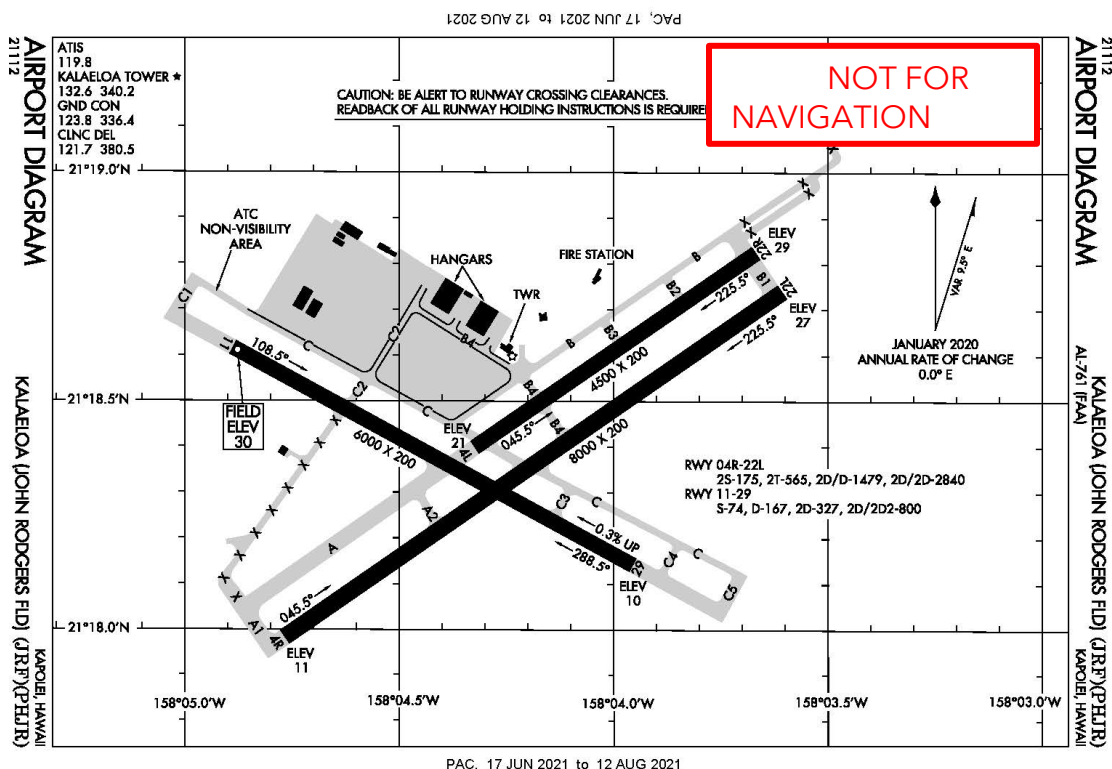


Figure 4: Kalaeloa Airport Diagram (Source: Aeronautical Information Services)

8.0 Company Overview

According to the CEO, Trans Executive Airlines was formed on February 9, 1982, operating a Cherokee 6 airplane, for which the owner was the sole pilot. About three years later they started operating Cessna 402 airplanes. In 1996 they began operating the Bombardier SD3-60 airplane. As they purchased more Bombardier SD3-60 airplanes, they retired the Cessna 402 airplanes. In 2011 the CEO purchased Rhoades Aviation, Inc., based in Indiana, and transferred its location to Honolulu, Hawaii.

⁴² Precision Approach Path Indicator

According to FAA documentation Rhoades Aviation, Inc.'s certificate number JRAA169N was transferred to the Honolulu certificate management office (CMO) on May 17, 2012. They began operating Boeing 737 airplanes under 14 CFR Part 121, as a supplemental cargo-only operation doing business as Transair. At the time of the accident Rhoades Aviation, Inc. had five B-737 airplanes listed under their 14 CFR Part 121 certificate.

At the time of the accident Rhoades Aviation, Inc. had 230 employees, 24 pilots, and operated a fleet of five 737 airplanes⁴³ under 14 CFR Part 121. Transair Executive Airlines had 59 employees, about 13 pilots, operated six Shorts 360 airplanes and one B-737-200, and operated under 14 CFR Part 135. The company had recently purchased a Boeing 737-400 that was in the process of being converted to a cargo configuration.

According to the company's website⁴⁴:

Transair is one of Hawaii's largest Air Cargo Providers. Operating since 1982, the combined Transair and Transair Express all-cargo fleet of five Boeing 737 and five Bombardier SD3-60-300 aircraft fly daily to all major Hawaiian island destinations of Kauai, Maui, Kona and Hilo with extended service to Lanai and Molokai. In addition, cargo charters are available to all points within the state of Hawaii.

The all-cargo B-737 aircraft are operated by Rhoades Aviation, Inc. d/b/a Transair, and the all-cargo SD3-60-300 are operated by Trans Executive Airlines of Hawaii, Inc. d/b/a Transair Express.

Rhoades Aviation, Inc. was authorized to conduct supplemental operations under their operational specification A001 "Issuance and Applicability" dated December 2, 2015. Additionally, they were authorized to conduct the operation under the name "Transair."

Rhoades Aviation, Inc.'s biggest customers were the US Postal Service and FedEx.

8.1 Transair and Transair Express Aviation Safety Report

The following company aviation safety reporting form was located on the company's website⁴⁵:

⁴³ Rhoades operated one each B-737-209, B-737-210C, B-737-275C, B-737-2T4, and B-737-2T4C of which the accident airplane was one of those five. Source: [Federal Aviation Administration - Airline Certificate Information - Aircraft Detail \(faa.gov\)](https://www.faa.gov/airline_certificates/certificate_information/aircraft_detail)

⁴⁴ Source: <https://transairhawaii.com>

⁴⁵ Source: <https://transairhawaii.com/transair-rhoades-aviation-inc-aviation-safety-report>

Transair & Transair Express * Aviation Safety Report

1. Please provide as much detail as possible. Use additional forms for multiple hazards or issues.
2. Do not report criminal activities on this form.
3. Identities contained in this report will only be used to address the issues related to the safety of company employees or property.
4. This form and the information therein will NOT be used to take administrative action against an employee.
5. You may leave section 1 blank if anonymity is desired.

1. Contact Information			
Name		Email	
Phone			
2. General Information			
Date Observed		Time Observed (UTC)	
Location Observed		Aircraft Tail Number	
Hazard/Concern reported to management?	Yes ☐ No ☐	If yes, who?	
3. Describe the hazard or concern.			
4. Describe potential outcome if hazard or concern is not addressed.			
Submit			

Figure 5: Transair Computer Based Aviation Safety Report

The following aviation safety report was located in the Rhoades Aviation, Inc. Transair Forms Manual:

Manual (SIEM) covers the scope, intent and implementation of the Safety Management System.

8.3 Safety & Internal Evaluation Manual

The Safety & Internal Evaluation Manual provided the following information for the SMS program at Rhoades Aviation, Inc.:

General

RAI's airline Safety Management System is designed around a culture of senior management leadership dedicated to promoting the growth of a positive safety culture. The Director of Safety promotes and communicates safety information to the employees to maintain the highest degree of safety possible in providing air cargo transportation while maintaining a safe and healthy workplace for our employees. In pursuit of this goal, an aggressive safety strategy has been incorporated into all company operations which are based upon sound policy, safety risk management, safety assurance, and safety promotion.

Policies

- 1. All subject matter identified in the RAI manual section, sub-section, and sub-sub-section headers has been developed to deal with the general policies required by regulation for the processes described herein.*

Safety Management System

The main processes defined herein are designed with key procedures with embedded controls designed to ensure procedural completion. The interfaces between the processes and procedures are clearly identified to ensure compatibility with other departments and processes. The responsibility for the process and authority to revise the process as necessary are clearly identified. Finally, the process outcomes are measured to provide feedback and a means for safety assurance. This manual will contain all processes, procedures and controls for compliance with 14 CFR Part 5.

9.0 Organizational and Management Information

The Rhoades Aviation, Inc. Administration Manual dated February 13, 2020, provided the following Organizational Chart:

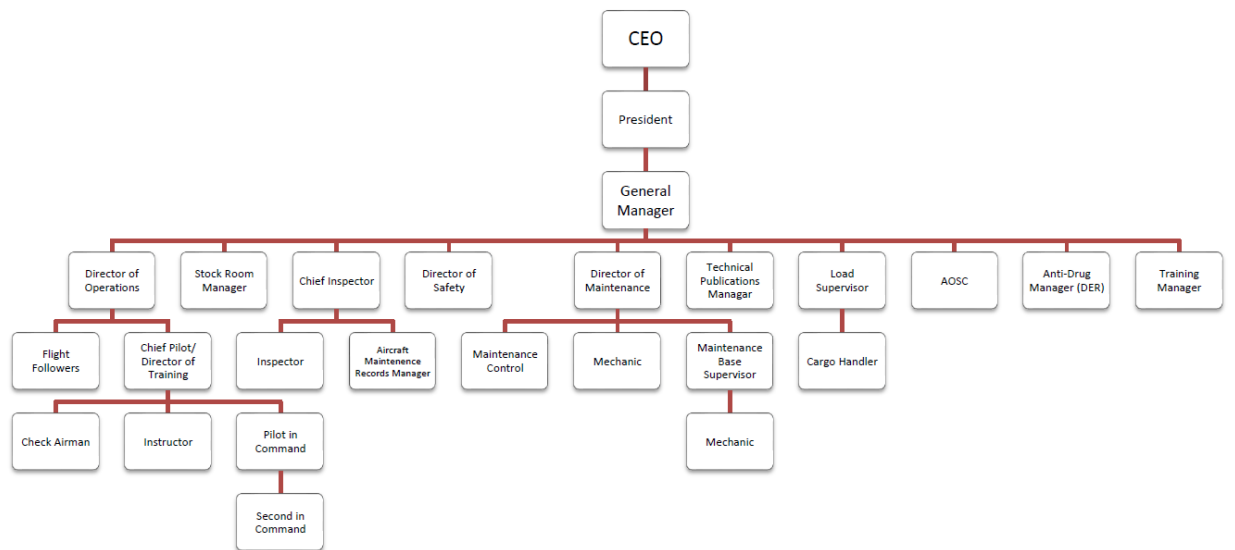


Figure 7: Organizational Chart

9.1 Director of Safety

The Rhodes Aviation, Inc. Administration Manual Section 3.6.1 provided the following, in part, information about the responsibilities of the Director of Safety:

The Director of Safety shall be knowledgeable of all company operations and the functions and responsibilities of each department within the airline. He/she will understand the certificate holder's regulatory responsibilities and pertinent parts of the Federal Aviation Regulation as well as the procedures contained in the Company's Manuals.

The Director of Safety is responsible for the conduct of the RAI Safety Program, assuring that all aspects of the company shall coincide with the philosophy that safety comes first, and that no higher priority exists. To that end, the Director of Safety has the authority to establish internal evaluation procedures. They are responsible for performing periodic, spot, and comprehensive evaluation of the entire organization to insure [sic] that ongoing evaluation structures within maintenance, operations, and stores are effective.

The Director of Safety is authorized to initiate an internal communication process for employees to convey findings and concerns regarding all matters of safety. The Director of Safety is responsible for coordinating responses to safety issues among the various departments. He/she has the authority to insure [sic] all comprehensive fixes and corrective actions are implemented and followed. The DS is responsible and has the authority to modify the program as needed...

The Director of Safety shall report directly to the General Manager on all safety related concerns and maintain historical files on issues and resolutions in sufficient detail to allow senior managers to develop policies and procedures as may be required.

1. Additionally, the responsibilities of the DS include but are not limited to, the following:

- a. Monitor and report to senior management on all air carrier activities that may have an impact on safety;*
- b. Establish a reporting system which provides for a timely and free flow of safety-related information;*
- c. Develop and maintain a database of incident/accident information to monitor and analyze trends;*
- d. Monitor and evaluate the various safety, company record, and malfunction reporting systems to ensure appropriate integration and evaluation of data;*
- e. Investigate and report on incidents/accidents and make recommendations to preclude a recurrence;*
- f. Conduct safety audits and inspections;*
- g. Solicit and process safety improvement suggestions;*
- h. Develop and maintain a safety awareness program;*
- i. Review and evaluate the adequacy of the emergency response plan;*
- j. Monitor industry safety concerns that may have an impact on operations;*
- k. Maintain close liaison with the FAA, NTSB, and industry safety organizations and associations;*
- l. Discharge duties to meet applicable legal requirements and to maintain safe operations in accordance with section 14 CFR 119.65. [14 CFR 119.65(d)(3)]*
- m. Maintain currency and knowledge in the following areas with respect to RAI's operation [14 CFR 119.65(d)(2)]:*
 - Aviation standards and safe operating practices [14 CFR 119.65(d)(2)(i)];*
 - Federal Aviation Regulations [14 CFR 119.65(d)(2)(ii)];*
 - RAI operations specifications [14 CFR 119.65(d)(2)(iii)];*
 - Appropriate maintenance and airworthiness requirements [14 CFR 119.65(d)(2)(iv)];*
 - The RAI manual system [14 CFR 121.133]*

2. The DS shall attend a minimum of two industry or government activities per year. [14 CFR 119.65(d)(2)]

Expertise

1. Corporate safety culture.

2. *The role of the safety director as advisor to senior management officials.*
3. *Safety philosophy.*
4. *Safety data collection and analysis programs.*
5. *Risk management.*
6. *Incident/accident prevention and investigation.*
7. *Human factors.*

Qualifications

The person assigned as Director of Safety should have extensive operational experience and professional qualifications in aviation. These qualifications may be any of the following.

1. *A FAA commercial pilot or airline transport certificate.*
2. *A FAA mechanic certificate.*
3. *A FAA aircraft dispatcher certificate.*
4. *Three years' experience in a supervisory position with a part 121 air carrier.*
5. *Three years' experience in a position comparable to (4) above in US military aviation operations.*
6. *Three years' experience in a supervisory position with a US Government department, board, or agency that deals directly with aviation matters.*

Knowledge

The person assigned as the Director of Safety should have understanding of the following materials with respect to the certificate holder's operation.

1. *The certificate holder's operation specifications.*
2. *The manuals required by section 14 CFR 121.133.*
3. *All appropriate maintenance and airworthiness requirements of 14 CFR chapter 1 (part 1 through 199).*
4. *The operator's Hazardous Materials (HazMat) program.*
5. *Transportation Security Administration (TSA) restrictions and policies in regards to RAI's operation.*
6. *Aviation safety programs.*
7. *Aviation safety standards.*
8. *Safety related aviation operating practices.*

Safety Audit Program

The Director of Safety will conduct safety audits at the intervals listed in SIEM 4.8.3, or at other times as he/she may deem necessary. The findings of the audit shall be forwarded to all required management personnel for appropriate corrective action. Follow-up audits will be conducted to ensure the effectiveness of this program and to verify that corrective action has been taken.

9.2 Chief Pilot

The Rhoades Aviation, Inc. Administration Manual Section 3.6.3 provided the following, in part, information about the responsibilities of the chief pilot/director of training:

The Chief Pilot is listed as the Chief Pilot in the Operations Specifications and reports to the Director of Operations. He/she is responsible for and is in complete charge of all flight crewmembers employed by this Company and manages all flight crew training in accordance with RAI's Aircrew Training Manual (ATM). He/she acts as liaison between the pilots and the Director of Operations. He/she works closely with the Director of Operations and in the absence of the Director of Operations, assumes his general duties (This delegation must be in writing and the FAA notified by certified mail). The Chief Pilot assists in formulating the planning of future flights, routes, contracts, operations and new equipment. In addition, the Chief Pilot is charged with the following specific duties and responsibilities. This individual must meet all the requirements of 14 CFR 119.65, 14 CFR 119.67.

Duties, Responsibilities, and Authority

- 1.** *Remain current and qualified in a Company aircraft in accordance with the requirements of a regular line captain.*
- 2.** *Stay available and serve as line PIC on a normal basis, unless restricted by the rest requirements of the Federal Aviation regulations.*
- 3.** *Coordinate with the Director of Operations to provide enough line pilots for each type aircraft the company operates.*
- 4.** *Responsible for the selection of flight personnel for advancement and upgrading in accordance with Company policy and FAA requirements.*
- 5.** *May sign Operations Specifications as authorized in ADM 6.14.4;*
- 6.** *Serve as a pilot of a normal line crew, adhering to all the provisions and regulations applicable to a Pilot-in-Command.*
- 7.** *Supervise, assist, and standardize all line pilots in accordance with applicable company policies and federal regulations.*
- 8.** *Responsible for test flight of aircraft when required.*
- 9.** *Responsible for advising the Director of Operations concerning request for the transportation of questionable cargo.*
- 10.** *Responsible for the selection and maintaining standardization of all check airmen for each aircraft type operated.*
- 11.** *Responsible for the hiring of all flight personnel.*
- 12.** *Assist and coordinate with the Director of Safety on all matters of safety concerning the operation of the airline.*
- 13.** *Establish methods for selection and usage of specific aircraft checklist and operational procedures. Provide interface within the Aircraft*

Performance Operating Limitations process and flight crew operational procedures.

- 14.** *Coordinate with the Director of Operations to ensure standardization of pilot training.*
- 15.** *Establish ground and flight training programs for all flight crew members which meet the requirements of the FAA.*
- 16.** *Prepare and issue revisions and information regarding ground and flight training. He/she is authorized to modify and change the ground and flight training program.*
- 17.** *Ensure that all training is accomplished in accordance with the FAA Approved Flight Crew Member Training Program and is properly recorded in pilot records.*
- 18.** *Schedule required FAA checks for all flight crew members to ensure all qualifications are current; submit a report annually to the POI that summarizes all flight checks given and the results of each check. Report is due by September 30th each year.*
- 19.** *Ascertain that each crew member has completed all required training prior to being released for flight assignments.*
- 20.** *Advise the Director of Operations as soon as possible when crew member proficiency is unsatisfactory.*
- 21.** *Coordinate all contract training and is responsible for arranging for all training conducted in facilities not operated by Rhoades Aviation when required.*
- 22.** *Chairman of the MEL Committee, and as such is responsible for maintaining the company aircraft MEL's current as to the Master MEL and equipment changes.*
- 23.** *Has the responsibility and authority for programs listed throughout the GOM where stated.*

10.0 Organizational Safety Culture

Investigators asked employees in various roles to describe their impressions of Rhoades Aviation Inc.'s safety culture. The CEO stated that he promoted a friendly, positive work environment; that it was the policy and culture of Rhoades Aviation, Inc. to report safety issues; and that SMS implementation was leading to some cultural change, explaining "It's a culture, safety culture of the operations trying to find out what is right or wrong and accepting and encouraging every employee to putting their own thoughts, what they think should be done better as information really helps with the SMS to find the root cause and find the control for it..."

Investigators asked the CEO to comment on a safety report submitted by a Rhoades Aviation Inc. first officer that was discussed at a May 21, 2021, Rhoades Aviation Inc. safety meeting. Investigators stated that this report involved a captain's

reluctance to report a maintenance issue because he was afraid of being terminated. The CEO stated that he saw the report the day it was filed, and he was shocked to read it because it was the first time he had ever heard of a Rhoades Aviation Inc. employee hesitating to write up a maintenance issue. The CEO called a management meeting and managers decided to address the report through the company's SMS. The CEO told investigators he contacted a lawyer who represented the company, and the lawyer encouraged him to issue a letter to all employees stating that the company supported them and encouraging them to file a report about any issues of concern or discuss them directly with management. The CEO conferred with the Rhoades Aviation, Inc. POI, and the POI thought it was a good idea, so he distributed the letter.

Rhoades Aviation, Inc.'s vice president of operations told investigators *"any safety system... comes down to two things: communication and listening,"* and those things were encouraged. The CEO had an open office and that anyone could go into his office and tell him something. The CEO was good about putting money away for expensive maintenance projects, such as engine overhauls. In addition, the vice president of operations said that he told the managers who worked for him that they could tell him of any concerns. His policy was, *"If you don't tell me, I can't help you. But if you tell me, I can help you."* He spent time at company outstations performing basic jobs and asking the employees how things were going. On one occasion someone told him about a ground power unit (GPU) that was still connected to an airplane when an employee tried to drive away. As a result, the vice president ordered some tags labeled "check for connection" to be placed on the GPU's tow hitches.

The director of safety said that whenever there was a safety issue, the safety department brought it to the CEO, who was the accountable executive for safety, and they figured out how to address it. He had a good relationship with the CEO, who had told him, *"Anything you need, let me know, I'll provide it."* They never had any conflicts. He felt supported and was able to make safety-related decisions without fear of repercussions. He said he did not feel pressured to do anything unsafe, and he did not have any safety-related concerns about the company.

The director of operations stated that Rhoades Aviation Inc.'s safety culture was, *"Really in tune, really like the whole SMS program we have going."* He thought SMS was *"one of the best things FAA ever required"* because it promoted a fundamental change in thinking and culture. He believed employees felt comfortable reporting safety issues, because he received the reports, with and without employees' names on them. He was responsible for making sure departments under him were meeting safety goals and were addressing any hazards. Asked whether he felt supported by his management, he said yes. Management supported mitigations he needed. The CEO made decisions about funding them, and he was generally willing to do it. Asked if he felt pressure to do things that were unsafe, he said he had been asked to put more pilots and planes in the air when demand was high, but he would not do anything unsafe.

The chief pilot stated, *"From the flight operation side, we encourage our pilots, if there's something wrong to write it up, and we never push them to take anything that they feel is unsafe, and once we write it up we want to make sure that it gets right signed off correctly. So, [the director of operations] and I do check those things. You know, see how they signed it off and then make sure of everything else, but. I mean I feel I fly their airplanes, so it's not like I'm worried about it. So, I feel it's good with the safety aspect of it. I mean our planes are old... they're old, they're not new, so we're going to have things that we're going to fly with MELs but it's nothing unsafe, you know."* He felt supported by management when making safety-related decisions, and he had no safety-related concerns about the company.

A Rhoades Aviation Inc. captain and line check airman described the company's safety culture as *"good."* He felt supported and had no safety concerns. Another Rhoades Aviation Inc. captain and line check airman said it was, *"Okay. I mean, they were there, they were around, they were present, and they had, you know, the forms for us to fill out. I mean, I always told people it was a great company to work for."* He had no safety-related concerns.

The accident captain said he felt the organizational safety culture at Rhoades Aviation Inc. was *"good."* He said he had worked for other companies with poor safety cultures in the past. Asked whether he felt supported by management and was able to make safety-related decisions without repercussions, he said, *"Definitely, yes."* He did not feel pressure to do things that were unsafe. Asked whether he had any safety-related concerns about the company, he said, *"No. I wouldn't be working here if I felt it wasn't safe. I wouldn't have taken that airplane if I felt it wasn't safe."*

During a follow-up interview, the captain said that the chief pilot had *"chewed him out"* after past abnormal events because the captain tended to *"do things differently than the way [the chief pilot] wants things to be done."* For example, the chief pilot chastised him for rejecting takeoffs when EGT indications were *"off the scale."* The captain said that the accident airplane was the *"hot airplane"* and that if the chief pilot had not *"chewed him out"* for rejecting a takeoff in that airplane due to high EGT readings, he would have written up the accident airplane at the end of his previous shift and declined to fly it until the issue had been corrected. He said he had observed EGT indications in the yellow range on that airplane during takeoffs performed during his previous shift.

The accident captain said he had heard another captain was suspended for rejecting a takeoff due to high EGT indications. Investigators interviewed that captain, who said he had never been reprimanded, he did not feel pressured to do things that were unsafe, and that the company safety culture was *"pretty good."* He said he had received some pushback from maintenance about some of his maintenance write-ups.

The accident captain said he had been criticized by the chief pilot following a previous incident involving an engine failure after takeoff because he had landed immediately without performing the engine failure checklist. He told investigators this had prompted an angry reaction from the chief pilot who told him to follow the company's standard engine-out procedures and run the checklist if it happened again. This was something they had practiced "*many times*" in the simulator. The captain said that the chief pilot's reaction prompted him to fly away from the airport during the accident flight. He said that he never imagined the other engine would also fail, adding, "*We should have gone back to the airport instead of going to do the checklist like a brand new airplane... We should have landed immediately.*"

A first officer who had flown with the accident captain said that the captain had told him about being chastised by management before the accident occurred. The captain once relayed a story to him about an oil bypass light that had come on after engine start on the ramp. The captain ran the engine for a few minutes to see if it would go out. It did not, so he shut down and asked maintenance to look at it, delaying the flight. The captain told the first officer he had been reprimanded for doing that and told by management that if it occurred again, he should taxi to the runway to see if the light went out before calling maintenance. The captain told the first officer that the light came on again, so he taxied to the runway and then returned to the ramp as instructed, but he got in trouble for doing so.

Two Rhoades Aviation Inc. captains who described the company's safety culture in positive terms, said they felt supported by management, and said they had no safety concerns about the company. A third, who was in the process of leaving the company at the time of the accident, said he never felt supported by management when making safety-related decisions. He said that when the accident captain declined an airplane due to oil servicing or some other issue, he or one of the other captains would be called in to fly it, which led to some resentment. The chief pilot once told him he would make the accident captain accept a flight or they would terminate him or demote him to the position of first officer. He said the chief pilot had also "*beat [the captain] up pretty good and threatened him a lot*" over various incidents that occurred in the four months or so preceding the accident, over such things as declaring an emergency when a fuel quantity gauge malfunctioned. He said he knew about these events because they had been described to him by the chief pilot.

When the accident first officer was asked to describe the company's safety culture, he said he had been working closely with the director of operations and believed the director of operations was very safety focused. Asked if this assessment applied to Rhoades Aviation Inc. management in general, he said yes, he believed safety was a priority for the company. He told investigators he did not feel pressure from Rhoades Aviation Inc. to do anything unsafe and he indicated that he had no safety-related concerns about the company.

The Rhoades Aviation Inc. captain who was in the process of leaving the company at the time of the accident told investigators he had a telephone conversation with the first officer in the days before the accident during which the first officer told him that Rhoades Aviation Inc. was offering him a captain's position, that would require him to sign a two-year contract. The captain encouraged the first officer not to take the position or sign the contract because of *"who you're working for, and what they ask of you, and the planes you're flying."* The captain told investigators that the first officer called him the day before the accident and told him he was going to decline the captain upgrade, explaining, *"It's not safe. I'm not going to stay here another two years, I don't care what they offer me. I don't care if they upgrade me or not, it's not worth it."* According to the captain, the first officer told him, *"This company is so screwed up. I am neck deep into manuals - you know, I'm speaking with the FAA directly and I'm working on the manuals directly... I'm an attorney, I'm trying to help them out but this place is so far beyond help."*

Three other first officers described the company's safety culture in positive terms, said they felt supported by management, and said they had no safety concerns about the company. Another first officer said that the company's ground crews seemed disorganized, but otherwise he had no safety concerns. A fifth first officer said that the company seemed to handle some safety issues proactively, such as encouraging ramp workers to wear neon colored clothing, but the first officer expressed concern that the company also encouraged flight crews to delay writing up maintenance issues until they returned to Honolulu instead of before they departed.

11.0 Relevant Systems

11.1 Emergency Equipment

The Rhoades Aviation, Inc, General Operations Manual, Chapter 2 "Normal Operations" Section 2.1.2 "Emergency Equipment Storage Locations - Boeing 737" provided, in part, the following guidance:

Each piece of equipment should be verified in the appropriate location and inspection tag checked for currency during aircraft preflight.

- 1. Escape Rope: An emergency escape rope is installed overhead of each pilot position.*
- 2. Life Vest: An emergency flotation device is provided at the back of each pilot seat and two are stored in the equipment storage area in the passageway for jumpseat riders and additional crewmembers.*
- 3. Smoke Goggles: Smoke goggles are stored in the equipment storage bins adjacent to pilot seat and in the seatbacks for ACMs / additional crewmembers.*

4. *Flashlight: Each pilot crewmember is responsible to carry their own flashlight in good working order and to have it easily accessible at their pilot station.*
5. *Hand Fire Extinguishers: Portable Halon fire extinguishers are provided for onboard fire protection and are stored on the right aft cockpit bulkhead.*
6. *Crash Axe: An axe is located on the aft cockpit bulkhead.*
7. *Portable Oxygen: A portable oxygen bottle is provided for emergencies where a crewmember must leave their station and is stowed on the aft cockpit bulkhead.*
8. *PBE Mask: One PBE mask shall be mounted on the aft wall of the cockpit and shall be located no further than three feet from the fire extinguisher.*
9. *Emergency Oxygen: See GOM 2.20.2*
10. *First Aid Kit: A first aid kit is stowed in a mounted position on the aft cockpit bulkhead.*
11. *ELT Beacon: This radio is stowed in the supernumerary area.*

12.0 Relevant Procedures

12.1 Areas of Responsibilities

Rhoades Aviation, Inc., Aircraft Operations Manual Volume 1, Section 2 "Normal Procedures - Introduction," dated April 3, 2014, provided the following depiction of each pilot's area of responsibility while in flight, depending on which pilot was the pilot flying.

12.1.1 Captain's Area of Responsibility as Pilot Flying

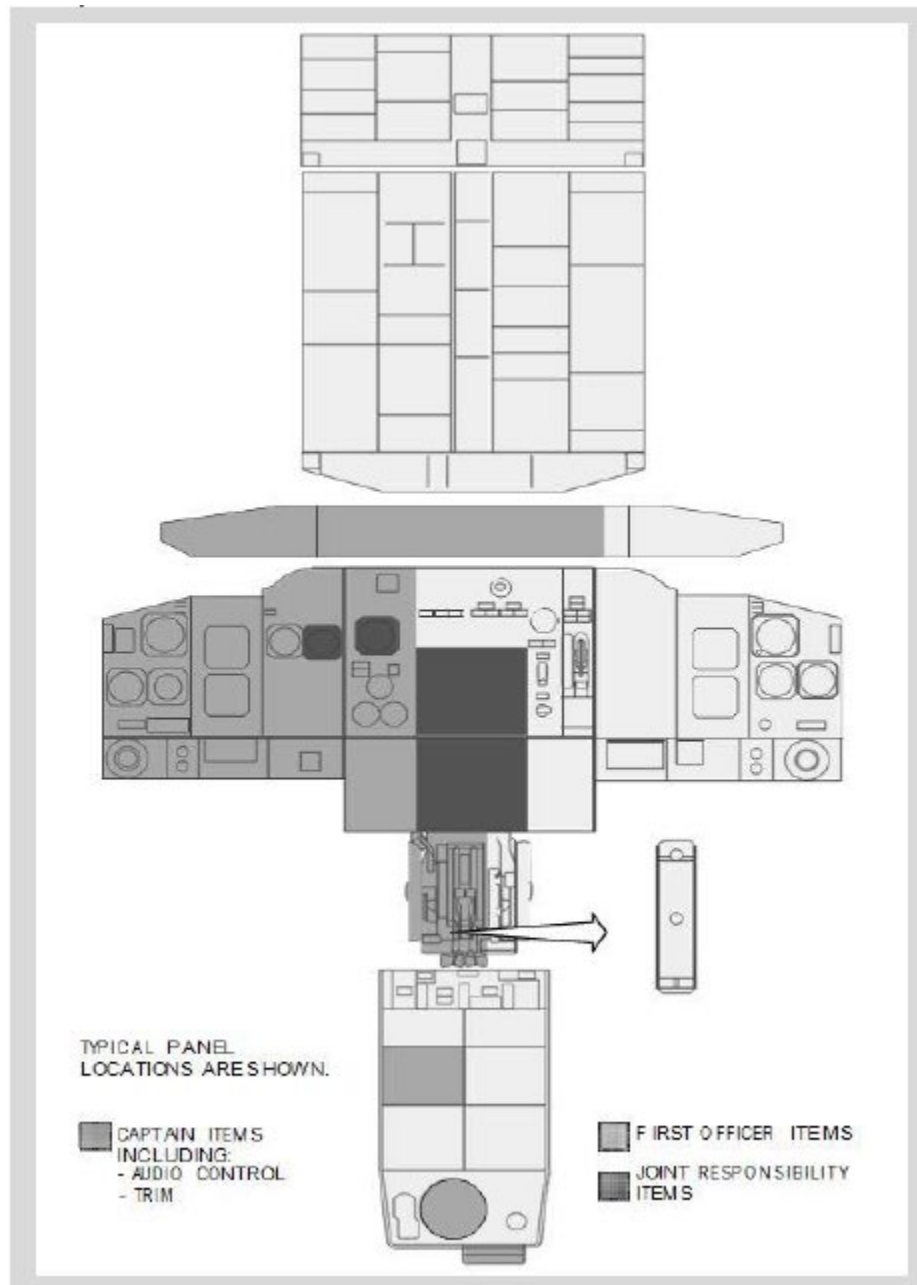


Figure 8: Captain's Area of Responsibility as the Pilot Flying
(Source: Rhoades Aviation, Inc. Aircraft Operations Manual Vol 1)

12.1.2 First Officer as Pilot Flying

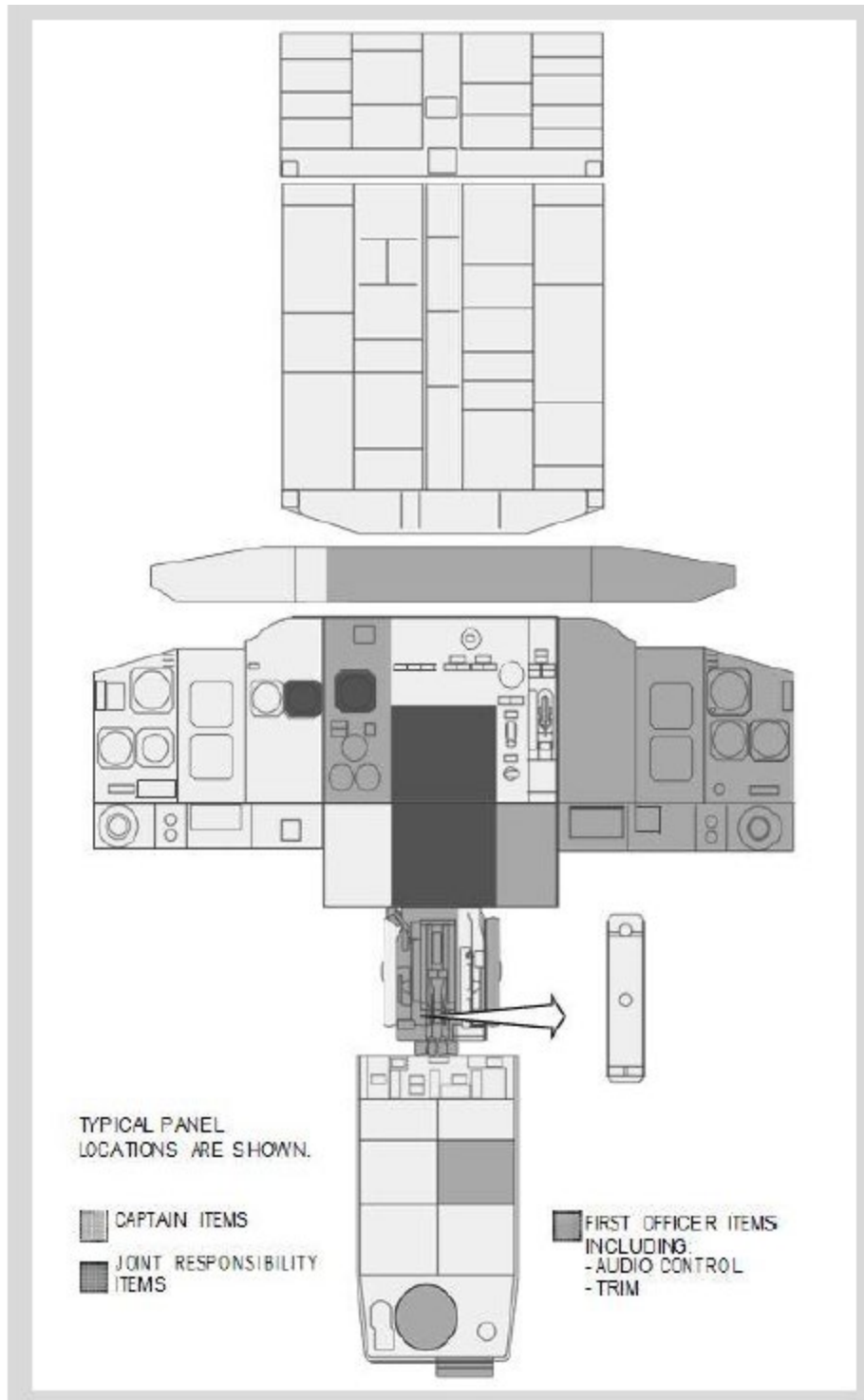


Figure 9: First Officer's Area of Responsibility as the Pilot Flying
 (Source: Rhoades Aviation, Inc. Aircraft Operations Manual Vol 1)

12.2 Mechanical Irregularities

Rhoades Aviation, Inc, General Operations Manual Chapter 2 "Normal Operations" provided the following guidance for flightcrews in reporting mechanical irregularities:

The Pilot-in-Command shall ensure that all mechanical irregularities occurring during flight time are entered in the Aircraft Flight Log (Form S-5) at the conclusion of that flight time. Any discrepancy entered into the Aircraft Flight Log (Form S-5) at other than Honolulu will be relayed to maintenance control and Flight Following.*

** A mechanical irregularity occurs when an aircraft component does not operate as specified (or only intermittently so) in the appropriate aircraft operating manual (AOM). Aircraft Flight Log Entries.*

1. The Captain shall assure that the Aircraft Flight Log (Form S-5) entries are made and reported on all safety of flight discrepancies and mechanical irregularities, as well as non-essential and non-airworthiness items that need repair.

2. A flight crew may not clear an aircraft Mechanical Difficulty Item; however, a flight may continue per the MEL with an appropriate release from maintenance.

3. If a flight crew discovers their previous Aircraft Flight Log (Form S-5) write-up to be incorrect, (e.g., discrepancy does not exist as reported) the item should be crossed out with a single line. The corrected data will be entered, dated and signed by the PIC.

4. Flight crews are not to enter any information in the Corrective Action section of the Aircraft Flight Log (Form S-5) except when deferring a discrepancy per the approved MEL/CDL/MCO program or complying with a repetitive (M) maintenance procedure.

5. INFO Entries:

Precede narrative with the word "INFO". INFO write-ups are to be written only in the MECHANICAL DIFFICULTIES section of the Aircraft Flight Log (Form S-5). Such an entry will not require a mechanic to sign the Aircraft Flight Log (Form S-5) at the time of entry.

** Example INFO item:*

a. A flight crew may be requested by maintenance to functionally test an aircraft system while taxiing out for takeoff. On such occasions, an information entry will be made stating the system check performed and results. If the system check is satisfactory, the flight may proceed without additional action. If unsatisfactory, further maintenance action will be required.

6. When a functional check flight is required, the following will be adhered to:

a. The Captain is made aware of the component replaced and is in agreement to perform a system flight check;

- b. There is only one component involved;*
- c. In dual installations, the "other" system must be a "good" system; and*
- d. Non-routine Flight Procedures are followed.*
- 7. Flight crews shall not use a system which has been placarded INOPERATIVE.*
- 8. Flight and block times are to be recorded in hours and tenths.*
- 9. Fueling Data*

Company reporting and tracking requirements are based upon the accuracy of pilots reporting fuel uplift in gallons and pounds. An Aircraft Flight Log (Form S-5) entry shall be made at each station where fuel is uplifted. In addition, each leg's arrival fuel in pounds shall be recorded.

10. Oil Quantity

Whenever oil is added away from home base, the PIC will ensure the quantity added is recorded in the Aircraft Flight Log (Form S-5).

12.2.1 Aircraft Flight Log Corrective Action

Rhoades Aviation, Inc. Central Operations Manual, Chapter 2 - "Normal Operations" provided the following information to flight crews on who was responsible for conducting the appropriate corrective action for an irregularity or discrepancy:

Maintenance Control (a function of the Director of Maintenance), is responsible for releasing the aircraft to flight following at all times. If while completing a pre-flight or post-flight and an irregularity or discrepancy is discovered at a non-maintenance station, the aircrew will make an appropriate entry into the Aircraft Flight Log (Form S-5) and contact Maintenance Control with the full details of the irregularity or discrepancy. Whenever a mechanical difficulty has been written up in the Aircraft Flight Log (Form S-5), the aircraft cannot be released for flight until Maintenance Control is assured that the appropriate corrective action has been taken.

A Rhoades Aviation, Inc. authorized mechanic may take corrective action on a mechanical difficulty with an appropriate sign off as follows:

- 1. At stations where either Rhoades Aviation, Inc. maintenance or previously established contract maintenance personnel meet the aircraft, corrective action may be taken. Maintenance Control shall be kept informed through these individuals.*
- 2. Stations having on-call contract maintenance assigned or mechanical needs (not contracted to routinely meet aircraft):*
 - a. On arrival of an overnight aircraft, the Captain will contact Maintenance Control and read all open Aircraft Flight Log (Form S-5)*

items. Maintenance Control will determine the requirement for maintenance action.

b. A contracted mechanic is not authorized to perform maintenance on Rhoades Aviation, Inc. aircraft without specific approval from Maintenance Control.

c. A contracted mechanic may not clear an open discrepancy without specific approval from Maintenance Control.

NOTE: At stations where Rhoades Aviation, Inc. Maintenance Control has arranged for maintenance on a one-time authorization basis, upon completion of the maintenance, the Captain must contact Maintenance Control. The contact will assure that the maintenance performed is documented as required by Rhoades Aviation, Inc.'s General Maintenance Manual, and has been performed within the limitations imposed by Rhoades Aviation, Inc. on the contracted mechanic.

3. If a Special Flight Permit is required, flight crews must comply with the provisions of the Special Flight Permit (See Operations Specifications D084).

The Captain will advise Flight Following prior to departure of the corrective action(s) taken and the status of open item(s) in the Aircraft Flight Log (Form S-5). Flight Followers shall verify with Maintenance Control the airworthiness status of the aircraft prior to authorizing the release of a flight.

12.3 Engine Condition Monitoring

The Rhoades Aviation, Inc., General Operations Manual, Chapter 2 "Normal Operations Section 2.16.4 "Engine Condition Monitoring" provided, in part, the following guidance:

A daily compilation of data is required by the Maintenance Department for effective trend monitoring of the engines on Rhoades Aviation, Inc. aircraft and continued use of "On Condition" replacement of parts. The Captain is responsible for accurately recording this data once each day per aircraft he flies. The collection does not need to be repeated if already accomplished by another crew on that date. Record engine data in the Engine Health Monitoring section of the Aircraft Flight Log (Form S-5A).

2.16.4.1 Trend Monitoring Data Collection Procedures

Trend monitoring is used to identify current and future mechanical issues. It's importance as a safety tool cannot be overemphasized, thus data collection accuracy is requested and greatly valued.

The following procedures shall be used in recording the most accurate information possible.

- *Engine performance data should be recorded on all flights except the following city pairs due to the short cruise segment: LIH/HNL, HNL/OGG, OGG/KOA, KOA/ITO, and ITO/OGG.*
- *Trend readings should be taken within +/- 5,000 feet of the standard cruise altitude (at normal cruise altitude) with the autopilot altitude hold mode engaged.*
- *The following "standard" configuration for readings should always be attempted: All engine bleeds ON, pack valves ON, and isolation valve AUTO. Anything that may be of consequence to the trend monitoring process (e.g., engine generator off, engine hydraulic pump off) should be noted in the remark's section.*
- *All engine data must be recorded with the engine and wing anti-ice OFF.*
- *To reduce parallax and maintain consistency in data, the Captain's station and instruments must always be used to read the instrument data.*
- *The engine parameters should be allowed to stabilize in cruise flight a minimum of 5 minutes. The power levers should not be adjusted after the initial setting, otherwise another 5-minute stabilization period should take place.*
- *EPR's should be initially matched. If during the 5-minute stabilization period the EPR's change, the engine power should be allowed to drift away from the initial setting. It's not a concern if the engine's power indications become mismatched since the trend program will compensate as long as the actual parameters that are indicated are recorded accurately.*
- *The parameters should all be recorded as close together in time as possible (within a 1-minute time period) to a one decimal point reading as shown in the sample below. DO NOT round off numbers.*
- *Altitude must be recorded as pressure altitude as accurately as the instrument allows (Flight level should NEVER be recorded.) To determine the correct pressure altitude, the altimeter setting of 29.92" Hg should be set in the Kollsman window and the pressure altitude read from the altimeter.*
- *The Total Air Temperature (TAT) must be denoted as either positive or negative (+ or -).*
- *The Indicated Airspeed (IAS) should be read to the closest 5 knots (or exact on aircraft with a speed drum). If Mach is available, the nearest 1/100 (e.g., .64, .72, .85) should be recorded.*

Sample engine trend (health) data

transair ENGINE HEALTH MONITORING											FORM S-5A 9/01/2018	
DATE 4/9/67		TIME (HST) 0215		AIRCRAFT # 306AL		CRUISE WT 108,023		PRESS ALT 23,160		IAS 307	MACH .68	TAT (+/-) +09
ENG NO.	EPR	N1	EGT	N2	F/F LBS/HR	ENGINE OIL		ENGINE BLEED	AIR PAC VALVE	ISOL VALVE	DUCT PRESS	
						PRESS	TEMP					
1	1.50	80.1	450	85.1	3400	49	119	ON OFF	ON OFF	AUTO	38	
2	1.51	81.8	415	88.0	3450	48	118	ON OFF	ON OFF	CLOSED	36	
Remarks:												

3941 901

Figure 10: Sample Engine Trend Data.
Source: Rhoades Aviation, Inc. General Operations Manual

12.4 Exceeding a Limitation of the Aircraft or Engine

The Rhoades Aviation, Inc, General Operations Manual, Chapter 2 "Normal Operations" Section 2.18 "Exceeding a Limitation of the Aircraft or Engine" provided, in part, the following guidance:

In-flight

If during flight an aircraft limitation has been exceeded, for any reason, contact Flight Following and Maintenance Control as soon as possible after the incident. Maintenance Control can help determine whether or not the flight may continue to its destination. If a diversion to an alternate airport is required, Flight Following should be advised.

NOTE: Flight Following/Maintenance Control may be reached by phone patch while airborne through a ground station or in an Emergency through ATC.

On the Ground

If an engine limitation has been exceeded while on the ground, the appropriate abnormal or emergency procedure shall be accomplished and maintenance control shall be notified.

When an engine or structural limitation has been exceeded, as stated in the applicable AOM, an Aircraft Flight Log (Form S-5) entry is also required detailing the limitation exceeded and the amount of time it was exceeded.

12.5 Runway Analysis Manual

The Rhoades Aviation, Inc, General Operations Manual, Chapter 2 "Normal Operations" Section 2.27.2 "Runway Analysis Manual" provided, in part, the following guidance:

RAI keeps current aircraft specific performance data for each commonly used airport within its authorized area of operations. This data is provided to the flight crews through the publication of an Airport Analysis Manual. All data contained in the manual is kept current by an Airport Surveillance System operated and maintained by Aircraft Performance Group, Inc. (APG), the FAA approved commercial provider of the computer-generated analysis. APG will provide updates to the analysis of the airports listed in the table of contents of the airport analysis manual; any time changes occur in the airport aeronautical data that affects airplane performance calculations. Airport analysis shall be obtained from APG, on an as needed basis, for all other airports of intended use. To ensure only the most up to date information is used for ad-hoc airports; orders for airport analysis should be made on the day of intended use, and provided to the pilot-in command prior to conducting aircraft operations at that airport.

If the certificate-holding district office charged with the overall inspection of the Rhoades Aviation operations finds that revisions are necessary for the continued adequacy of the Rhoades Aviation's system for collection, dissemination, and usage of aeronautical data that has been granted approval, the certificate holder shall, after notification by the certificate-holding district office, make those revisions in the system.

Use of Runway Analysis

All flight crews operating transport category aircraft will reference the Runway Analysis information to determine the maximum allowable gross take-off and landing weight for the airports listed on the Flight Release. The PIC shall pay particular attention to any Special Procedure when issued. When NAVAIDS are used to aid in the definition of these non-standard procedures (engine-out departure tracks and or level off heights) the PIC will ensure such NAVAIDS are in service and usable. When the Special Procedures are not satisfactory the PIC will contact the Director of Operations and request a new analysis based on the conditions and specifications required at that time. Landing at airports where an airport analysis has not been issued will require an airport analysis before the aircraft can be released to and from that airport.

12.6 Takeoff Flap Setting

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided the following guidance on takeoff flap setting:

For takeoffs, when conditions permit, consider using larger flap settings to provide shorter takeoff distance. Larger flap settings also provide greater tail

clearance. Refer to the Typical Takeoff Tail Clearance table in this chapter to determine minimum tail clearance for different takeoff flap settings.

12.7 Reduced Thrust Takeoff

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided the following guidance on reduced thrust takeoffs:

The reduced thrust takeoff lowers EGT and extends engine life. Operation with reduced takeoff thrust requires that the engine inoperative climb gradient is not less than the regulatory minimum, or that required to meet obstacle clearance criteria. Therefore, there is no need for additional thrust beyond the reduced takeoff thrust in the event of an engine failure.

The reduced thrust takeoff may be done using the Assumed Temperature Method (ATM). Use the takeoff speeds provided by the Runway Analysis Manual.

Note: Reduced thrust takeoffs are not authorized if potential windshear conditions exist.

12.7.1 Assumed Temperature Method

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided the following guidance on the assumed temperature takeoff method:

The ATM achieves a takeoff thrust less than the maximum takeoff thrust by assuming a temperature that is higher than the actual temperature. The thrust reduction is limited to 25% below any certified takeoff thrust rating.

The primary thrust setting parameter (EPR) is not considered a limitation. Takeoff speeds consider ground and in-air minimum control speeds (VMCG and VMCA) with full takeoff thrust for the actual temperature. If conditions are encountered during the takeoff where additional thrust is desired, such as windshear, the crew should not hesitate to manually advance thrust levers to maximum rated thrust.

The assumed temperature method of computing reduced thrust takeoff performance is always conservative. Actual performance is equal to or better than the performance obtained if actually operating at the assumed temperature.

This is because the true airspeed at the actual temperature is lower than at the assumed temperature.

Note: Do not use the ATM if conditions that affect braking such as a runway contaminated by slush, snow, standing water, or ice exist. ATM takeoffs are allowed on a wet runway if suitable performance accountability is made for the increased stopping distance on a wet surface.

Note: An increase in elevator column force during rotation and initial climb may be required for ATM takeoffs.

12.7.2 Engine Failure During a Reduced Thrust Takeoff

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided the following:

Since the reduced thrust (ATM) takeoff must still comply with all regulatory takeoff performance requirements, it is not necessary to increase thrust beyond the reduced level on the operating engine in the event of an engine failure. However, if more thrust is needed during an ATM takeoff, thrust on the operating engine may be increased to full rated takeoff thrust by manually advancing the thrust lever. This is because the takeoff speeds consider VMCG and VMCA at the full rated takeoff thrust.

Increasing thrust on the operating engine to full rated takeoff thrust provides additional performance margin. This additional performance margin is not a requirement for the reduced thrust takeoff and its use is at the discretion of the flight crew.

12.8 Non-Normal Operations

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Non-Normal Operations," provided, in part, the following guidance:

This chapter describes pilot techniques associated with accomplishing selected Non-Normal Checklists (NNCs) and provides guidance for situations beyond the scope of NNCs. Aircrews are expected to accomplish NNCs listed in the QRH. These checklists ensure maximum safety until appropriate actions are completed and a safe landing is accomplished. Techniques discussed in this chapter minimize workload, improve crew coordination, enhance safety, and provide a basis for standardization. A thorough review of the QRH Introduction section and

Non-Normal Checklists is an important prerequisite to understanding this chapter.

Non-Normal Situation Guidelines

When a non-normal situation occurs, the following guidelines apply:

- **NON-NORMAL RECOGNITION:** *The crewmember recognizing the malfunction calls it out clearly and precisely*
- **MAINTAIN AIRPLANE CONTROL:** *It is mandatory that the Pilot Flying (PF) fly the airplane while the Pilot Monitoring (PM) accomplishes the NNC. Maximum use of the autoflight system is recommended to reduce crew workload.*
- **ANALYZE THE SITUATION:** *NNCs should be accomplished only after the malfunctioning system has been positively identified. Review all caution and warning lights to positively identify the malfunctioning system(s).*

Note: Pilots should don oxygen masks and establish communications anytime oxygen deprivation or air contamination is suspected, even though an associated warning has not occurred.

- **TAKE THE PROPER ACTION:** *Although some in-flight non-normal situations require immediate corrective action, difficulties can be compounded by the rate the PF issues commands and the speed of execution by the PM. Commands must be clear and concise, allowing time for acknowledgment of each command prior to issuing further commands. The PF must exercise positive control by allowing time for acknowledgment and execution. The other crewmembers must be certain their reports to the PF are clear and concise, neither exaggerating nor understating the nature of the non-normal situation. This eliminates confusion and ensures efficient, effective, and expeditious handling of the non-normal situation*
- **EVALUATE THE NEED TO LAND:** *If the NNC directs the crew to land at the nearest suitable airport, or if the situation is so identified in the QRH, diversion to the nearest airport where a safe landing can be accomplished is required. If the NNC or the Introduction section does not direct landing at the nearest suitable airport, the pilot must determine if continued flight to destination may compromise safety.*

Troubleshooting

Troubleshooting can be defined as:

- *taking steps beyond a published NNC in an effort to improve or correct a non-normal condition*
- *initiating an annunciated checklist without a light, alert, or other indication to improve or correct a perceived non-normal condition*
- *initiating diagnostic actions.*

Examples of troubleshooting are:

- attempting to reset a system by cycling a system control or circuit breaker when not directed by the NNC
- using maintenance-level information to diagnose or take action
- using switches or controls intended only for maintenance.

Troubleshooting beyond checklist directed actions is rarely helpful and has caused further loss of system function or failure. In some cases, accidents and incidents have resulted. The crew should consider additional actions beyond the checklist only when completion of the published checklist steps clearly results in an unacceptable situation. In the case of airplane controllability problems when a safe landing is considered unlikely, airplane handling evaluations with gear, flaps or speedbrakes extended may be appropriate. In the case of jammed flight controls, do not attempt troubleshooting beyond the actions directed in the NNC unless the airplane cannot be safely landed with the existing condition. Always comply with NNC actions to the extent possible.

Crew distraction, caused by preoccupation with troubleshooting, has been a key factor in several fuel starvation and CFIT accidents. Boeing recommends completion of the NNC as published whenever possible, in particular for flight control malfunctions that are addressed by a NNC. Guidance for situations beyond the scope of the non-normal checklist is provided later in this chapter.

12.8.1 Non-Normal Checklist Procedures - QRH

The Rhoades Aviation, Inc. Boeing 737-200C QRH, Section 1 "Introduction," provided, in part, the following guidance on checklist usage:

...Non-normal checklist use starts when the airplane flight path and configuration are correctly established. Only a few situations need an immediate response (such as CABIN ALTITUDE WARNING or Rapid Depressurization). Usually, time is available to assess the situation before corrective action is started. All actions must then be coordinated under the Captain's supervision and done in a deliberate, systematic manner...

The pilot flying calls for the checklist when:

- The flight path is under control
- The airplane is not in a critical phase of flight (such as takeoff or landing)
- All memory items are complete. The pilot monitoring reads aloud:
- The checklist title
- As much of the condition statement as needed to verify that the correct checklist has been selected
- As much of the objective statement (if applicable) as needed to understand the expected result of doing the checklist...

Non-memory items are called reference items. The pilot monitoring reads aloud the reference items, including:

- *The precaution (if any)*
- *The response or action*
- *Any amplifying information.*

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood. The item numbers do not need to be read.

The word "Confirm" is added to checklist items when both crewmembers must verbally agree before action is taken. During an inflight non-normal situation, verbal confirmation is required for:

- *An engine thrust lever*
- *An engine start lever*
- *An engine, APU or cargo fire switch*
- *A generator drive disconnect switch*
- *A flight control switch*

12.9 Engine Failure - Takeoff

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided, in part, the following guidance on engine failure at takeoff:

General

Differences between normal and engine out profiles are few. One engine out controllability is excellent during takeoff roll and after liftoff. Minimum control speeds in the air (VMCAs) are below VR and VREF.

Engine Failure Recognition

An engine failure at or after V1 initially affects yaw much like a crosswind effect. Vibration and noise from the affected engine may be apparent and the onset of the yaw may be rapid. The airplane heading is the best indicator of the correct rudder pedal input. To counter the thrust asymmetry due to an engine failure, stop the yaw with rudder. Flying with lateral control wheel displacement or with excessive aileron trim causes spoilers to be raised.

12.9.1 Engine Failure After V1

The Rhoades Aviation Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided the following:

PILOT FLYING	PILOT MONITORING
At or above 500 feet AGL (unless an earlier turn is required by a departure procedure):	
If using the Flight Director, call for appropriate lateral mode: "HEADING SELECT" or "VOR/LOC." "DECLARE EMERGENCY"	Select the requested lateral mode on the Flight Director. Acknowledges "DECLARE EMERGENCY" request and notifies ATC when able
After the aircraft has reached Acceleration Altitude (800 ft AFE minimum or higher as required by Transair runway analysis):	
Adjust pitch to allow aircraft to accelerate to flaps up maneuvering speed Call for flap retraction on schedule Example - flaps 5 t/o: At V2+15: "FLAPS 1" At 190 KIAS: "FLAPS UP"	Position FLAP lever as directed and monitor flaps and slats retraction.

At 210 KIAS, call "SET MAX CONTINUOUS THRUST" and resume climbing at flaps up maneuvering speed Engage autopilot if desired and announce, "AUTOPILOT ENGAGED." Determine the malfunction and call for the appropriate non-normal checklist. When complete, call for the "AFTER TAKEOFF CHECKLIST."	Set Max Continuous Thrust. Read and accomplish the appropriate QRH checklist. Silently accomplish the After Takeoff Checklist and announce "AFTER TAKEOFF CHECKLIST COMPLETE."
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12.9.1.1 Technique for an In-Flight Engine Shutdown

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement - Non-Normal Operations" provided the following guidance for the recommended technique for an in-flight engine shutdown:

Any time an engine shutdown is required in flight, good crew coordination is essential. Airplane incidents have turned into airplane accidents as a result of the flight crew shutting down the incorrect engine.

When the flight path is under complete control, the crew should proceed with a deliberate, systematic process that identifies the correct engine and ensures that the operating engine is not shut down. Do not rush through the shutdown checklist, even for a fire indication.

The following technique is an example that could be used:

The PF then verbally coordinates confirmation of the affected engine with the PM and then slowly retards the thrust lever of the engine that will be shutdown.

Coordinate activation of the start lever as follows:

- PM places a hand on and verbally identifies the start lever for the engine that will be shutdown
- PF verbally confirms that the PM has identified the correct start lever
- PM moves the start lever to cutoff.

If the NNC requires activation of the engine fire switch, coordinate as follows:

- PM places a hand on and verbally identifies the engine fire switch for the engine that is shutdown
- PF verbally confirms that the PM has identified the correct engine fire switch
- PM pulls the engine fire switch.

12.9.1.1 Simulator Study Guide

An email to the accident pilot from the chief pilot, dated October 18, 2020, provided an attached document titled "Sim Guide - Engine Failure Procedures, 10-1-20". The email body stated, in part "... updated sim guide for engine failure...make sure you look over this. This is the way I want it done in sim.." The "Sim Guide" provided, in part, the following engine failure guidance:

Initial Climb: Engine Failure After V1

PILOT FLYING	PILOT MONITORING
At or above 500 feet AGL (unless an earlier turn is required by a departure procedure):	
If using the Flight Director, call for appropriate lateral mode: "HEADING SELECT" or "VOR/LOC."	Select the requested lateral mode on the Flight Director.
Captain will have the PM "DECLARE AN EMERGENCY."	
	Notify ATC of emergency declaration and initial intentions (such as heading & altitude).
After the aircraft has reached Acceleration Altitude (800 ft AFE minimum or higher as required by Transair runway analysis):	
Adjust pitch to allow aircraft to accelerate to flaps up maneuvering speed. Call for flap retraction on schedule.	

PILOT FLYING	PILOT MONITORING
Example for flaps 5 t/o: At V2+15: "FLAPS 1" At 190 KIAS: "FLAPS UP"	Position FLAP lever as directed and monitor flaps and slats retraction.
At 210 KIAS, call "SET MAX CONTINUOUS THRUST" and resume climbing at flaps up maneuvering speed. Engage autopilot if desired (recommended) and announce, "AUTOPILOT ENGAGED," (if on) "I HAVE THE RADIOS."	Set Max Continuous Thrust.
PF will now fly the aircraft, navigate, and communicate.	Call out or reconfirm the malfunction.
Initiate the emergency procedure by either calling for the appropriate "MEMORY ITEMS" or non-normal procedure, as applicable.	
Note - <i>Engine Failure or Shutdown</i> abnormal has no memory items.	
Note – To allow the PF to Confirm PM correct selection of controls, PM hand/finger placement on control must be carefully positioned so hand to switch/lever selection is easily verified by the PF.	
Memory actions follow for <i>ENGINE FIRE or Severe Engine Damage or Separation</i>	
Check that the PM has selected the Thrust Lever of the <u>Affected</u> engine and if correct, reply "CONFIRMED," if not correct, reply "NEGATIVE."	Place a finger under the affected engine's Thrust Lever and ask, "THRUST LEVER, AFFECTED ENGINE, CLOSED – CONFIRM?" (If a Negative response to a confirmation challenge is received, the PM will remove

PILOT FLYING	PILOT MONITORING
	hand from the control, reassess his selection, and then rechallenge with his new or reviewed selection.)
	When confirmed, move the Thrust Lever to the closed position.
Note - For an engine not developing thrust, retarding the Thrust Lever is an additional verification that the affected engine was selected. Be alert for aircraft yawing and changes in engine gauges & engine noise that could indicate that thrust is being reduced on the incorrect engine (operating engine).	
	Place a finger under the affected engine's Engine Start Lever and ask, " ENGINE START LEVER, AFFECTED ENGINE, CUTOFF – CONFIRM? "
Check that the PM has selected the Engine Start Lever of the <u>Affected</u> engine and if correct, reply " CONFIRMED, " if not correct, reply " NEGATIVE. "	When confirmed, move the Engine Start Lever to CUTOFF.
Check that the PM has selected the Engine Fire Switch of the <u>Affected</u> engine and if correct, reply " CONFIRMED, " if not correct reply " NEGATIVE. "	Place fingers under the affected engine's Engine Fire Switch and ask, " ENGINE FIRE SWITCH, AFFECTED ENGINE, PULL – CONFIRM? " When confirmed, Pull the Engine Fire Switch.

PILOT FLYING	PILOT MONITORING
	If the Engine Fire Switch or ENG OVERHEAT light stays illuminated: • Engine Fire Switch – Rotate to the Stop and hold for 1 second. • Start the timer. • If after 30 seconds the Engine Fire Switch or ENG OVERHEAT light stays illuminated: ➤ Engine Fire Switch – Rotate to the other Stop and hold for 1 second.
<i>ENGINE FIRE or Severe Engine Damage or Separation</i> Memory items End	
Call for the appropriate non-normal checklist.	
The Captain, if not currently the PM, may (and most times should) elect to become the PM and run the QRH checklist himself.	
	Read and accomplish the appropriate QRH checklist, keeping the PF advised and asking for confirmation when necessary.
When time permits, advise ATC of level of impairment, assistance required, souls-on-board, fuel-on-board (in pounds), and request ATC to notify Transair Flight Following (HNL ATC has telephone number – no need to give it.) If time permits, Flight Following may be notified directly on 129.75 instead.	

PILOT FLYING	PILOT MONITORING
"AFTER TAKEOFF CHECKLIST." After checklists are complete, transfer the radios back to the PM. "YOU HAVE THE RADIOS."	Silently accomplish the After Takeoff Checklist and announce "AFTER TAKEOFF CHECKLIST COMPLETE."

Emergencies

- 1) Fly the airplane**
- 2) Silence the warning**
- 3) Handle the emergency**

12.9.2 Initial Climb - One Engine Inoperative

The Rhoades Aviation Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided, in part, the following guidance on one engine inoperative during the initial climb:

The initial climb attitude should be adjusted to maintain a minimum of V₂ and a positive climb. After liftoff attitude and indicated airspeed are the primary pitch references. Cross check indicated airspeed, vertical speed and other flight instruments as needed.

Retract the landing gear after a positive rate of climb is indicated on the altimeter. The initial climb attitude should be adjusted to maintain a minimum of V₂. If an engine fails at an airspeed between V₂ and V₂ + 20 knots, climb at the airspeed at which the failure occurred. If engine failure occurs above V₂ + 20 knots, increase pitch to reduce the airspeed to V₂ + 20 knots and maintain V₂ + 20 knots until reaching acceleration height.

Indications of an engine fire, impending engine breakup or approaching or exceeding engine limits, should be dealt with as soon as possible. Accomplish the appropriate memory checklist items as soon as the airplane is under control, the gear has been retracted and a safe altitude has been attained. Accomplish the reference checklist items after the flaps have been retracted and conditions permit.

If an engine failure has occurred during initial climb, accomplish the appropriate checklist after the flaps have been retracted and conditions permit.

12.9.3 Immediate Turn after Takeoff - One Engine Inoperative

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided, in part, the following guidance on immediate turns after takeoff with one engine inoperative:

Obstacle clearance or departure procedures may require a special engine out departure procedure. If an immediate turn is required, initiate the turn at no lower than 500 AFE

Note: Maintain V₂ to V₂ + 15 knots with takeoff flaps while maneuvering.

Note: Limit bank angle to 15° until V₂ + 15 knots. Bank angles up to 30° are permitted at V₂ + 15 knots with takeoff flaps.

After completing the turn, and at or above acceleration height, accelerate and retract flaps.

12.9.4 Acceleration Altitude - Engine Out

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Procedures Supplement Taxi, Takeoff, and Initial Climb" provided the following guidance on the acceleration altitude with one engine inoperative:

The minimum altitude for flap retraction with an engine inoperative is the published acceleration altitude. This altitude varies by runway and is listed in the runway analysis. The standard minimum Engine Out Acceleration Altitude set by Transair through runway analysis is 800 feet AFE. This published altitude may be greater than 800 feet AFE if required to meet performance requirements. Flight crews must obtain and brief this altitude before every takeoff.

At engine out acceleration altitude, following the flight director commands will provide a decreased pitch attitude to level flight or a slight climb (0-200 FPM). Accelerate and retract flaps on schedule. After flap retraction, at flaps up maneuvering speed, set maximum continuous thrust and continue climb to obstacle clearance altitude. Accomplish the Engine Failure/Shutdown checklist or the Engine Fire, Severe Damage or Separation checklist reference items.

12.9.4.1 Special Departure Procedures for HNL

The Rhoades Aviation, Inc Runway Analysis Manual data was produced by the Aircraft Performance Group (APG)⁴⁶. The manual's record of changes listed the most recent change was "Switched to APG analysis format" which was effective on June 18, 2018. The manual provided the means to determine maximum allowable takeoff and landing weight based upon:

1. *Airport Characteristics consisting of airport elevation, runway gradient and length, runway contaminants and the obstructions within the takeoff flight path;*
2. *Environmental conditions consisting of temperature, wind, and pressure altitude;*
3. *Aircraft configurations consisting of power settings, flap settings, bleed configurations and Minimum Equipment List inoperative components.*

The manual provided a special departure procedure for runways 04R, 08L, and 08R, located prior to the runway performance charts for HNL. The takeoff performance charts for HNL included specific performance numbers based on the airplane tail number. The special departure procedure was also noted at the top of the of the runway takeoff performance page. The procedure for 08R was:

⁴⁶ APG was a privately held company based in Colorado that provided flight planning, runway analysis, and weight and balance services for aircraft operators. APG should not be confused with the NTSB Aircraft Performance Group.

```

*****
*****
*
*****          SPECIAL DEPARTURE PROCEDURES          *****
*
*****
*
*
*   HONOLULU, HI           PHNL
*   INOUYE INTL           24 Jun 21 UTC
*
*
*   Rwy           TAKEOFF WEIGHTS FOR RWY 08RDP REQUIRE
*   08RDP         THE USE OF THIS TAILORED NON-RNAV DEPARTURE
*                  PROCEDURE
*
*                  NOTE: NON-RNAV PROCEDURE. ALL FIXES
*                  ARE FLY-OVER FIXES UNLESS OTHERWISE
*                  NOTED. ALL TURNS ARE CLIMBING 15 DEGREES
*                  OF BANK UNLESS OTHERWISE NOTED.
*
*                  MAINTAIN RUNWAY HEADING TO HNL 1.3 DME
*                  (0.2 NM FROM DER)
*
*                  TURN RIGHT HEADING 220 DEGREES
*
*                  ###
*
*****
*****
*   These procedures describe the non-standard, one engine
*   inoperative, departure flight path. The maximum allow-
*   able takeoff weights, presented in the attached analysis,
*   are based upon the procedure(s) outlined above.
*
*****

```

**Figure 11: Special Engine Out Procedure Departing Runway 8R HNL
(Source: Transair Runway Analysis Manual)**

12.9.5 Flap Retraction - One Engine Inoperative

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 Procedures Supplement taxi, Takeoff, and Initial Climb provided, in part, the following guidance on flap retraction with one engine inoperative:

The minimum altitude for flap retraction with an engine inoperative is 400 feet AGL.

Acceleration height for a takeoff with an engine failure after V1 is based on accelerating to the recommended flaps up speed while retracting flaps and

selecting maximum continuous thrust limits within 5 minutes after initiating takeoff. Some combinations of high gross weight, takeoff flap selection and airport elevation may require initiating flap retraction as low as 400 feet after takeoff with an engine failure.

Engine-out acceleration and climb capability for flap retraction are functions of airplane thrust to weight ratio. Decrease pitch attitude to maintain approximately level flight while accelerating.

Accelerate and retract flaps on the flap-speed schedule.

Note: When the autopilot is engaged, the flight crew needs to monitor the autopilot performance to ensure a near level or slight climb is maintained.

If the flight director is not being used at acceleration height, decrease pitch attitude to maintain approximately level flight while accelerating. Retract flaps on the takeoff flap retraction Speed schedule.

As the airplane accelerates and flaps are retracted, adjust the rudder pedal position to maintain the control wheel centered and trim to relieve rudder pedal pressure...

After flap retraction and at flaps up maneuver speed, set maximum continuous thrust and continue to climb to the obstacle clearance altitude.

Initiate the appropriate engine failure non-normal checklist followed by the After Takeoff checklist when the flaps are up and thrust is set. Remain at flaps up maneuver speed until all obstructions are cleared, then select the engine-out schedule from the PDCS. After level-off, set thrust as required.

12.10 Engine Fire or Severe Damage or Separation Checklist

The Rhoades Aviation, Inc., Boeing 737-200C Quick Reference Handbook (QRH) provided the following engine fire or severe damage checklist. The checklist also included four "boxed items." These items were defined in the QRH Section 1.2 as "*in a non-normal checklist, a box black outline is used to separate the memory items from the reference items*" and "*Memory items (boxed items) are critical steps that must be done before reading the checklist. Reference items are actions to be done while reading the checklist.*":

Condition: One or more of these occur:

- **Engine fire warning**
- **Airframe vibrations with abnormal engine indications**
- **Engine separation.**

- 1 Thrust lever
(affected engine) Confirm Close
- 2 Engine start lever
(affected engine) Confirm . . . CUTOFF
- 3 Engine fire switch
(affected engine) Confirm Pull
To manually unlock the engine fire switch, press
the override and pull.
- 4 **If** the engine fire switch or ENG OVERHEAT light
is illuminated:
Engine fire switch Rotate to the stop and
hold for 1 second
If after 30 seconds the engine fire switch or ENG
OVERHEAT light stays illuminated:
Engine fire switch. Rotate to the
other stop and
hold for 1 second

5 Choose one:

◆ High airframe vibration **occurs** and **continues** after the engine is shut down:

Without delay, reduce airspeed and descend to a safe altitude which results in an acceptable vibration level.

Note: If high vibration returns and further airspeed reduction and descent are not practical, increasing airspeed may reduce the vibration.

▶▶ **Go to step 6**

◆ High airframe vibration does **not** occur or does **not** continue after the engine is shut down:

▶▶ **Go to step 6**

6 ISOLATION VALVE switch CLOSE

7 APU BLEED air switch OFF

- 8 Choose one:
- ◆ APU is **available** for start:
 - APUSTART
 - When** APU is running:
 - APU GEN switch
(affected side) ON
 - ▶▶ **Go to step 9**
 - ◆ APU is **not** available:
 - The galleys and one system B hydraulic pump are not powered.
 - ▶▶ **Go to step 9**
- 9 Balance fuel as needed.
- 10 Transponder mode selector
(TCAS equipped airplanes).TA
- This prevents climb commands which can exceed single engine performance capability.
- 11 **If** wing anti-ice is needed:
 - PACK switch (affected side) OFF
 - ISOLATION VALVE switch
(after fire has been extinguished). AUTO
- 12 Land at the nearest suitable airport.
- ▶▶ **Go to the One Engine Inoperative Landing checklist in section 2.8.13**



Figure 12: Engine Fire or Severe Damage or Separation Checklist
(Source: Rhoades Aviation, Inc. Boeing 737-200C QRH)

12.11 Engine Failure or Shutdown Checklist

The Rhoades Aviation, Inc., Boeing 737-200C QRH provided the following checklist for an engine failure or shutdown:

Condition: One of these occurs:

- **An engine failure**
- **An engine flameout**
- **Another checklist directs an engine shutdown.**

1 Choose one:

◆ Airframe vibrations with abnormal engine indications exist:

▶▶ Go to ENGINE FIRE or Engine Severe Damage or Separation checklist in section 2.9.2

■ ■ ■ ■

◆ An engine has separated:

▶▶ Go to ENGINE FIRE or Engine Severe Damage or Separation checklist in section 2.9.2

■ ■ ■ ■

◆ Airframe vibrations with abnormal engine indications do not exist and an engine has not separated:

▶▶ Go to step 2

2 Do an engine shutdown only when flight conditions allow.

3 Thrust lever
(affected engine) Confirm Close

- ◆ APU is **available** for start:
 APUSTART
When APU is running:
 APU GEN switch
 (affected side)ON
 ►► **Go to step 6**
- ◆ APU is **not** available:
 The galleys and one system B
 hydraulic pump are not powered.
 ►► **Go to step 6**

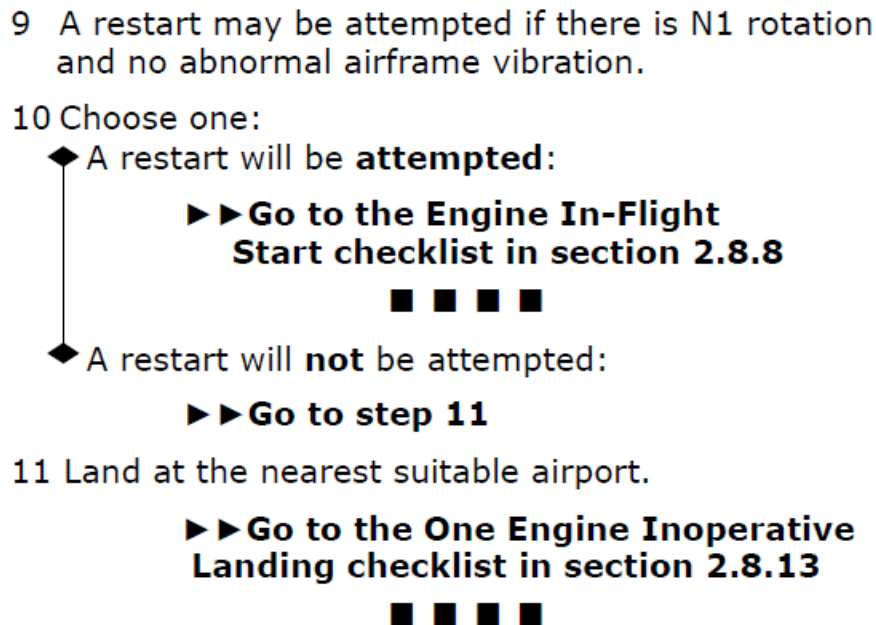


Figure 13: Engine Failure or Shutdown Checklist
(Source: Rhoades Aviation, Inc. Boeing 737-200C QRH)

12.12 Emergency Landing

The Rhoades Aviation, Inc. General Operations Manual, Section 3 "Non-Normal/Emergencies," provided, in part, the following guidance for an emergency landing both on airport and forced landing (off airport):

Emergency Landing (On Airport)

Whenever an engine is shutdown or other mechanical failure (which necessitates an emergency landing) occurs during flight, the Pilot-in- Command shall:

- 1. Complete the appropriate Emergency/ Non-Normal checklist.*
- 2. Advise controlling ATC facility of the emergency, advise your intentions, and request assistance.*
- 3. Land the airplane at the nearest suitable airport, in point of time, at which a safe landing can be made.*
- 4. If not in radar contact, give your position as accurately as possible.*
- 5. Have the controlling ATC facility advise the company flight following of your emergency.*
- 6. Keep ATC informed of the progress of the flight.*

Airport Suitability

Use a CFR Part 139 airport whenever possible to take advantage of the airport capability. Airport suitability will be determined by the Pilot-in-Command based on the following factors:

1. Runway length required for aircraft weight, systems status, airport altitude, winds, and temperature;
2. Missed approach performance; and
3. Surrounding Terrain.

Preparation

If preparation time is available; review the procedures in the QRH and Aircraft Operating Manual for emergency landing, evacuation procedures, emergency exit, and equipment locations prior to landing. The crew should accomplish the following items:

1. If jump seat is occupied, advise him of the emergency and brief him on his emergency duties.
2. Fire Extinguisher - CHECK, BE PREPARED TO USE.
3. Stow all loose cockpit equipment (flight kit, luggage bags, logbook, loose equipment).
4. If emergency occurs at night, have flashlights readily available for use during evacuation.
5. Turn ON all lights.

No Preparation

If no preparation time is possible, an immediate common-sense response (based on training and experience) is preferable to delay in search of the ideal solution. Unplanned emergencies happen during taxi, take-off, or landing. The crew has little or no time to prepare for survival and evacuation. The copilot shall give instructions that will help the jump-seat occupant survive impact and evacuate the aircraft...

Aircraft Evacuation

The PIC shall determine if an evacuation is necessary. He shall be responsible for evacuation duties. He shall assure that all personnel on the flight are briefed on the emergency situation and understand the briefed evacuation duties. He shall aid in removing any person or persons not able to evacuate the aircraft due to injury resulting from the cause of the evacuation...

Forced Landing (Off Airport)

General

This section provides procedures for forced landings and of necessity must be adaptable to many differing situations. In other words, you are being forced to land the airplane by circumstance. You have no choice. There is insufficient power or no power to sustain flight; water in the fuel; jet fuel in avgas tanks, etc. In extreme emergencies, such as uncontrolled in-flight fires, the Captain should consider the advisability of belly landing the airplane in order to expedite rapid evacuation.

Preparation

If time is available, review the Emergency Landing and Evacuation Procedures, then supplement with these guide-lines; and if GPS Equipped -

- 1. Avoid landing downwind in IMC or night, by comparing the GPS ground speed to TAS.*
- 2. Compare GPS heading with your DG to find crosswind direction and strength.*
- 3. Find an airport, field, or deserted road if possible.*
- 4. Remember the closest airport (or the best landing area) may be behind you.*

No Preparation

If no time is available, there are three (3) primary considerations in selecting a forced landing site. In the order of importance, they are:

- 1. Available altitude;*
- 2. Terrain;*
- 3. Wind direction and velocity.*

Approach

If available, make the approach with whatever power is available. Approach speed should be according to the speed card for the landing weight. Fly a planned, definite traffic pattern, altitude permitting, to assure putting your aircraft on the selected landing site. If no power is available, maintain the landing card speed for good control margin, and time to choose the best point of impact.

Landing

Regardless of surface conditions, rough unprepared area, or smooth, it is generally better to land with any or all landing gear extended, or partially extended. Some of the impact will be absorbed as the gear collapses. At night or over smooth surfaces, depth perception can be marginal. In these cases, it is wise to fly the aircraft onto the landing surface, with a nose high attitude, at five to ten knots above stalling speed. It is impossible to "stretch" a glide. Attempting to do

so will increase the rate of sink and cause an aircraft to land short of the desired point.

Aircraft Evacuation

Due to the potential fire hazard associated with forced landings, the aircraft should be evacuated as rapidly as possible after coming to stop. REMEMBER that after stopping, you will be enveloped by a cloud of dust and dirt. Be careful in evacuating the airplane. You will be easier to rescue if you remain uninjured. The Pilot-in-Command shall be responsible for evacuation duties. He shall assure that all personnel on the flight are briefed on the emergency situation and understand the briefed evacuation duties. He shall aid in removing any person or persons not able to evacuate the aircraft due to injury resulting from the cause of the evacuation...

12.13 Transfer of Control

The Rhoades Aviation, Inc. Aircraft Operations Manual Volume 1, Section 2 "Procedures/Flows/Calls" provided detailed information on various stages of flight. The "Enroute" stage provided the following, in part, guidance on transfer of control for a briefing:

Transfer aircraft control to the PM by saying (similar to) "Ready for briefing?" "YOU HAVE CONTROL." and advise new PF of current automation, navigation, and configuration (example - "Autopilot on, altitude hold 15,000, heading 285, speedbrakes extended.") Complete the Arrival Briefing prior to top of descent (TOD). Include all information on the ARRIVAL BRIEFING checklist.	"Ready." "I HAVE CONTROL" (includes control of navigation, ATC communication, and setting altitude alerter)." Monitor the approach briefing.
When briefing complete, assume aircraft control back by announcing (similar to) "Ready for controls."	"YOU HAVE CONTROL." plus current automation, navigation, and configuration.
"I HAVE CONTROL."	

12.14 Ditching

The Rhoades Aviation, Inc, General Operations Manual, Chapter 3 "Non-Normal/Emergencies" Section 3.15 "Ditching" provided, in part, the following guidance:

General

Any flight conducted over water must include life preservers which are approved by the FAA, sufficient in number to equip each occupant and each crewmember and be stowed within easy reach.

Before a forced landing, or a ditching, an extended period of time should be used to review the procedures in the QRH in order to refresh all crewmember's knowledge of evacuation equipment and procedures.

Survival after forced landing at sea depends to a great extent on how rapidly rescue is effected. Therefore, it is important that ground stations be advised as soon as possible of any occurrence that could result in a ditching.

Once the decision has been made to ditch, the Captain should consider taking advantage of ditching assistance provided by ocean vessels. They are normally able to illuminate a sea-lane for ditching at night and to provide radar vectors to a ditching near vessel when weather is a factor. The Captain should consider requesting another aircraft to remain in the area as an escort. If an ocean vessel is not in the area, such an escort can be helpful in directing rescuers to a ditched airplane. The Captain should determine the full assistance potential from any station that provides assistance.

Determining the Ditching Heading

Weather and sea conditions should be determined from whatever sources are available.

Normally, there is a primary swell and one or more secondary swells, each moving in a different direction. During daylight, the primary swells can be distinguished from high altitude (above 2,000 ft.). Secondary swells may not be visible until less than 800 ft. The sea is nearly always rougher than it appears to be at altitude.

Surface Winds More Than 35 Knots

If the surface wind is more than 35 knots, the ditching should be made into the wind, regardless of the direction of the swells. However, a ditching into the up-slope of an advancing swell should be avoided to lessen the chance of swamping or ricocheting uncontrollably into the air.

Surface Wind Less Than 35 Knots

If the surface wind is less than 35 knots, the best ditching heading is determined by whichever of the two headings below results in the greatest headwind component, thus minimizing forward speed on initial contact with the water:

*Parallel to the major swells and down the minor swells,
Parallel to the minor swells and down the major swells.*

Landing Technique

Call for and accomplish the appropriate aircraft Ditching non-normal checklist as soon as practical after the decision to ditch has been made. If possible, the ditching should be accomplished while engine power is available to permit maneuvering to a favorable touchdown area. During a ditching at night, the landing lights should be used to illuminate the surface of the sea. The final approach and landing should be made with the gear up, recommended flap setting and V-speeds. Touchdown should be made with the slowest forward speed and lowest descent rate consistent with adequate control. The pitch attitude should be 5 to 10 degrees nose up. This provides optimum planning [sic] action and load distribution over the bottom of the fuselage. The wings should be parallel with the surface of the sea, not with the horizon. The airplane should not be allowed to fall through to touchdown from a stall. This would result in a severe impact (which could collapse the bottom of the fuselage) followed by an abrupt deceleration as the nose buries itself in the sea.

An emergency evacuation in accordance with the applicable aircraft procedures should be commenced as soon as possible after the aircraft has come to a stop. When the evacuation has been completed the Captain should direct whatever activities are necessary concerning the general welfare of the crew.

Aircraft Ditching Diagram

DITCHING AT SEA - CREW DUTIES		
PILOT-IN-COMMAND	SECOND-IN-COMMAND	EXTRA CREW
Crew Stations for Ditching		
Left Cockpit Seat	Right Cockpit Seat	Jump-seat
Crew Duties Prior to Ditching		
Advise crew of intention to ditch. Brief as fully as time permits. Obtain ditching position from SIC.	Advise ATC of emergency and intention to ditch. Give estimated ditching time and position.	Assist crew as required.
	Maintain contact with ATC. Advise all pertinent details and assistance required.	
	Secure loose articles on flight deck.	Help secure loose articles.
	Collect emergency supplies, issue life vests, and prepare exits.	
	Retrieve ELT, if able and stow near by	Remove sharp articles, don life vest.
Remove sharp articles, don life vest.	Remove sharp articles, don life vest	
Secure seat belt and harness tight.	Secure seat belt and harness tight	Secure seat belt and harness tight
Crew Duties Prior to Ditching		
Check gear UP & flaps as desired & proper ditching heading.	Complete emergency procedures	
Crew Duties After Ditching		
Assist in evacuating.	Assist in evacuating. Launch and inflate rafts. Do not let them get away.	Assist in evacuating.
Ensure crew has evacuated aircraft. Assist as required.	If available, take ELT with you	Abandon aircraft, inflate vest and board raft.
Abandon aircraft, inflate vest and board raft.	Abandon aircraft, inflate life vest and board raft.	

Figure 14: Ditching at Sea Crew Duties

12.14.1 Ditching Checklist

The Rhoades Aviation, Inc., Boeing 737-200C QRH, Section "NNC-1: Miscellaneous" provided the following checklist for ditching and evacuating:

Condition: Airplane ditching and evacuation are needed.

- 1 Send distress signals. Determine position, course, speed, altitude, situation, intention, time and position of intended touchdown and transmit mayday. Report type of aircraft and request intercept.
- 2 Burn off fuel to reduce touchdown speed and increase buoyancy.
- 3 Plan to touch down on the windward side and parallel to waves and swells.
- 4 Plan a flaps 40 landing unless another configuration is needed.
- 5 Set VREF 40.
- 6 Do **not** arm the auto brake.
- 7 Do **not** accomplish the normal before landing checklist.
- 8 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization CAB ALT ____, LAND ALT ____
Recall Checked
Auto Brake **OFF**
Altimeters. ____ & X-Checked
Landing data **VREF 40** ____
Approach briefing Completed

Below 5000 feet

LANDING GEAR AURAL WARN
circuit breaker (P6) Pull

This prevents the warning horn with gear retracted and landing flaps selected.

The flight deck chime for an incoming call from the cabin crew is unavailable.

Engine BLEED air switches (both) OFF

This allows the airplane to be depressurized with the outflow valve closed.

Pressurization mode selector MAN DC

Outflow Valve Switch Hold in CLOSE
until the outflow VALVE
indication shows fully closed

This prevents water from entering the airplane.

APU switch OFF

GROUND PROXIMITY FLAP/GEAR

INHIBIT switch FLAP/GEAR INHIBIT

*Note: N737CS & N809TA have separate
FLAP & GEAR switches.*

Life vests, shoulder harnesses and seat belts . . . On

**Warning! Do not open aft entry or service
doors as they may be partially
submerged.**

Transmit all pertinent information regarding final ditching position.

After Impact Procedure Review

Set both engine start levers to CUTOFF. This closes fuel shutoff valves to prevent discharge of fuel from ruptured fuel lines.

Start the evacuation.

Proceed to L1 or R1, as appropriate, and launch rafts and evacuate the airplane as soon as practicable.

The airplane may stay afloat indefinitely if fuel load is minimal and no serious damage was sustained during landing.

Ditching Final

LANDING GEAR lever.UP and OFF

Flaps____ , ____ , Green Light

At **500 feet**, advise any ACM's that ditching is imminent.

At **50 feet**, advise any ACM's to brace for impact.

Maintain airspeed at VREF. Flare the airplane to achieve the minimum rate of descent at touchdown. Maintain 200-300 fpm rate of descent until the start of the flare.

At flare, rotate smoothly to a touchdown attitude of 10-12°. Maintain airspeed and rate of descent with thrust.

At touchdown, reduce thrust to idle.



Figure 15: Ditching QRH Checklist
(Source: Rhoades Aviation, Inc. Boeing 737-200C QRH)

12.15 Aircraft Flight Log

The Rhoades Aviation, Inc, General Operations Manual, Chapter 2 "Normal Operations" Section 2.28.15 "Aircraft Flight Log" provided the following guidance:

The Pilot-in-Command is responsible for the proper completion of the Aircraft Flight Log (Form S-5) page with all required flight information. Upon completion

of the final flight of the day, the Captain shall turn the logbook over to maintenance.

All time entries entered in the aircraft logbook are to be in Hawaii Standard Time (HST) in the 24-hour clock (4-digit military time) format.

The date for each logbook flight segment entry will be based on the HST "out" time (ramp block out) for that leg.

12.16 Engine Overboost

The Rhoades Aviation, Inc. Boeing 737 Aircraft Operations Manual, Volume 1 "Maneuvers," provided the following guidance:

A significant thrust overboost capability exists which could be used in emergency situations. This overboost capability should only be considered when ground contact is imminent. Overboosting the engines when the situation is not sufficiently serious unnecessarily shortens engine life and increases the potential for engine failure. In an emergency situation "firewalling the thrust levers" should be considered. This condition could result in an EGT or N1 exceedance. Land at the nearest suitable airport.

12.17 Operational Control

The Rhoades Aviation, Inc. General Operations Manual, Chapter 2 "Normal Operations" Section 2.28.9 "Operational Control" provided the following guidance:

- 1. The responsibility for Operational Control is vested in the Director of Operations, who shall have the overall authority for Supervision and Control of all Company Flight Operation and Flight Control.*
- 2. The PIC and the Director of Operations are jointly responsible for the initiation, continuation, diversion, termination, cancellation and suspension of all Company Flights, planned or conducted.*
- 3. The Director of Operations may delegate the functions for the initiation, continuation, diversion, and termination of a flight but he may not delegate the responsibility for those functions.*
- 4. The Director of Operations is responsible for canceling, diverting, or delaying a flight if in his opinion or the opinion of the pilot-in-command the flight cannot operate or continue to operate safely as planned or released. The flight shall be restricted or suspended until those conditions are corrected.*
- 5. The Director of Operations is responsible for assuring that each flight is monitored with respect to at least the following.*
 - a. Departure of the flight from the place of origin and arrival at the place of destination, including intermediate stops and any diversions therefrom.*

b. Maintenance and mechanical delays encountered at places of origin and destination and intermediate stops. If an item has been deferred, that item has been deferred in accordance with an approved procedure contained in the Minimum Equipment List or General Maintenance Manual.

c. Any known conditions that may adversely affect the safety of flight.

12.18 Maximum Distance from an Airport

The Rhoades Aviation, Inc, General Operations Manual, Chapter 2 "Normal Operations" Section 2.28.10.3 "Maximum Distance from an Airport" provided the following guidance:

Two-engine aircraft must remain within one hour's flying time (in still air at normal cruising speed with one engine inoperative) from an adequate airport.

13.0 FAA Oversight

FAA oversight for Rhoades Aviation, Inc. was provided by the Honolulu CMO. The FAA CMO team that managed the Rhoades Aviation, Inc. certificate consisted of an office manager, front line manager (FLM), principal operations inspector (POI), principal maintenance inspector (PMI), and a principal avionics inspector (PAI).

According to the previous FLM, the owner of Transair wanted to add Boeing 737 airplanes to the fleet; however, the Honolulu CMO did not have enough office resources to provide oversight, in order to manage the certificate. The owner of Transair then purchased a current operating certificate managed by Indianapolis, Indiana CMO. Once the certification was complete the certificate was transferred to the Honolulu CMO.⁴⁷ According to FAA records the Rhoades Aviation, Inc. certificate was transferred to Honolulu on May 17, 2012.

According to an interview with the current POI, he had been in that position since April 14, 2020, and he did not have an assistant to assist him with the POI duties to manage the Rhoades Aviation, Inc. certificate. Prior to being on the Rhoades certificate he was on another major airlines certificate for about four years as an assistant and an aircrew program manager. He described his job as *"to ensure compliance with regulatory content..."*⁴⁸ Although not type rated in the Boeing 737 aircraft, he was scheduled to attend training on the 737 in 2021; however, due to COVID his training was rescheduled to fiscal year '22. The POI interacted regularly with the director of operations and would also interact with the director of safety and chief pilot as needed.

⁴⁷ Source: Operational Factors/Human Performance - Attachment 4 - "FAA Personnel Interview Transcripts and Summaries" pg. 108.

⁴⁸ Source: Operational Factors/Human Performance - Attachment 4 - "FAA Personnel Interview Transcripts and Summaries" pg. 24.

The POI was not invited by Rhoades Aviation, Inc. to attend their twice weekly safety committee meetings. The POI had conducted enroute inspection on Rhoades Aviation Inc. airplanes, the most recent being about 2 weeks prior to the accident flight. On that enroute flight, the chief pilot was seated in the right seat and a line check airman was seated in the left. He further stated that the *"aircraft in flight was within the parameters of its operating parameters from what I could ascertain."*⁴⁹ He did state that the airplane was not the accident airplane. Additionally, the most recent enroute he conducted with a non-supervisory pilot was in September of 2020, and he stated that when he did an enroute he was *"there to observe. The crew members are not being evaluated in a testing situation."* When asked if the director of safety was capable of fulfilling the duties required, he stated *"...no at this time."* The POI further elaborated that he had not had the *"adequate training and tools"* that were a necessary component to success.

In an interview with the current FLM, she stated that they had been in that position for four months preceding the accident. The FLM stated that all the principal inspectors were *"new to the certificate."* She described the operator as *"a troubled operator, and they [FAA principal inspectors] have bent over backwards with surveillance activities, mentoring, training, and really playing a role as quality assurance for them."*⁵⁰ The FLM further stated that the operator has five or six Enforcement Investigation Reports (EIR) that were pending at the time of the accident, which included three proposed operational specification (OpSpec) amendments. One of the proposed amendments had been adopted. Another EIR was about OpSpec D072 "Aircraft Maintenance - Continuous Airworthiness Maintenance Program Authorization, and another was OpSpec D089 "Maintenance Time Limitations Section." She further stated that aircraft inspection program (AIP) was *"their maintenance inspection program"* and that after several months working with the operator the FAA gave Rhoades Aviation, Inc. 30 days to comply or they will remove the AIP, the notice was issued about two weeks prior to the accident.⁵¹ She further stated that the operator was *"understaffed a lot of the time. They just don't have enough help to do what they need to do and to fix manuals and all of that..."*

During an interview with the former POI⁵², who had been on the Rhoades certificate for about two and a half years, he stated that during that time there had been *"multiple engine failures"* and he classified those as more of a maintenance issue. During his time as POI for Rhoades Aviation, Inc., there was a cargo focus inspection conducted and it *"was more on the maintenance side."* During his time as Rhoades'

⁴⁹ Source: Operational Factors/Human Performance - Attachment 4 - "FAA Personnel Interview Transcripts and Summaries" pg. 19.

⁵⁰ Source: Operational Factors/Human Performance - Attachment 4 - "FAA Personnel Interview Transcripts and Summaries" pg. 70.

⁵¹ For further information reference the Aircraft Maintenance Group factual report associated with this accident.

⁵²Source: Operational Factors/Human Performance - Attachment 4 - "FAA Personnel Interview Transcripts and Summaries."

POI, manual changes were “*not often*” but when a change was done it was to be more efficient. The only risk he observed was those designated persons at Rhoades “*wore too many hats.*”

F. LIST OF ATTACHMENTS

Attachment 1: Flight Crew Interview Transcripts
Attachment 2: Rhoades Aviation, Inc./TransAir Personnel Interview Transcripts
Attachment 3: Previous Rhoades Aviation, Inc./Transair Personnel Interview Transcripts
Attachment 4: FAA Personnel Interview Transcripts and Summary
Attachment 5: Flight Crew Training Records [Excerpts]
Attachment 6: Rhoades Air, Inc. Flight Schedules Previous 3 Days
Attachment 7: Accident Flight Paperwork
Attachment 8: Accident Flight Fuel Log and Fuel Inspection Records
Attachment 9: Accident Flight Weight and Balance and Load Manifest [Excerpts]
Attachment 10: Scale Calibration Information
Attachment 11: Hydraulic Leak Photo (Source: First Officer)
Attachment 12: Rhoades Aviation, Inc. Aircraft Operations Manual Vol 1 [Excerpts]
Attachment 13: Rhoades Aviation, Inc. Quick Reference Handbook [Excerpts]
Attachment 14: Rhoades Aviation, Inc. General Operations Manual [Excerpts]
Attachment 15: Rhoades Aviation, Inc. Runway Analysis Manual [Excerpts]
Attachment 16: Rhoades Aviation, Inc. Simulator Study Guide
Attachment 17: Rhoades Aviation, Inc. Operation Specifications [Excerpts]
Attachment 18: Rhoades Aviation, Inc. Administration Manual [Excerpts]
Attachment 19: Rhoades Aviation, Inc. SEIM [Excerpts]
Attachment 20: Rhoades Aviation, Inc. Audit Report
Attachment 21: Rhoades Aviation, Inc. CRM Training Manual

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