NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

November 27, 2017

Group Chairman's Factual Report

OPERATIONAL FACTORS/HUMAN PERFORMANCE

CEN17MA183

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A. ACCIDENT

Location: Teterboro, New Jersey (NJ)
Date: May 15, 2017
Time: 1530 eastern daylight time (EDT) (1930Z)[1]
Airplane: Gates Learjet 35A, (N452DA)
Operator: Trans-Pacific Air Charter LLC

B. OPERATIONAL FACTORS GROUP

Captain David Lawrence
Operational Factors Division (AS-30)
National Transportation Safety Board (NTSB)

Dr. Bill Bramble
Human Performance Investigator (AS-60)
NTSB

Captain Leif Iverson
Lear 35 Captain
Trans-Pacific Air Charter

Captain Gary Spears
Senior Test Pilot
Bombardier (Lear)

Mr. Jim Warniers
Aviation Safety Inspector
Federal Aviation Administration (FAA)

C. SUMMARY

On May 15, 2017, at 1529 eastern daylight time (EDT), a Gates Learjet 35A, N452DA, operated by Trans-Pacific Jets, departed controlled flight while on a circling approach to runway 01 at the Teterboro Airport (TEB), Teterboro, New Jersey, and impacted a commercial building and parking lot. The captain and second-in-command died; no one on the ground was injured. The airplane was destroyed by impact forces and postcrash fire. The airplane was registered to A&C Big Sky Aviation LLC and operated by Trans-Pacific Air Charter LLC under the provisions of 14 *Code of Federal Regulations (CFR)* Part 91 as a positioning flight. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed. The flight departed from the Philadelphia International Airport (PHL), Philadelphia, Pennsylvania, about 1504 and was destined for TEB.

D. DETAILS OF THE INVESTIGATION

The Operations (Ops) Group Chairman did not launch to the accident site.[2] From May 29, 2017 to June 1, 2017, FAA pilot records, company manuals, and documentation related to the accident flight was requested. A review of the cockpit voice recorder (CVR) was conducted on May 30, 2017.

[1] Note: Times are EDT unless otherwise noted. Greenwich Mean Time (GMT or "Z") for the accident was EDT = GMT – 4 hr.
[2] The Bombardier Operations Group member traveled to the accident site.

On June 5, 2017, the FAA provided the NTSB with a background briefing on FAA oversight of Trans-Pacific.

From June 11, 2017 to June 13, 2017, the Ops Group conducted Lear 35A simulator observation work and instructor/evaluator interviews at the CAE Simuflite training facility at Dallas-Fort Worth International Airport (DFW), Dallas-Fort Worth, Texas. From June 13, 2017 to August 11, 2017, additional company documentation was requested and additional pilot interviews were completed.

From June 16, 2017 to June 19, 2017, the Ops group traveled to Van Nuys, California to conduct a tour of the Trans-Pacific Air Charter (hereinafter referred to as Trans-Pacific) offices and interview company management personnel. Additional interviews with former employees and documents from the operator and FAA were obtained between August and October 2017.

E. FACTUAL INFORMATION

1.0 History of Flight

Prior to the day of the accident, the Trans-Pacific Captain and Second-in-Command (SIC) were last on duty May 13, 2017 when they both flew together from Washington Dulles International Airport (IAD) to Morristown Municipal Airport (MMU), departing at 1230 EDT, and then flew to TEB and landed at 1426 EDT. Both pilots were free of duty on May 14, 2017.[3]

On May 15, 2017, a flight release for the day's flights was generated at 0408 EDT. The pilots were scheduled to go on duty at TEB airport at 0622 EDT, one hour prior to their scheduled departure to Laurence G. Hanscom Field Airport (BED), Bedford, Massachusetts at 0722 EDT.[4]

According to a commercial website, Fltplan.com, the Captain used his account with the website to check the weather for the TEB-BED leg on May 15, 2017 at 0637 EDT. The weather in TEB at 0624 EDT was wind 330º at 16 knots gusting to 23 knots, 10 statute miles visibility with scattered clouds at 3,600 ft above ground level (agl) and broken clouds at 6,000 ft., temperature 13º C, dewpoint 06º C, and an altimeter of 29.67 inches of mercury.[5] The crew took on 84 gallons of fuel in TEB, and N452DA departed the Jet Aviation ramp and took off about 0732 EDT on a Part 91 positioning flight to BED. There were no passengers on the flight. The weather at BED was forecasted to have winds 320° at 14 knots gust to 27 knots, visibility better than 6 miles with rain

[3] See Attachment 14 - Crew Schedules.

[4] Duty time requirements were defined in the Trans-Pacific Air Charter General Operations Manual (GOM), Section 12.3.4. According to the FAA Principal Operations Inspector for Tran-Pacific, the GOM was an FAA "accepted" manual.

[5] According to the FltPlan.com weather report received by the Captain prior to departing TEB, the TEB forecast covering the time of the accident indicated after 1400 EDT winds 320 at 22 knots gusting to 32 knots, and visual flight rules (VFR) weather. The gust value in the forecast was indicated in red. See Meteorology Group Chairman's Factual Report, Attachment 1 – Weather Briefing.

showers in the vicinity, and overcast clouds at 3,500 feet agl. N452DA landed BED about 0815, parking at the Jet Aviation ramp.
At 0831 EDT, the Captain again used FltPlan.com to check the weather from BED to PHL. The pilots added 485.4 gallons of fuel for BED-PHL, and according to the BED fueler, the fueling "was correct" and verified with one of the pilots.[6]

The original manifest called for one passenger to board in BED and travel to PHL. However, three passengers arrived at the airplane, and according to witness interviews, the flight was originally scheduled to depart BED at 0915 EDT, but was delayed until the pilots were able to complete the documentation of the three passengers. The charter passengers boarded the airplane, and N452DA operated BED to PHL as a Part 135 on-demand charter flight, departing BED about 1009 EDT. The BED fueler also observed the engine start and initial taxi out, and stated that the crew performed a full control check prior to taxi. According to a passenger interview, the Captain was the flying pilot on the BED-PHL leg. N452DA landed PHL about 1104 EDT and parked at Atlantic Aviation where the passengers disembarked.

According to the Direct User Access Terminal Service (DUATs),[7] the Captain filed an IFR flight plan at 1415 EDT, indicating 2 hours and 30 minutes fuel onboard, 28 minutes of flight time at an altitude of 27,000 ft mean sea level (msl) with no alternate airport filed.[8] The flight plan indicated an estimated departure time of 1430 EDT. The flight crew did not take on additional fuel at PHL, and there was no record of the flight crew obtaining updated weather for PHL or TEB with FltPlan.com.[9]

According to Air Traffic Control (ATC) records, N452DA contacted PHL clearance delivery at 1433 EDT requesting an IFR clearance to TEB.[10] N452DA was cleared via the Philadelphia One departure except to climb to an initial altitude of 3,000 ft msl and expect 4,000 ft msl 10 minutes after departure, and the flight crew read back the clearance.

About 1454 EDT, N452DA contacted PHL ground control and was given taxi instructions to runway 35 for takeoff. About 1503 EDT, N452DA was told by PHL tower to line up and wait on runway 35, followed by a takeoff clearance. According to recorded data, the SIC in the right seat was the pilot flying (PF) and the Captain in the left seat was the pilot monitoring (PM). Weather in PHL at the time of departure were winds from 310º at 17 knots gusting to 28 knots, visibility 10

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[6] Fuel analysis records also indicated "no deficiencies" in the fuel supply at Jet Aviation in BED. See Attachment 13 - BED Fuel Analysis, and Attachment 2 - Witness Statements.
[7] CSRA (CSRA, formerly Computer Sciences Corporation (CSC)) DUATS is a free FAA-sponsored service to pilots, dispatchers and others authorized by the FAA, and CSRA DUATS on the Web provides immediate on-line access to U.S. Federal Aviation Administration (FAA) approved information including: current, continuously, updated weather information, easy-to-understand plain language weather, flight plan filing and closing, and automated flight planning. Source: https://www.duats.com/.
[8] See Attachment 9 - DUATS Flight Plans.
[9] Source: Email to the NTSB received from FltPlan.com on July 17, 2017 at 1250 CDT. It is unknown if the pilot used another source for weather information.
[10] ATC and pilot communications were obtained from FAA transcripts. For additional information, see Air Traffic Control Group Chairman's Factual Report.

miles or more, a few clouds at 6,000 ft agl and at 25,000 ft agl, temperature 21º C, dewpoint 4º C, and altimeter setting of 29.82 inches of mercury.

About 1504 EDT, N452DA took off from runway 35 at PHL for a Part 91 repositioning flight to TEB. About one minute later, the PHL controller cleared the airplane to 4,000 ft msl. About 1506 EDT, N452DA was climbing from 2,500 ft msl to 4,000 ft msl. About 3 minutes later the PHL controller asked N452DA what their airspeed was, and N452DA responded that they were at 260 knots.[11] N452DA requested a higher altitude at 1512 EDT, but the controller stated they were unable to issue that clearance. The airplane never climbed above 4,000 ft msl during the flight to TEB.

About 1513 EDT, N452DA was handed off to New York approach control while the airplane was at 4,000 ft msl, and was told to fly 020 degrees and expect the ILS06,[12] circle to runway 01 approach at TEB. N452DA acknowledged the instructions, and about 1515 EDT was told to descend to 3,000 ft msl, which was acknowledged by N452DA.

About 1519 EDT, N452DA was told to fly a heading of 090º to intercept the runway 06 localizer and contact Newark approach control, and about one minute later the Newark controller told N452DA to turn to 020º to intercept the localizer and descend to 2,000 ft msl.[13] About 1523 EDT, N452DA was 8 miles from the VINGS intersection[14] and 20.5 miles from TEB, traveling at an airspeed of 240 knots when Newark controller cleared N452DA for the ILS runway 06 approach, circle runway 01 approach. N452DA was further instructed to cross VINGS at 2,000 ft msl at a speed of 240 knots, and then slow to 180 knots and maintain that speed until the TORBY intersection.[15] N452DA responded "alright. two forty until VINGS eh two thousand on the altitude and we can slow it down to one eighty to TORBY, four five two delta alpha."

About 1526 EDT, N452DA was told to contact TEB tower and to cross DANDY[16] at 1,500 ft msl and circle at TORBY. N452DA responded with "alright DANDY at two hundred feet circle at

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[11] Title 14 *CFR* 91.117(a) Aircraft speed, states that unless otherwise authorized by the Administrator, no person may operate an aircraft below 10,000 feet MSL at an indicated airspeed of more than 250 knots (288 mph). Further, 14 *CFR* 91.117(c) states that no person may operate an aircraft in the airspace underlying a Class B airspace area designated for an airport or in a VFR corridor designated through such a Class B airspace area, at an indicated airspeed of more than 200 knots (230 mph). According to the Trans-Pacific GOM, Section 12.4.31, unless authorized by the FAA, no Trans-Pacific Air Charter pilot may operate an aircraft at or below 2,500 feet above the surface within 4 nautical miles of the primary airport of a Class C or Class D airspace area at an indicated airspeed of more than 200 knots. TEB was located in Class D airspace (see 14 *CFR* 91.129 Operations in Class D Airspace).

[12] ILS – Instrument Landing System.

[13] ATC transcripts did not indicate that N452DA obtained the latest Automated Terminal Information Service (ATIS) weather at TEB. ATIS information "Z" (ZULU) was current at the time N452DA was cleared for the ILS runway 06, circle to land runway 01. ATIS "Z" showed at 1450 EDT indicated an automated observation of wind 340 at 18 knots gusting to 29 knots, visibility 10 mile with light rain, scattered clouds at 5,500 feet, temperature 18º C, dew point 6º C, altimeter 29.74 inches.

[14] According to the Jeppesen 11-1 ILS 06 approach chart, VINGS was 12.5 miles from TEB. See Section 10.2 TEB ILS 06 Circle-to-land, of this Factual Report.

[15] According to the Jeppesen 11-1 ILS 06 approach chart, TORBY was the final approach fix (FAF) and 3.8 miles from the threshold of runway 06. See Section 10.2 TEB ILS 06 Circle-to-land, of this Factual Report.

[16] According to the Jeppesen 11-1 ILS 06 approach chart, DANDY was 6.4 miles from TEB. See Section 10.2 TEB ILS 06 Circle-to-land, of this Factual Report.

Torby," which was corrected by the controller to cross DANDY at 1,500 ft, and then acknowledged by N452DA. Around the same time, another airplane on the circle approach elected to go around, telling the TEB tower that "the winds weren't favorable at that time." TEB tower did not initially hear from N452DA after they were told to switch frequencies, and the tower made two attempts to contact N452DA when the Newark controller had to remind N452DA to contact the tower a second time. About 1528 EDT, N452DA contacted the TEB tower while the airplane was 2.65 nautical miles (NM) southwest of the airport. The co-pilot of a Challenger 300 on the circle approach that landed ahead of N452DA stated that there was some turbulence on the approach, and the tailwinds were manageable from where they started their initial circling turn at TORBY.[17]

About 1528 EDT, TEB tower told N452DA the wind conditions as 360º at 16 knots, gusts to 32, and to continue towards runway 01 as another airplane was occupying runway one and awaiting departure, and N452DA acknowledged with their call sign. About a minute later, after clearing the other airplane on the runway for takeoff, TEB tower cleared N452DA to land on runway 01. Shortly afterwards, TEB tower asked N452DA "uh, five delta alpha you going to start that turn," and N452DA responded "yes sir we're doing it right now."

Radar track data indicated that N452DA did not start a right circling turn to align with runway 01 until it was about 1 mile from the approach end of runway 06. About 1530 EDT, witnesses observed N452DA enter an uncontrolled descent, impacting the ground about .5 nautical miles south of the runway 01 threshold. The airplane was destroyed by impact and postcrash fire, and 3 buildings and 16 vehicles were damaged by impact or fire.

The 5-minute TEB Automated Surface Observation System (ASOS) at 1530 EDT reported wind 330˚ at 16 knots gusting to 28 knots, 10 statute miles visibility with light rain, scattered clouds at 5,500 ft agl, temperature 19˚ C, dew point 6˚ C, and altimeter setting of 29.74 inches of mercury.[18]

2.0 Flight Crew Information

The accident flight involved two flight crewmembers; the Captain and the SIC. There were no passengers onboard the airplane.

2.1 The Captain

The Captain was 53 years old and resided in Salt Lake City, Utah (UT). He was hired by Sunquest Executive Air Charter LLC (hereinafter referred to as Sunquest)[19] on July 15, 2016, and was assigned as a Lear Captain on the accident flight, occupying the left seat. He signed an employment

[17] See Attachment 1 – Interview Summaries.
[18] There was no rain falling at the airport at the time of the accident. For additional information, see Meteorology Group Chairman's Factual Report.
[19] Sunquest Executive Air Charter changed its name to Trans-Pacific Air Charter in January 2017. For additional information, see Section 11.0 Company Information of this Factual Report.

contract with Sunquest on July 8, 2016.[20] According to his resume, he had 6,600 hours total time when hired, and 805 hours in the Lear series.[21]

The Captain was previously employed by D&D Aviation in Salt Lake City, Utah as an SIC on the Lear on May 8, 2006. He was laid off from D&D Aviation on February 22, 2009 due to a "reduction of force due to lack of work," and was rehired by D&D Aviation November 2014 as a Beechjet 400 SIC. He remained there until December 2015 when his employment contract was not renewed.[22]

A former D&D Aviation Captain who had flown with the accident Captain, who was a co-pilot at the time, told the NTSB the accident Captain was not pro-active in the cockpit when using checklists, and did not consider him ready to be recommended to upgrade to Captain. This same Captain said he did not feel supported in the cockpit when flying with the accident captain. A former 7-Jet (formerly D&D Aviation) Captain told the NTSB the accident Captain was "fine with his CRM" as a co-pilot, but was "absolutely not ready to check out as a captain" due to his inexperience.[23]

The Captain held an Airline Transport Pilot certificate with a type rating on the Lear, and a First Class Medical certificate dated February 28, 2017. A background review indicated that the Captain had a 2002 driving license suspended due to an excess of points but was not reported on his most recent medical application (FAA form 8500-8, question 18v).[24] He was convicted of assault with a deadly weapon in 1986 (at age 23) which was reduced to misdemeanor, and was also not self-reported on his most recent medical certificate application which required a report for any history of nontraffic convictions, including misdemeanors or felonies (FAA Form 8500-8, question 18w).

A review of the FAA Accident/Incident Data System, Enforcement Information System and PTRS[25] database showed no records or reports of any previous aviation incidents or accidents involving the Captain.

2.1.1 The Captain's Pilot Certification Record[26]

<u>Private Pilot – Airplane Single Engine Land</u> certificate issued July 8, 1993.

[20] According to the contract, SunQuest Executive Air Charter was a limited liability company formed in the state of Hawaii.
[21] See Attachment 5 – Captain Records.
[22] See Attachment 6 - Captain Previous Employer Records.
[23] The 7-Jet Captain and the accident Captain flew together on the Beechjet.
[24] Question 18v asked for a history of (1) any conviction(s) involving driving while intoxicated by, while impaired by, or while under the influence of alcohol or a drug or (2) history of any conviction(s) or administrative action(s) involving an offense(s) which resulted in the denial, suspension, cancellation, or revocation of driving privileges or which resulted in attendance at an educational or rehabitional program.
[25] The Program Tracking and Reporting Subsystem (PTRS) is a comprehensive information management and analysis system used in many Flight Standards Service (AFS) job functions. It provides the means for the collection, storage, retrieval, and analysis of data resulting from the many different job functions performed by Aviation Safety Inspectors (ASIs) in the field, the regions, and headquarters. This system provides managers and inspectors with the current data on airmen, air agencies, air operators, and many other facets of the air transportation system. Source: FAA.
[26] Source: FAA.

Private Pilot – Airplane Single Engine Land, Instrument Airplane certificate issued July 27, 1995.

Commercial Pilot – Airplane Single Engine Land, Instrument Airplane certificate issued March 27, 1996.

Notice of Disapproval – Certified Flight Instructor Airplane issued December 18, 1996. Areas of reexamination: Area of Operation II, III, V, XV, Area of Operation II, Task P completed successfully.

Flight Instructor – Airplane Single Engine certificate issued February 3, 1997.

Flight Instructor – Airplane Single Engine Instrument Airplane certificate issued July 24, 1997.

Notice of Disapproval – Commercial Pilot – Airplane Multiengine Land, Instrument Airplane (First Failure) issued November 29, 1997. Areas of reexamination: Area of Operation IV. B. – Normal and crosswind approach and landing; IV. D. Short-field approach and landing.

Commercial Pilot – Airplane Single and Multiengine Land, Instrument Airplane certificate issued November 29, 1997.

Flight Instructor – Airplane Single and Multiengine Instrument Airplane certificate issued April 1, 1998.

Reissued: March 13, 2000.

Notice of Disapproval – Airline Transport Pilot – Multiengine Land (First Disapproval) issued February 7, 2001. Areas of reexamination: All areas of Section 2 of the PTS (Approaches were unsatisfactory).

Airline Transport Pilot – Airplane Multiengine Land, Commercial Privileges Airplane Single Engine Land certificate issued February 8, 2001.

Airline Transport Pilot – Airplane Multiengine Land, LR-25, LR-35, LR-55; Commercial Privileges Airplane Single Engine Land (LR-25, LR-35, LR-55 SIC Privileges only, Circ Apch VMC Only) certificate issued October 20, 2008.[27]

Airline Transport Pilot – Airplane Multiengine Land, LR-Jet[28]; Commercial Privileges Airplane Single Engine Land certificate issued August 25, 2009.[29]

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[27] According to FAA records, the Captain satisfactorily completed the Part 135 Second-in-Command Training and proficiency check for the Lear under the D&D Aviation (IKMA643F) approved training program as described in FAR 61.55(e).

[28] According to FAA Advisory Circular (AC) 61-89E Pilot Certificates: Aircraft Type Ratings, dated August 4, 2000, Learjet Corp. was listed as the manufacturer for Lear 35 aircraft. Original pilot certificates listed LR-35 for type ratings. A "LR-Jet" (Learjet) designation entered on a pilot certificate is inclusive of the Lear 35 (LR-35). For the purposes of this Factual Report, "Lear" and "Learjet" are synonymous.

[29] According to FAA records, the Captain conducted upgrade training and PIC type rating on the Lear at Simcom International in Orlando, Florida in a Lear 35A Level C full-flight simulator (FFS).

Airline Transport Pilot – Airplane Multiengine Land, BE-400, LR-Jet, MU-300; Commercial Privileges Airplane Single Engine Land (MU-300, BE-400 SIC Privileges only) certificate issued November 26, 2014.

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

Airline Transport Pilot (certificate issued November 26, 2014)
Airplane Multiengine Land; LR-Jet, BE-400 (SIC), MU-300 (SIC) type ratings.

Medical Certificate - First Class (issued February 28, 2017)
Limitations: Must wear corrective lenses

2.1.3 The Captain's Training and Proficiency Checks Completed[30]

Date of Hire	July 15, 2016
Date Upgraded to Captain on Lear	October 7, 2016
Date of Most Recent Proficiency Training[31]	August 11, 2016
Date of Most Recent Proficiency Check (LR-Jet)[32]	March 20, 2017
Date of Most Recent PIC[33] Line Check (LR-Jet)[34]	October 7, 2016

2.1.4 The Captain's Flight Times[35]

The Captain's flight times, according to Trans-Pacific:

Total pilot flying time	6,898
Total PIC time	5,819
Total LR-Jet series flying time	1,158[36]
Total flying time last 24 hours	2.5
Total flying time last 30 days	33
Total flying time last 90 days	96
Total flying time last 12 months	353

[30] Source: Trans-Pacific.
[31] Title 14 *CFR* 135.293 required pilots to pass a written or oral test every 12 calendar months covering topics such as regulations, airplane systems, weight and balance, and weather, and a competency check covering maneuvers and procedures. The instrument proficiency check required by 14 *CFR* 135.297 may be substituted for the competency check required for the type of aircraft used in the check.
[32] The Captain's March 20, 2017 check included was a 14 *CFR* 135.297(c) check, which required each PIC to receive an instrument proficiency check each 6 calendar months.
[33] Pilot in Command.
[34] Title 14 *CFR* 135.299 required a PIC to pass a flight check in one of the types of aircraft which that pilot is to fly.
[35] Source: Trans-Pacific.
[36] Total Lear series flight time includes 805 hours as a Lear SIC with a previous employer, and 353 hours as a Lear Captain with Trans-Pacific.

2.1.5 Captain's Training

Trans-Pacific was authorized by Operations Specifications A-031 to use CAE Simuflite at DFW Airport, Texas for contract training of its pilots.[37]

The Captain attended Lear 35A training for Sunquest between July 17, 2016 and July 24, 2016. According to CAE Simuflite records and instructor interviews, the Captain was scheduled for one day of ground school on July 15, 2016, followed by one simulator training session and then a check ride per 14 *CFR* 135.293 (oral and competency recurrent) combined with a 14 *CFR* 135.297 check (instrument competency).

According to CAE Simuflite records, the Captain required three additional simulator training sessions prior to his check ride. He accumulated a total of 17.5 hours of simulator time, which included 9.2 hours as pilot flying (PF) and 8.3 hours as pilot monitoring (PM). He conducted 8 ILS approaches, 9 non-precision approaches, 2 visual approaches, and 5 circle-to-land approaches.[38] During the circle-to-land training conducted on July 17, 2016, he was graded "Not Yet Proficient – Additional Training Required," and on July 18, 2016, he required additional training to meet proficiency requirements on circle-to-land approaches. According to a July 18, 2016 email from the Captain's instructor, the Captain was not recommended for the check ride in the Lear 35, and he would need more training before being signed off. The instructor further requested the company [Trans-Pacific] be notified of the captain's delayed check ride. On July 20, 2016, Trans-Pacific was notified of the additional training required for the Captain.[39]

According to the Chief Pilot, Trans-Pacific was aware of the captain's training difficulties that included circling approaches and maintaining assigned altitudes, but attributed the difficulties to the Captain having flown a different airplane prior to flying the Lear 35A. According to internal CAE Simuflite emails, on July 17, 2016 the Captain's instructor sent an email to the CAE Simuflite Lear manager, informing him that the Captain had been out of the airplane for 7 years and the instructor could not recommend the Captain for a check ride due to a lack of proficiency.

The Captain satisfactorily completed proficiency checks on July 24, 2016, March 20, 2017 and a line check on October 7, 2016 that included circle-to-land approaches in the Lear 35A.

2.2 The Second-in-Command

The SIC was 33 years old and resided in Union, New Jersey. He was hired by Sunquest Executive Air Charter on September 1, 2016, and was assigned as a Lear SIC on the accident flight,

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[37] Trans-Pacific was required to conduct an audit of CAE Simuflite training to ensure compliance with its Approved Training Program every 24 calendar months, per Operations Specifications A031. The most recent audit occurred on March 21, 2016.
[38] All circle-to-land approaches trained in the simulator at CAE Simuflite for Lear 35A pilots were conducted at John F. Kennedy International Airport (JFK) using the VOR runway 04L approach, circle to runway 31R.
[39] For additional CAE Simuflite instructor comments on the Captain's Lear training, see Attachment 1 – Interview Summaries.

occupying the right seat. According to his most recent records, he had 2,675 hours total time when hired, and 265 hours in the Lear series.[40]

The SIC previously flew with MedFlight Air Ambulance based in Albuquerque, New Mexico, and was hired on August 3, 2015 as Lear 35A SIC. According to interviews, MedFlight was initiating a review of the SIC's continued employment based on his weak performance when the SIC resigned from MedFlight on January 5, 2016.

The SIC held a Commercial Pilot certificate with a Lear type rating (SIC privileges only). He held a First Class medical certificate, dated October 13, 2016. On his 2007 and 2009 medical certificate applications, the SIC answered "yes" to Medical History question 18v for a conviction May 2003, and stated on the application "I was street racing and running away from the police and assault on a police officer, but it was a third degree." For his 2014 medical application and subsequent applications, the SIC answered "no" to question 18v.

The SIC was hired by Short Hills Aviation Services, Inc. in Morristown, New Jersey with an employment start date of May 23, 2017 as a DA-50/900 SIC (eight days after the accident).[41] He was scheduled for simulator training at CAE Simuflite on May 23, 2017. According to the Trans-Pacific Chief Pilot, he was unaware that the SIC had been hired by another company, and was scheduled to start training on a Falcon 50 a week after the accident, and the SIC had not provided Trans-Pacific any notice of his new employment. The SIC was based in Van Nuys, California (VNY) for Trans-Pacific, but according to the Chief Pilot, he had left his residence on the west coast about a month before the accident and moved to New Jersey.

A review of the FAA Accident/Incident Data System, Enforcement Information System and PTRS database showed no records or reports of any previous aviation incidents or accidents involving the SIC.

2.2.1 The Second-in-Command's Pilot Certification Record[42]

Notice of Disapproval – Private Pilot Single Engine Land Airplane (first failure) issued April 10, 2009. Areas of reexamination: Area of Operation IV. Takeoffs, Landings and Go-arounds; X. Emergency Operations.[43]

Notice of Disapproval – Private Pilot Single Engine Land Airplane (second failure) issued April 13, 2009. Areas of reexamination: Area of Operation IV. Takeoffs, Landings and Go-arounds; X. Emergency Operations.

Private Pilot – Airplane Single Engine Land certificate issued April 28, 2009.

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[40] Most recent flight times derived from the SIC's Short Hills Aviation Services, Inc. (Morristown, New Jersey) employment application.
[41] See Attachment 7 - SIC Records.
[42] Source: FAA.
[43] According to the FAA Form 8710-1 (Airman Certificate and/or Rating Application), dated April 7, 2009, the SIC had a total time of 197 hours and 186 hours of flight instruction.

Private Pilot – Airplane Single Engine Land; Instrument Airplane certificate issued August 3, 2010.

Commercial Pilot – Airplane Multiengine Land; Instrument Airplane; Private Pilot Privileges Airplane Single Engine Land certificate issued May 13, 2011.

Commercial Pilot – Airplane Single and Multiengine Land, Instrument Airplane certificate issued October 3, 2014.

Commercial Pilot – Airplane Single and Multiengine Land, Instrument Airplane; LR-Jet (SIC Privileges Only) certificate issued October 19, 2015.[44]

2.2.2 The Second-in-Command's Certificates and Ratings Held at Time of the Accident

Commercial Pilot (certificate issued October 19, 2015)
Airplane Single and Multiengine Land, Instrument Airplane
LR-Jet (SIC Privileges Only)

Medical Certificate First Class (issued October 13, 2016)
Limitations: Must wear corrective lens

2.2.3 The Second-in-Command's Training and Proficiency Checks Completed[45]

Date of Hire	September 1, 2016
Date Transitioned to Lear SIC	November 2, 2016
Date of Most Recent Proficiency Training	November 1, 2016
Date of Most Recent Proficiency Check	September 20, 2016

2.2.4 The Second-in-Command's Flight Times[46]

The SIC's flight times, according to Trans-Pacific:

Total pilot flying time	1,167
Total PIC time	512
Total Lear series flying time	407
Total flying time last 24 hours	2.5
Total flying time last 30 days	33
Total flying time last 90 days	81
Total flying time last 12 months	208

[44] According to FAA records, the SIC received Lear training through the MedFlight Air Ambulance Air Carrier Training Program. On FAA form 8710-1, dated October 6, 2015, the SIC listed his total time as 1,034 hours, 496 hours flight instruction received, and zero hours of FFS (full-flight simulator) or FTD (flight training device) hours.
[45] Source: Trans-Pacific.
[46] Source: Trans-Pacific.

2.2.5 The Second-in-Command's Training

The SIC received his initial Lear training through the MedFlight Air Ambulance Air Carrier Training Program. On August 7, 2015, the SIC satisfactorily completed a 135.293(a) and (b) proficiency simulator check in the Lear 35A.[47]

The SIC attended Lear 35A training for Sunquest between September 16, 2016 and September 29, 2016. According to CAE Simuflite records and instructor interviews, the SIC was scheduled for a Part 135 5-day recurrent training curriculum (R5), which included two days of Lear 35A ground school, two days of simulator training, and one day for a check ride. The ground school began on September 16, 2016, and the simulator training began on September 18, 2016.

According to CAE Simuflite simulator training records, the SIC required four additional simulator training sessions (for a total of 6 simulator training sessions) prior to conducting his check ride on September 29, 2016. He accumulated a total of 24.7 hours of simulator time, which included 18.6 hours as pilot flying (PF) and 6.1 hours as pilot monitoring (PM). He conducted 17 instrument approaches, 12 non-precision approaches, 2 visual approaches, and 5 circle-to-land approaches.[48] During the circle-to-land training conducted on September 22, 2016 and September 25, 2016 he was graded "Not Yet Proficient – Additional Training Required." On September 28, 2016 (the day before his proficiency check) he was graded proficient in circle-land approaches. His proficiency check on September 29, 2016 did not include a circle-to-land approach.

According to the SIC's instructor's notes following the September 18, 2016 simulator training

[47] Title 14 *CFR* 135.245 Second-in-Command qualifications, required a Second-in-Command hold at least a commercial pilot certificate with appropriate category and class ratings and an instrument rating. According to the FAA Form 8410-3 dated August 7, 2015, the accident SIC required retraining in the Lear 35A stall series.

[48] CAE Simuflite records indicated that the SIC was graded "not yet proficient" in circle-to-land approaches two out of the three days they were trained.

session, the SIC had the following training difficulties:

- Struggled with normal procedures
- Did not perform takeoff checks correctly or know what to look for during the checks
- Did not know how to start the engines
- Crashed on first takeoff due to incorrect flight director settings
- Unable to control speed and altitude during the stall series
- Flew inverted on the unusual attitude module
- Crashed on landing during an ILS approach

According to internal CAE Simuflite emails, the instructor for the SIC informed the CAE Simuflite Lear manager that the SIC was not ready for his originally scheduled check ride, and the manager requested the SIC be removed from the scheduled check ride.

CAE Simuflite notified the Director of Operations of Trans-Pacific that the SIC was not progressing through the training, and planned to continue working with the SIC. The SIC indicated that he was having a personality conflict with his instructor, and the SIC also requested additional ground school training and extra simulator time, which was approved by Trans-Pacific. According to the instructor, the SIC told him that he previously did not get much time at the Lear controls, and the instructor stated the SIC was behind in training.[49]

2.3 Pilot's Recent Activities

The Captain's wife said that in the 72 hours before the accident she communicated with the Captain daily by cell phone and text message. She could not recall the timing of their communications on May 12 or May 13, 2017, but she recalled that they were routine. She said she last spoke with the captain by phone the evening of Sunday, May 14, 2017 around 2230 or 2300 EDT and that the call lasted about half an hour. The pilot told her he had been doing his laundry in the hotel and having dinner, that he was about to go to sleep, and that he had to get up early the next morning. She said that when the Captain was home, he normally went to bed about 1930 or 2000 and woke about 0630. At 1115 EDT on May 15, 2017, the Captain texted his wife to let her know he had landed in Philadelphia, which was habitual for him.

The SIC's mother, with whom he had been staying a few days, could not recall details about his activities prior to Sunday, May 14. She stated that he called her at work at 0030 EDT on Sunday to see when she would be coming home (she got off work at 0200 EDT), and that he slept at her house that night. She recalled that he was still asleep when she left the house to attend church at 1000. In the afternoon and evening, the SIC ran errands and participated in a Mother's Day gathering at her residence. He told her he was going to sleep early because he had an early flight

[49] For additional CAE Simuflite instructor comments on the SIC's Lear training, see Attachment 1 -Interview Summaries.

the next morning, but she did not know what time he went to sleep. He had already left the house when she woke at 0630 EDT on Monday morning, May 15, 2017. She was uncertain about his typical off-duty sleep schedule because he had been living on his own in recent years.

About 1330 EDT on May 15, 2017, the SIC called his mother to tell her that he had landed in Philadelphia and he would be coming home that evening. The SIC's mother later recalled that the SIC was in a good mood during the call because the passengers had tipped the crew.

3.0 PRIA Information

The "Pilot Records Improvement Act of 1996" (PRIA) required that a hiring air carrier under 14 *CFR* Parts 121 and 135, or a hiring air operator under 14 *CFR* Part 125, request, receive, and evaluate certain information concerning a pilot/applicant's training, experience, qualification, and safety background, before allowing that individual to begin service as a pilot with their company. According to the FAA, the previous employer was required to provide the following:

1. Records pertaining to the individual, found in – 49 U.S.C. Section 44703 (h) (1) (B) (i)
2. Records pertaining to the individual's performance as a pilot, found in 49 U.S.C. Section 44703 (h) (1) (B) (ii).[50]

According to company records and interviews, Trans-Pacific sent a PRIA request to D&D Aviation for the Captain's records on July 10, 2016, but never received a response.[51] In an email sent by the Trans-Pacific Chief Pilot to the NTSB, dated August 10, 2017, the Chief Pilot stated the following:

> *D&D did not provide records. We sent the initial request and after a period of time followed up with a phone call and still didn't receive anything. After the accident we made another phone call in an attempt to obtain the records and again did not receive them.*[52]

The SIC's PRIA Records from MedFlight Air Ambulance were requested on August 22, 2016, and received by Trans-Pacific.[53]

[50] Source: http://www.faa.gov/pilots/lic_cert/pria/guidance/.
[51] Source: Email sent from Trans-Pacific Chief Pilot to the NTSB, dated August 10, 2017 at 1356 CDT. See Attachment 4 - Pilot PRIA Records.
[52] The NTSB obtained the accident Captain's previous employment records. See Attachment 6 - Captain Previous Employer Records.
[53] See Attachment 4 - Pilot PRIA Records.

4.0 Medical and Pathological Information

Toxicology testing was performed at the FAA Civil Aerospace Medical Institute (CAMI).[54]

5.0 Airplane Information

Photo 1: Photo of accident airplane N452DA.[55]

The accident airplane was a Lear 35A, registration number N452DA, serial number 35A-452. It was a fixed wing multiengine aircraft with two turbine-fan Garrett TFE-731-SER engines. The airplane was manufactured in 1981, and was registered to A&C Big Sky Aviation, LLC in Billings, Montana.

Per Operations Specifications A001, Trans-Pacific was authorized to conduct operations under the provisions of 14 *CFR* Part 135 using the Lear 35A in passenger and cargo operations, under day/night, IFR enroute conditions, and in accordance with 14 *CFR* 119.21(a)(5) on-demand operations. The airplane was listed on Operations Specifications D085, issued to Trans-Pacific Air Charter LLC, Certificate number 1QUA578N.

[54] The pilot toxicology results can be reviewed in the public docket for this accident.
[55] Source: http://www.airliners.net/photo/Untitled/Gates-Learjet-35A/.

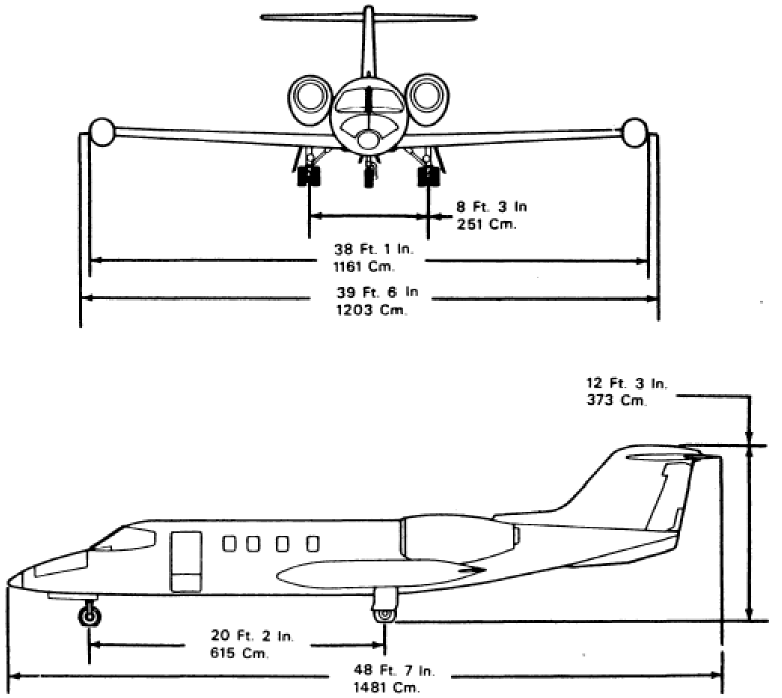


Figure 1: Lear 35A dimensions.[56]

According to the Learjet 35A Airplane Flight Manual (AFM), page 1-1, the Lear 35A minimum crew was a pilot and co-pilot. The Lear 35A was not approved for aerobatic maneuvers, including spins.

The Lear 35A AFM also included flight load acceleration limitations. For a configuration of Flaps Up, the Lear 35A was limited to +3.0g to -1.0g, and for a configuration of Flaps Down, the Lear 35A was limited to +2.0g to 0.0g. A note in the Lear 35A AFM (page 1-14) stated the following:

> *These acceleration values limit the bank angle in a level coordinated turn to 70º (flaps up) and 60º (flaps down). In addition, pullups and pushovers must be limited to these values.*

6.0 Weight and Balance

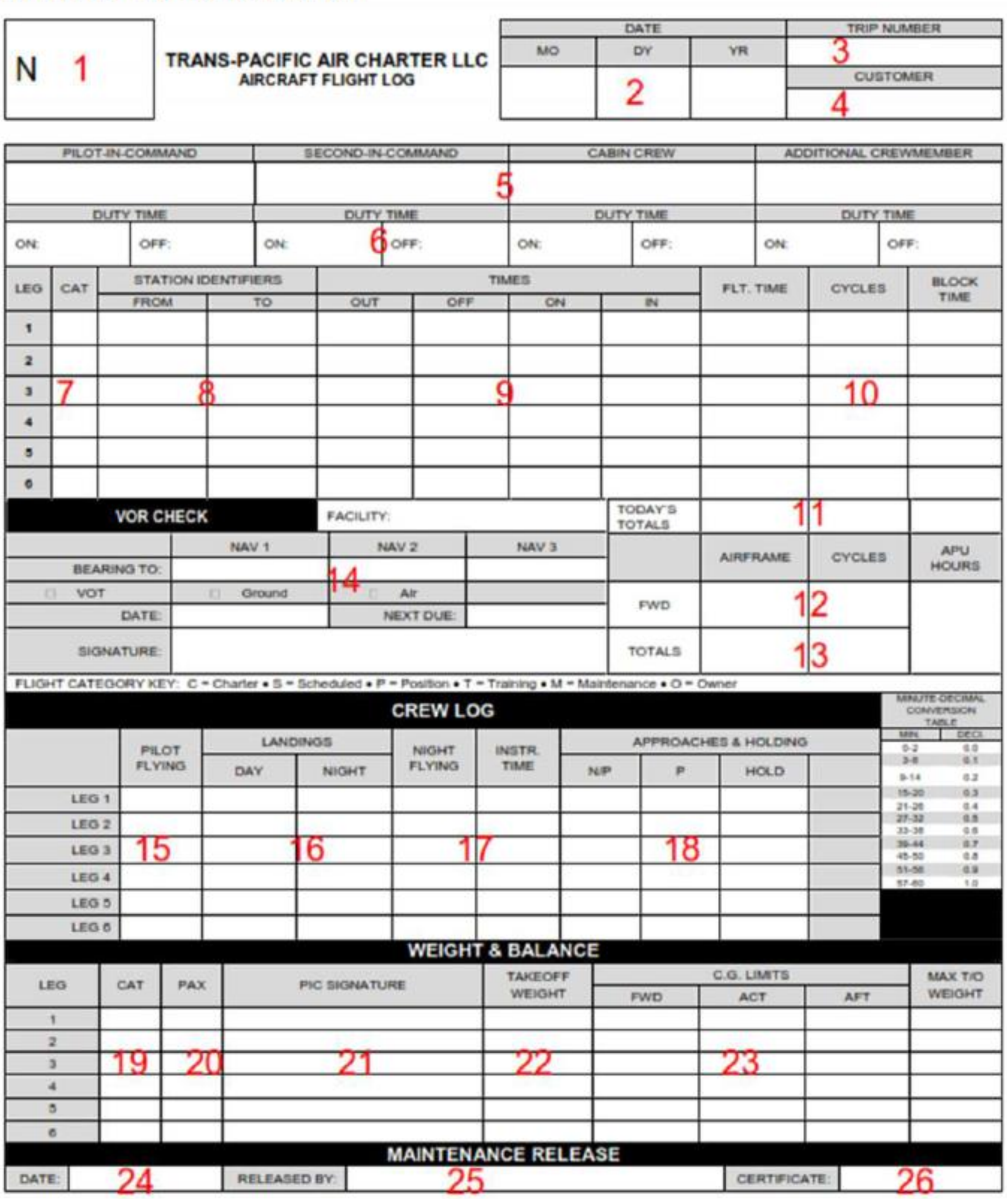
Trans-Pacific Operations Specification A096 defined the weight and balance program for the company's 14 *CFR* Part 135 flights. Trans-Pacific pilots conducting weight and balance calculations and were required to use the American Aeronautics Graph to calculate the airplane's center of gravity envelope based on the airplane's actual weight at time of takeoff.[57]

Onboard each Trans-Pacific airplane was an aircraft Maintenance Log. The log was composed of the Aircraft Flight Log (Form 1220), the Aircraft Discrepancy Form (Form 1122) and the Deferred Maintenance Log (Form 1121). Completion of the Aircraft Flight Log (Form 1220) was the

[56] Source: Learjet 35A/36A Pilot's Manual (dated February 1992), page 1-3.
[57] Source: Trans-Pacific GOM, page A-44. Procedures for use of the American Aeronautics Weight and Balance Plotter were outlined in the Trans-Pacific GOM, Section 3, page 2-4.

responsibility of the PIC,[58] and according to the Trans-Pacific Standard Operating Procedures (SOP) Manual (page 7-3), the Flight Log (Form 1220) shall be completed in accordance with the instructions contained in Appendix A of the Trans-Pacific GOM, and the PIC was required to transmit a copy of the required documents after starting crew rest.

Form 1220 – Aircraft Flight Log



N 1

TRANS-PACIFIC AIR CHARTER LLC
AIRCRAFT FLIGHT LOG

DATE			TRIP NUMBER
MO	DY	YR	3
	2		CUSTOMER
			4

PILOT-IN-COMMAND		SECOND-IN-COMMAND		CABIN CREW		ADDITIONAL CREWMEMBER	
		5					
DUTY TIME		DUTY TIME		DUTY TIME		DUTY TIME	
ON:	OFF:	ON:	6 OFF:	ON:	OFF:	ON:	OFF:

LEG	CAT	STATION IDENTIFIERS FROM	TO	TIMES OUT	OFF	ON	IN	FLT. TIME	CYCLES	BLOCK TIME
1										
2										
3	7	8		9					10	
4										
5										
6										

VOR CHECK	FACILITY:			TODAY'S TOTALS	11		
	NAV 1	NAV 2	NAV 3		AIRFRAME	CYCLES	APU HOURS
BEARING TO:		14					
☐ VOT	☐ Ground	☐ Air		FWD	12		
DATE:		NEXT DUE:					
SIGNATURE:				TOTALS	13		

FLIGHT CATEGORY KEY: C = Charter • S = Scheduled • P = Position • T = Training • M = Maintenance • O = Owner

CREW LOG

	PILOT FLYING	LANDINGS DAY	NIGHT	NIGHT FLYING	INSTR. TIME	APPROACHES & HOLDING N/P	P	HOLD	
LEG 1									
LEG 2									
LEG 3	15	16		17			18		
LEG 4									
LEG 5									
LEG 6									

MINUTE-DECIMAL CONVERSION TABLE

MIN.	DECI.
0-2	0.0
3-8	0.1
9-14	0.2
15-20	0.3
21-26	0.4
27-32	0.5
33-38	0.6
39-44	0.7
45-50	0.8
51-56	0.9
57-60	1.0

WEIGHT & BALANCE

LEG	CAT	PAX	PIC SIGNATURE	TAKEOFF WEIGHT	C.G. LIMITS FWD	ACT	AFT	MAX T/O WEIGHT
1								
2								
3	19	20	21	22		23		
4								
5								
6								

MAINTENANCE RELEASE

DATE:	24	RELEASED BY:	25	CERTIFICATE:	26

Figure 2: Sample Trans-Pacific Form 1220.[59]

For sections 21 and 22 of Form 1220, Appendix A of the Trans-Pacific GOM, page A-44 stated the following in part:

[58] Source: Trans-Pacific GOM, page A-41.
[59] Source: Trans-Pacific Air Charter GOM, Appendix A, page A-40.

21. The Pilot-in-Command shall [sp] in this field prior to each flight after completing the weight and balance calculations, verifying all documents required by Section 1.2.6 of this manual is on the aircraft and in proper order, that the aircraft is airworthy, and that all items required by the procedures of Section 6.1.6 of this manual has been checked and found satisfactory. The Aircraft Flight Log shall be transmitted to Trans-Pacific Air Charter after this and the weight and balance information has been completed.

22. The actual weight of the aircraft at the time of takeoff, as determined by the aircraft weight and balance calculations derived from the American Aeronautics Weight and Balance Graph shall be entered into the field using pounds.

The Trans-Pacific GOM, Section 12.4.6, page 12-21, listed the flight preparations duties for each pilot, and included the PIC responsibility to complete a weight and balance and load manifest, and the SIC to review those documents.

Title 14 *CFR* 135.63(c) Operating Requirements, stated the following:

For multiengine aircraft, each certificate holder is responsible for the preparation and accuracy of a load manifest in duplicate containing information concerning the loading of the aircraft. The manifest must be prepared before each takeoff and must include:

(1) The number of passengers;
(2) The total weight of the loaded aircraft;
(3) The maximum allowable takeoff weight for that flight;
(4) The center of gravity limits;
(5) The center of gravity of the loaded aircraft, except that the actual center of gravity need not be computed if the aircraft is loaded according to a loading schedule or other approved method that ensures that the center of gravity of the loaded aircraft is within approved limits. In those cases, an entry shall be made on the manifest indicating that the center of gravity is within limits according to a loading schedule or other approved method;
(6) The registration number of the aircraft or flight number;
(7) The origin and destination; and
(8) Identification of crew members and their crew position assignments.

Title 14 *CFR* 135.185(a) stated the following:

No person may operate a multiengine aircraft unless the current empty weight and center of gravity are calculated from values established by actual weighing of the aircraft within the preceding 36 calendar months. According to the FAA Weight and Balance handbook (FAA-H-8083-1A), the Basic Empty Weight was the standard empty weight of the aircraft plus optional equipment.

According to the Trans-Pacific GOM, Section 2.1.3, page 2-1, before each revenue flight, the PIC must calculate the gross takeoff weight, gross landing weight and the actual center of gravity for the loaded weight. According to the Trans-Pacific Chief Pilot, when asked if the SOP manual had a requirement for the crew to perform a weight and balance for each leg, regardless of Part 91 or Part 135, he said it was the company expectation for pilots to comply with the SOP manual and conduct a weight and balance for every flight. According to the Trans-Pacific Director of Operations, he expected the pilots to conduct a weight and balance on every "live" flight, or flight with a passenger, but there was not an expectation on flights conducted under Part 91. He further said the SOPs outlined in the SOP manual were to be completed regardless if the flight was flown under Part 91 or Part 135.[60] A weight and balance for the BED-PHL leg was completed by the flight crew and called in to the company prior to departure, and the notes were scanned and retained by Trans-Pacific.[61]

6.1 Estimated Weight and Balance

There was no record of the Aircraft Flight Log or other document containing the accident flight's weight and balance being transmitted to Trans-Pacific Air. An estimated weight and balance, using the airplane basic empty weight, fuel uplift records, and estimated fuel burns for the PHL-TEB flight derived from performance charts contained in the Learjet 35A/36A AFM was calculated below.[62]

WEIGHT & BALANCE (maximum certificated weights in **bold**)		
	Basic Empty Weight	10,173[63]
	Pilot weights (estimated)	360
	Baggage/Cargo Weight	50
	Zero Fuel Weight	10,583
	Maximum Zero Fuel Weight	**13,500**
	Fuel Weight (pounds)[64]	3,400[65]
	Ramp Weight	13,983
	Maximum Ramp Weight	**18,500**
	Taxi Fuel Burn	250
	Takeoff Weight (estimated)	13,733
	Maximum Takeoff Weight (landing limited)	**16,100**
	Estimated Fuel Burn (PHL-TEB)[66]	800

[60] See Attachment 1 – Interview Summaries.
[61] See Attachment 12 - Weight and Balance Information.
[62] See Attachment 12 - Weight and Balance Information.
[63] Source: Aircraft Weighing Report for Learjet N452DA from Ventura Mobile Aircraft Services, report number 17-4250, dated May 4, 2017
[64] According to the Lear 35A AFM (page WB-18), the fuel capacity of the wing tanks was 374 gallons total, the tip tanks was 357 gallons total, and the fuselage tank was 200 gallons. Total fuel capacity for the Lear 35A was 931 gallons. The maximum tip tank fuel for landing was 925 pounds and the minimum fuel load was 600 pounds in each wing for take-off and intentional go-around (Lear 35A AFM, page 1-13). The airplane was refueled through filler caps on the tip tanks. Fuel gravity flowed from the tip tanks to wing tanks. The wing fuel pumps were used to fill the fuselage tank.
[65] According to Bombardier, the estimated fuel on board from PHL – TEB based on filing of 2+30 fuel and flight at FL270 would be 3,400 lbs. (normal 1,600 lbs burn first hour, 1,200 burn second hour, 600 lbs for 30 minutes). Source: Email from Bombardier to the NTSB dated June 5, 2017.
[66] Estimated fuel burn for 30 minutes at 4,000 feet and 250 KIAS. Source: Email from Bombardier to the NTSB dated June 5, 2017.

	Estimated Weight on Landing (TEB)	12,933
	Maximum Landing Weight	**15,300**
	Landing V_{REF} (knots for 40 degrees flaps)[67]	119

7.0 Pilot Weather Review[68]

According to the Trans-Pacific SOP Manual, Section 1.1.15, the flight crew was required to conduct a preliminary check of weather and NOTAMs (Notices to Airmen) at all departure, destination and alternate airports within 24 hours prior to departure. Further, the Trans-Pacific SOP Manual, Section 1.1.5, covering pre-flight duties, required the PIC to obtain weather and NOTAMs through one of the approved sources defined in Section 12.4.2 of the Trans-Pacific GOM, and may only be obtained within three hours of scheduled departure.[69]

Trans-Pacific pilots used Fltplan.com to conduct a review of weather and file flight plans. The weather data provided on the FltPlan.com website was from the National Weather Service (an approved weather source for Trans-Pacific), and according to Fltplan.com, the Captain used his account with the website to check the weather for the TEB-BED leg on May 15, 2017 at 0637 EDT, and for the BED-PHL leg at 0831 EDT. The website did not record any review of the weather for the PHL-TEB leg through FltPlan.com.[70]

The forecast received by the pilot through FltPlan.com for TEB at the estimated time of arrival into TEB for the accident flight, when it was reviewed by the Captain at 0637 EDT prior to departing on the TEB for BED leg, indicated a forecast of winds 320 at 22 knots gusts 32 knots, better than 6 statute miles visibility, and scattered clouds at 6,000 feet. At 1512 EDT, the TEB forecast was amended to show that, at the time of arrival of the accident flight into TEB, winds would be 320 at 20 knots gusting 32 knots, better than 6 statute miles visibility, and scattered clouds at 6,000 feet.

According to the Trans-Pacific SOP Manual (Section 5.1.2), once enroute, weather and airport information was required to be obtained prior to 35 nm route distance from the airport of intended landing. Once the weather and airport information was received and the PF briefed, the flight crew was required to establish the approach they expected to use and the taxi plan from the active runway to the parking ramp, and an approach briefing was required to be conducted in accordance with the SOP manual, Section 5.1.6.

For more detailed weather information, see Meteorology Group Chairman's Factual Report.

[67] See Figure 17: Lear 35A Landing Speeds of this Factual Report.
[68] For detailed weather information, see Meteorology Group Chairman's Factual Report.
[69] The Trans-Pacific GOM Section 12.4.2 was entitled "Use of Checklists." Section 12.4.1 was entitled "NOTAMs, Briefings and Aeronautical Weather Data."
[70] Source: Email to the NTSB received from FltPlan.com on July 17, 2017 at 1250 CDT. The NTSB could not determine if the pilot reviewed weather from a source other than FltPlan.com.

8.0 Accident Flight Authority (Part 91 versus Part 135)

Trans-Pacific was authorized to conduct operations with the Lear 35A under the provisions of 14 *CFR* Part 135 per their operating certificate issued under 14 *CFR* 119.21(a)(5). The Trans-Pacific Chief Pilot stated that the accident flight from PHL-TEB was operated under 14 *CFR* Part 91 as a re-positioning flight and was not subject to 14 *CFR* Part 135 regulations.[71]

The issuance and applicability of Trans-Pacific operations were defined in the company Operations Specifications A001, which stated the following in part:

> *d. The certificate holder is authorized to conduct flights under 14 CFR Part 91 for crewmember training, maintenance tests, ferrying, re-positioning, and the carriage of company officials using the applicable authorization in the operations specifications, without obtaining a Letter of Authorization, provided the flights are not conducted for compensation or hire and no charge of any kind is made for the conduct of the flights.*

According to billing information covering the accident charter, Trans-Pacific was compensated by their broker for the TEB-BED and PHL-TEB empty re-positioning legs operated on the day of the accident.[72]

When asked if the company charged for empty legs, the Trans-Pacific Director of Operations told the NTSB "we charge for everything," and the charter for the accident flight was also charged for the empty legs of the trip.[73] When asked if the company was compensated for all three legs of the accident trip, he said "correct," and the repositioning flight from TEB-BED was Part 91. The Director of Operations said the BED-PHL flight was Part 135, and the PHL-TEB flight was Part 91. When further asked if the accident flight was contrary to their Operations Specifications A001, he said "that was a good question" and he would have to look into it since that was a common industry practice. He further said that Trans-Pacific used Part 135 duty times for rest requirements even when the trip included Part 91 repositioning flights.

The FAA was asked by the NTSB for a legal interpretation of the accident flight to determine whether the flight was authorized to operate under 14 *CFR* Part 91. In an October 31, 2017 email to the NTSB, the FAA stated the following in part:

> *Research of the original intent of subparagraph d of the OpSpec reveals the intent was to eliminate the need or confusion regarding having to obtain a separate letter of authorization for the listed operations. The reference to compensation or hire was not in the initial language proposed for subparagraph d. In 2002, an amendment, meant to address operations under part 125, added the language to read "... provided the flights are not conducted for compensation or hire and no charge is made under the applicable provisions of parts 91 and 125. In 2003, due to changes in part 125, the verbiage was changed to "no charge of any kind is made for the conduct of the flights."*

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[71] An FAA legal interpretation (ref: Slater 2015 legal interpretation, dated November 17, 2015 stated in part: "*If the 'passenger-carrying revenue flights' were conducted as part 135 on-demand operations, tail-end ferries under part 91 would be permitted"*

[72] See Attachment 11 – Charter Information.

[73] See Attachment 1 – Interview Summaries.

Repositioning flights can reasonably be characterized as ferry flights and the FAA interprets ferry flying to be "other commercial flying" which may be conducted under part 91 operating rules, pursuant to 119.1 (e)(3). These ferry flights can operate under 91.501(b)(1), when common carriage is not involved.

In order for these flights to be required to be conducted under 14 CFR part 135, certain requirements must be met. One of those requirements is that passengers and/or cargo are being transported for compensation or hire. As this was not the case with the flight from TEB to BED and PHL to TEB, these flights were not required to be conducted under part 135. While this operator may have appeared to conduct re-positioning flights contrary to the language contained in OpSpec A001, they did not do so contrary to the intent of that paragraph or in violation of 14 CFR part 135.[74]

9.0 Flight Following

Flight following for Trans-Pacific flights was primarily conducted through the FAA filed flight plan and direct communications with the flight crew.[75] Following transmitting the weight and balance form and boarding passengers, the flight crew would notify the company through verbal contact, text message or email that they were departing. Upon arrival at the destination or alternate airport, the flight crew would notify the flight coordinator of their arrival.

According to the Trans-Pacific GOM, (page 6-10), the Director of Operations was primarily responsible for flight tracking, though many duties associated with locating flights had been delegated to the charter coordinator. According to the Director of Operations, Trans-Pacific flights were tracked through Flightaware.com, and via text messages or emails on landing. He said it was the expectation for Trans-Pacific pilots to do that for both Part 91 and Part 135 flights, although the manual said it was only required for Part 135 flights, and added that Trans-Pacific mainly did that to track the airplane's availability. For the accident flight, the flight crew communicated verbally with the company.

Title 14 *CFR* 135.79 Flight locating requirements, stated in part:

(a) Each certificate holder must have procedures established for locating each flight, for which an FAA flight plan is not filed, that -

(1) Provide the certificate holder with at least the information required to be included in a VFR flight plan;

(2) Provide for timely notification of an FAA facility or search and rescue facility, if an aircraft is overdue or missing; and

[74] In the October 31, 2017 email, the FAA stated "In consideration of the above. AFS-200 initiated a change to OpSpec [Operation Specification] A001 to clarify subparagraph d to remove the non-regulatory language."
[75] Trans-Pacific Operational Control was defined in the company Operations Specifications A008.

(3) Provide the certificate holder with the location, date, and estimated time for reestablishing communications, if the flight will operate in an area where communications cannot be maintained.

The Trans-Pacific GOM, Section 6.5.8 also stated the following in part:

Flight crewmembers will not be assigned duties, nor will the crewmember accept an assignment that is scheduled to exceed a planned duty day of fourteen (14) hours. This period is considered from the time the crew is expected to report "on duty" until the completion of that flight duty day (normally 30 minutes beyond actual "block in").

According to a review of the flight release for the day of the accident, the pilot's duty time started at 0622 EDT, an hour before their 0722 EDT scheduled departure (per the Trans-Pacific GOM, Section 6.5.2), and was scheduled to end at 2336 EDT, 30 minutes after their scheduled arrival. According to the flight release provided to the flight crew, the total scheduled duty time was 17 hours and 14 minutes.[76]

Title 14 *CFR* 135.267(d) stated the following in part:

(d) Each assignment under paragraph (b) of this section must provide for at least 10 consecutive hours of rest during the 24-hour period that precedes the planned completion time of the assignment.

According to an email to the NTSB, dated July 20, 2017, the Trans-Pacific Chief Pilot stated that the flight release contained a "typographical error" regarding the scheduled arrival into TEB, and the release had already been sent before it was caught. He further stated that the times were "cleared up" with the crew, and since the last flight was to only relocate the airplane back to TEB, they were free to take whatever time they needed and to depart at their leisure. According to the Chief Pilot, there was no documentation that was edited to reflect the correct schedule.

10.0 Airport Information[77]

Teterboro Airport was located 1 mile southwest of Teterboro, New Jersey at an elevation of 8.4 feet msl, and at a latitude/longitude of 40-51-00.4000N / 074-03-39.0000W. The airport had four runways (01/19 and 06/24), and was served by a 24-hour ATC tower.

10.1 TEB ILS Runway 01

The accident flight was cleared for an ILS (instrument landing system) approach to runway 06, circle to land to runway 01. Runway 01 was 7,000 feet long and 150 feet wide, and had a grooved asphalt surface. The total landing distance available beyond the threshold was 6,161 feet.[78]

[76] See Attachment 3 - Flight Release.
[77] Source: http://www.airnav.com/airport/KTEB.
[78] According to the Jeppeson TEB 10-9A chart, the last 68 feet was unavailable for landing calculations.

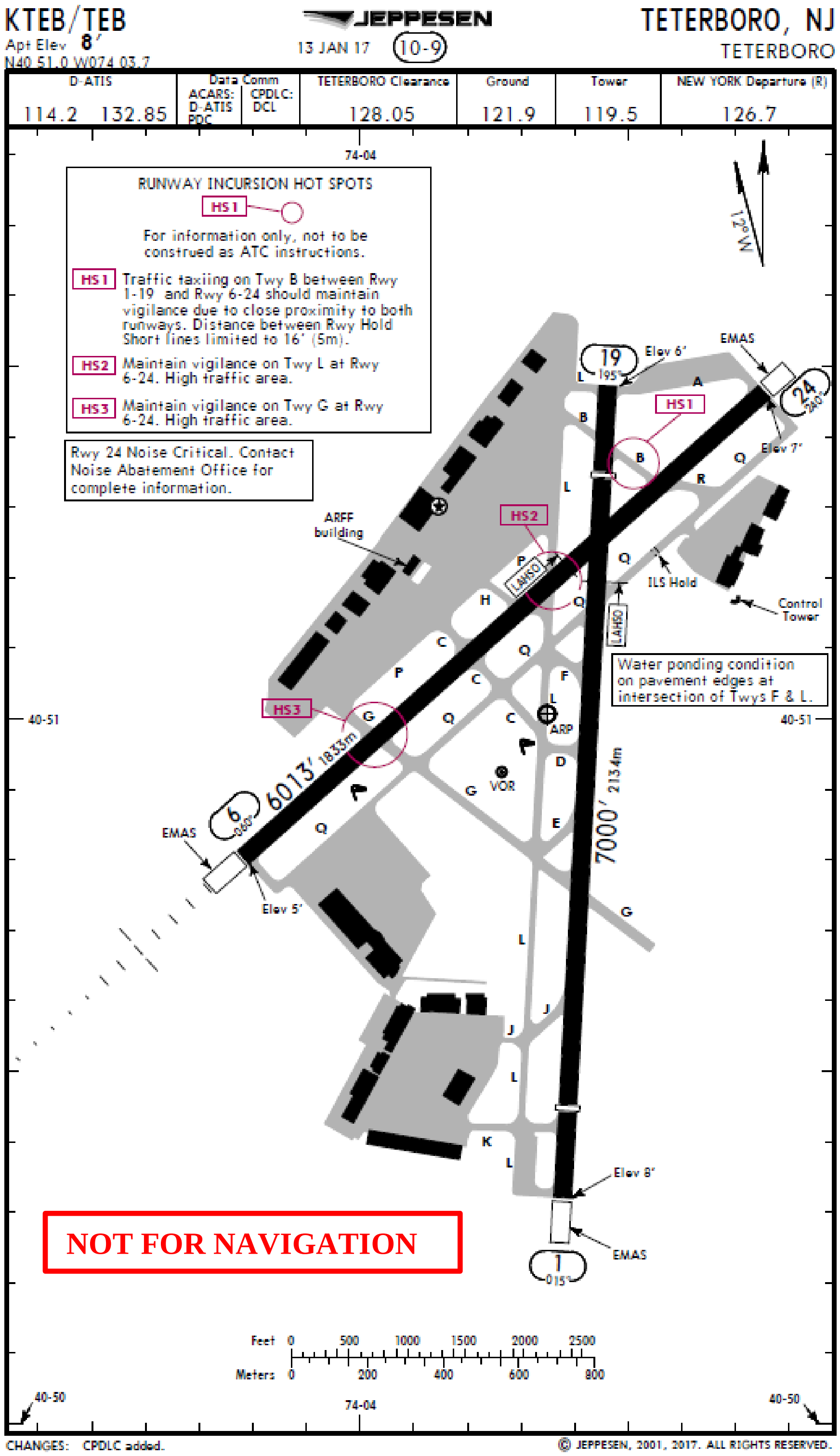

Figure 3: Jeppesen TEB 10-9 Airport Chart.[79]

[79] Source: Jeppesen. Trans-Pacific Operations Specifications A009 authorized the use of Jeppesen charts and aeronautical data. In addition, Operations Specification A061 authorized Trans-Pacific Lear 35A pilots to use a Class

10.2 TEB ILS 06 Circle-to-land 01

Due to the winds at TEB on May 15, 2017, ATC issued the accident flight a clearance to execute an ILS 06 instrument approach, circle-to-land approach to runway 01. There was no published straight-in instrument approach to runway 01 at TEB.

1 Electronic Flight Bag (EFB) via an Apple iPad Mini during a 6-month validation test that was to expire on July 1, 2017. Trans-Pacific pilots were still required to carry all paper charts on board the airplane.

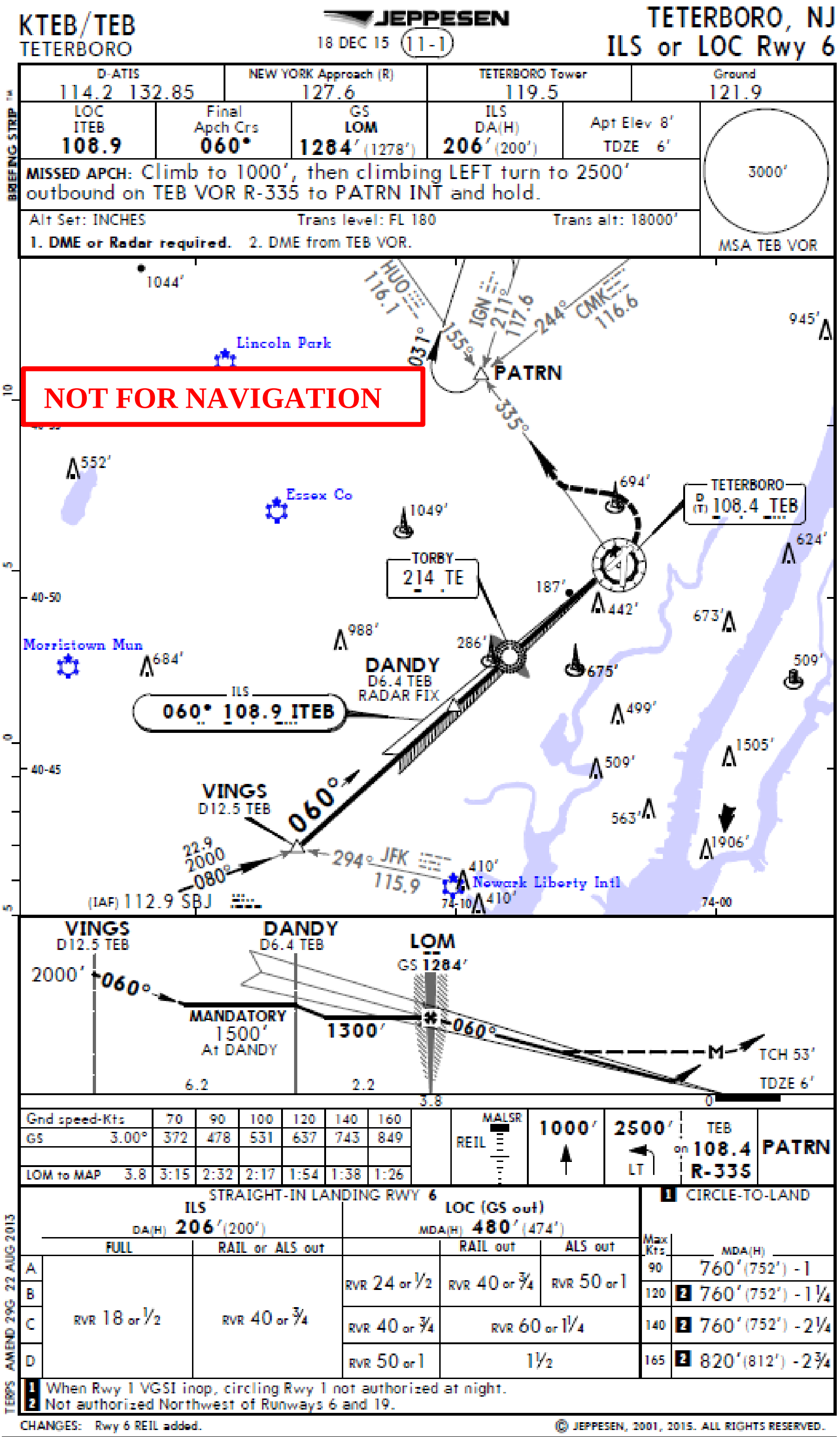

Figure 4: Jeppesen TEB 11-1 ILS/LOC Approach Chart.[80]

[80] Source: Jeppesen.

10.3 Circling Approach Protected Area

According to the Pilot/Controller Glossary published in the Aeronautical Information Manual (AIM), a circle-to-land was a maneuver initiated by the pilot to align the aircraft with a runway when a straight-in landing from an instrument approach was not possible or was not desirable. At tower controlled airports, this maneuver was made only after ATC authorization had been obtained and the pilot had established required visual reference to the airport.

A "circle to runway" clearance was used by ATC to inform the pilot that h/she must circle to land because the runway in use was other than the runway aligned with the instrument approach procedure. The direction of the circling maneuver in relation to the airport/runway was required, the controller must state the direction and state the direction (eight cardinal compass points) and specify a left or right downwind or base leg as appropriate. According to the AIM (page 5-4-54), standard left turns or specific instruction from the controller for maneuvering must be considered when circling to land.

Circling minimums were published on approach charts as a statement of the minimum descent altitude (MDA) required for the circling maneuver and the visibility requirements for the approach. Published circling minimums provided obstacle clearance when pilots remained within the appropriate area of protection. Pilots would determine the category of the airplane for the approach based on the approach speed of the airplane, which in turn would determine the MDA and visibility requirements for the circle-to-land approach as depicted on the approach chart. According to 14 *CFR* 97.3, an aircraft approach category means a grouping of aircraft based on a speed of VREF, if specified, or if VREF is not specified, 1.3 Vso at the maximum certificated landing weight.[81] VREF, Vso, and the maximum certificated landing weight were those values as established for the aircraft by the certification authority of the country of registry.[82] The categories were as follows:

(1) Category A: Speed less than 91 knots.
(2) Category B: Speed 91 knots or more but less than 121 knots.
(3) Category C: Speed 121 knots or more but less than 141 knots.
(4) Category D: Speed 141 knots or more but less than 166 knots.
(5) Category E: Speed 166 knots or more.

The FAA Instrument Procedures Handbook (FAA-H-8083-16A), page 4-8 and 4-9, stated that the circling approach area was the obstacle clearance area for airplanes maneuvering to land on a runway that does not meet the criteria for a straight-in approach. A minimum of 300 feet of obstacle clearance was provided in the circling segment, and pilots should remain at or above the circling altitude depicted on the approach chart until the airplane was continuously in a position from which a descent to a landing on the intended runway could be made at a normal rate of descent and using normal maneuvers.

The circling approach protected areas developed prior to 2012 used the radius distances shown in the following table, expressed in nautical miles, dependent on aircraft approach category:

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[81] VREF is defined as 1.3 times the stalling speed in the landing configuration (VSO). It is the required speed at the 50-foot height above the threshold end of the runway. Source: Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25A, Chapter 10, page 10-32.
[82] According to interviews, the Lear 35A was taught by CAE instructors as an approach category "D" airplane.

Circling MDA in feet MSL	Approach Category and Circling Radius (NM)				
	CAT A	CAT B	CAT C	CAT D	CAT E
All Altitudes	1.3	1.5	1.7	2.3	4.5

Figure 5: Pre-2012 Approach Category and Circling Radius chart.[83]

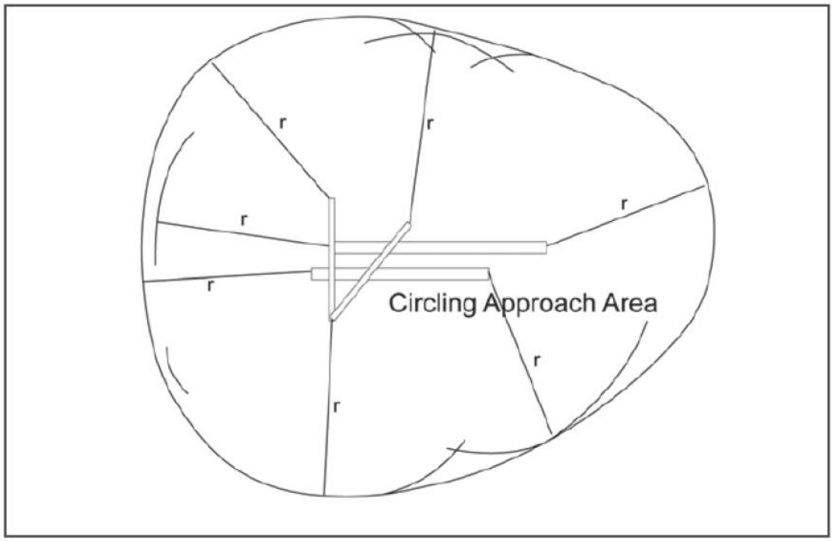

Figure 6: Chart depicting an example of pre-2012 circling approach protected areas.[84]

According to the FAA, beginning with the November 15, 2012 chart publication date, the FAA began publishing new circling criteria (TERPS 8260.3B Change 21) that affected the circling approach area dimensions by expanding the areas to provide better obstacle protection. The new circling approach areas used an expanded radius distance from the runway, and included a circling altitude which accounted for the true airspeed increase with altitude, dependent on aircraft category.[85]

Circling MDA in feet MSL	Approach Category and Circling Radius (NM)				
	CAT A	CAT B	CAT C	CAT D	CAT E
1000 or less	1.3	1.7	2.7	3.6	4.5
1001 – 3000	1.3	1.8	2.8	3.7	4.6
3001 – 5000	1.3	1.8	2.9	3.8	4.8
5001 – 7000	1.3	1.9	3.0	4.0	5.0
7001 – 9000	1.4	2.0	3.2	4.2	5.3
9001 and above	1.4	2.1	3.3	4.4	5.5

Figure 7: TERPS 8260.3B Change 21 modified circling approach areas.[86]

The affected approach procedures would be denoted on the approach chart with a negative "C" or on the circling line of the minima table to which the new criteria had been applied.

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[83] Source: FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS): TERPS/Landing Minima Data, Attachment 5.
[84] Source: FAA.
[85] See Attachment 20 - FAA TERPS Change 21.
[86] Source: FAA.

An example of an instrument approach chart minimums table with the expanded circling approach area dimensions was as follows:

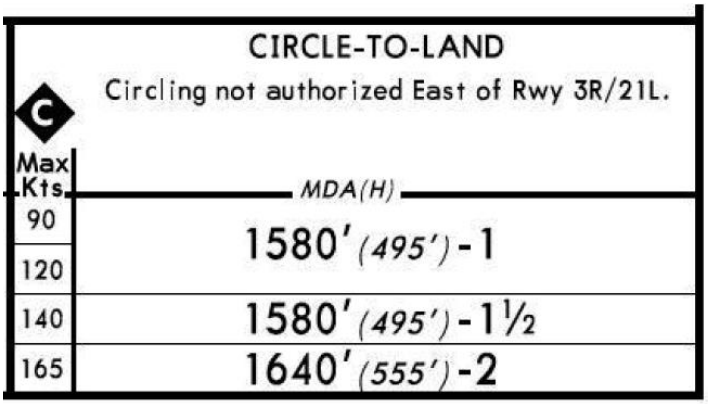

Figure 8: Example of an instrument chart with expanded circle-to-land minimums and a negative "C".[87]

The NTSB requested the FAA provide a pictorial chart showing the current circling approach protected areas surrounding TEB (see Attachment 21 – TEB Protected Airspace Charts).[88] The first chart provided by the FAA showed the protected airspace around TEB with the pre-2012 criteria, and the second chart showed the protected airspace around TEB using the current Change 21 criteria. According to the FAA, the Change 21 circling areas had not yet been applied to all approaches, including those at TEB. The Jeppesen 11-1 ILS06 approach at TEB did not have the negative "C", and TEB used the pre-2012 approach category and circling radius (See Figure 9) for circling approaches at TEB on the day of the accident.

According to the FAA, when Change 21 is eventually applied to TEB approaches, the circling radii will result in no change to Category A aircraft, a 0.31 nautical mile increase to Category B, a 1.13 nautical mile increase to Category C, and a 1.4 mile increase to Category D (See Figure 10).

KTEB Circling Area		
	Pre Change 21	Post Change 21
CAT A	1.3NM	1.3NM
CAT B	1.5NM	1.81NM
CAT C	1.7NM	2.83NM
CAT D	2.3NM	3.7NM

Figure 9: Change 21 Circling Areas for TEB.[89]

According to ATC transcripts, on the day of the accident, multiple airplanes (including the accident airplane) were cleared for the TEB ILS06 circle-to-land runway 01, and were told to begin their

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[87] Source: Jeppesen Briefing Bulletin published April 12, 2013.
[88] Note: These charts were developed by the FAA at the request of the NTSB during this investigation. These charts are not provided to pilots for refencing the circling approach areas and protected airspace around TEB.
[89] Source: FAA.

circling maneuver after the TORBY intersection. TORBY was the FAF for the ILS06 approach and located 3.8 nautical miles from the threshold of runway 06.

11.0 Company Information

Trans-Pacific was a Part 135 on-demand charter company based in Honolulu, Hawaii (HNL). According to the Director of Operations, the original name of the company was Sunquest Executive Air Charter, LLC.[90] In January 2017, as owner of the company, the Director of Operations changed the name of the company to Trans-Pacific Air Charter in anticipation of receiving Class II navigation authority from the FAA for the AMD-50-50s (Falcon 50) and using those aircraft for future operations on the intra-island charter market.

According to the company Operations Specifications D085, at the time of the accident the company operated two AMD-50-50 (Falcon 50), one Lear 31A, and three Lear 35A (including the accident Lear). As of April 28, 2017, Trans-Pacific Form 1201 showed that the company had nine total pilots (including the accident pilots); three Captains and two SICs on the Lear, and three Captains and one SIC on the Falcon. Except for one Captain qualified on the Lear and Falcon, all Trans-Pacific pilots signed a one-year employment agreement with the company.[91] Trans-Pacific pilots were not represented by any union.

The Director of Operations conducted all pilot hiring, and said he hired both accident pilots. According to the Chief Pilot, Trans-Pacific pilots were scheduled on an "as-needed" basis, receiving 5 days off "of their choosing" each month, and typically had advanced notice of their charters.[92]

At the time of the accident, there were no flight operations or pilots based in HNL, and all Trans-Pacific operations were in the continental U.S., primarily out of VNY. Basic indoctrination training (including Crew Resource Management training) and emergency training for pilots was conducted in HNL, and all flight simulator training was conducted at CAE Simuflite at DFW Airport, Texas.

Trans-Pacific airplanes were equipped with cockpit voice recorders, but they did not have any flight data monitor (FDM) systems onboard.[93] The company did not have a Flight Operational Quality Assurance (FOQA) program[94] or Aviation Safety Action Program (ASAP).[95] There was

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[90] According to FAA PTRS records, Sunquest Executive Air Charter, LLC Operations Specifications A001 (Issuance and Applicability) was issued on May 3, 2011.
[91] The Captain that was qualified on both the Lear and Falcon was no longer flying for Trans-Pacific at the time of the accident.
[92] See Attachment 1 – Interview Summaries.
[93] FDM is a system capable of recording flight performance data. For reference, see 14 *CFR* 135.607 Flight Data Monitoring System, as related to helicopters in air ambulance operations. See also NTSB recommendation A-16-34, referenced in Section 17.3 NTSB Report #AAR-6-03 of this Factual Report.
[94] FOQA is a voluntary safety program designed to improve aviation safety through the proactive use of flight recorded data. Source: FAA.
[95] ASAP is a safety program designed to encourage air carrier and repair station employees to voluntarily report safety information that may be critical to identifying potential precursors to accidents. Source: FAA Advisory Circular 120-66B "Aviation Safety Action Program (ASAP)."

no formal voluntary safety reporting system for employees at Tran-Pacific, and the Director of Operations said they had an open-door, non-punitive policy where pilots could come directly to him if they had any concerns.

According to the Director of Operations, the company had discussed implementing a formal SMS program, but they had a "backlog of information waiting on the POI's [principal operations inspector] approval" and there was no SMS program at Trans-Pacific.[96] The company had discussed implementing a formal risk assessment tool, but at the time of the accident, there was no company requirement to conduct a risk assessment prior to a flight.

Trans-Pacific did not conduct any enroute observations of their crews, and according to the Director of Operations, did not have the ability to check the Lear pilots on a regular basis since there was no way to observe the crew because the Lear did not have the staffing and did not have a jumpseat. According to the Chief Pilot, when asked how he would know if his pilots were complying with SOPs during regular flight operations without data from the flights or anyone actually observing the operation, he told the NTSB "I don't," and did not know what happened when the cockpit door was closed.[97]

11.1 Management Structure and Duties

The authorized management positions for Trans-Pacific were listed in the company's Operations Specifications A006, and included the Chief Pilot, Director of Operations, and Director of Maintenance. The Trans-Pacific organizational structure was outlined in the Trans-Pacific GOM, Section 1.

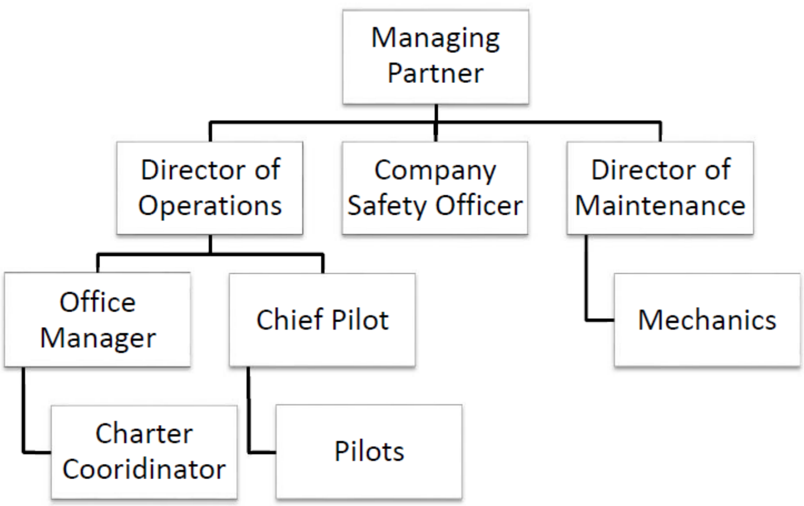

Figure 10: Trans-Pacific Management Organizational Chart.[98]

The duties for Director of Operations were listed in the Trans-Pacific GOM (Section 1.2.1), and included the following:

[96] See Attachment 1 – Interview Summaries.
[97] See Attachment 1 – Interview Summaries.
[98] Source: Trans-Pacific GOM, Section 1.1.1.

1. Formulates company plans and policies.
2. Directs the execution of company policies, established operations, and standards.
3. Schedules all flight operations.
4. Coordinates all flight operations.
5. Coordinates with the Director of Maintenance to schedule aircraft maintenance.
6. Distributes the Operations Manual or portions of it to those persons listed in the Table of Distribution
7. Obtains the required diplomatic clearances prior to departure for all flights into or over countries listed in the Operations Specifications.
8. Supervises procurement and distribution of all information or memoranda relative to any changes affecting the company policy or flight operations.
9. Ensures prompt reporting, filing, and follow-up action on accident reports to the appropriate federal agencies.
10. Responsible for compliance with the record keeping requirements of 14 *CFR* 135.63.
11. Performs duties for air ambulance operations in accordance with Section 9 of the GOM.
12. Ensures that all pilots are qualified to perform flight crewmember duties under 14 *CFR* 135.

The Director of Operations was permitted by the Trans-Pacific GOM to delegate functions pertaining to scheduling and coordinating of flight operations, flight release, distribution of manuals and material, or record keeping duties to other qualified company personnel.

According to his interview, the Director of Operations was also the managing member of the company, and handled the company finances and legal issues. As Director of Operations, he oversaw all flight operations, and was the primary manager of all the pilots, and would coordinate maintenance, flight operations, releasing of flights, and assist the chief pilots with maintaining pilot records and coordinating pilot training. The Director of Operations characterized his workload prior to the accident as “high but manageable.” [99]

The duties for the Chief Pilot listed in the Trans-Pacific GOM (Section 1.2.2) included the following:

1. Directs all training activities of flight crewmembers.
2. Coordinates operations policies and training matters with appropriate activities.
3. Advises the appropriate personnel of the status of flight operations and training of the flight crewmembers.
4. Responsible for the standardization of crewmembers.
5. Provides an adequate and current flight kit for each aircraft.
6. Maintains current aircraft checklist.
7. Disseminates information to all crewmembers as it pertains to flight operations.

[99] See Attachment 1 – Interview Summaries.

8. Maintains and makes available to all employees a current copy of the AIM and 14 *CFR* parts 61, 91, and 135.
9. Prepares and maintains proficiency records, flight schedules, reports and correspondence pertaining to flight operations and flight crewmember training.
10. Submits to the FAA all required reports pertaining to flight crews.
11. Ensures that all pilots maintain current route qualifications and receive proficiency checks as required by the FAA and company.
12. Schedules aircraft to the available flight crewmembers, designates the PIC and SIC for each flight and establishes personnel duty hours.
13. Performs duties for air ambulance operations in accordance with Section 9 of the GOM.

According to his interview, the Chief Pilot communicated with pilots regarding policies or procedures generally by email "as needed," which would include things like making sure the pilots were checking the general conditions of the airplanes, and making sure they were cleaned and stocked up.[100]

The duties for the Company Safety Officer were listed in the Trans-Pacific GOM (Section 1.2.5), and included the following:

1. Maintain a reporting system for accidents, incidents and hazards to flight operations.
2. Obtains and distributes safety information.
3. Conducts company safety inspections and audits.
4. Develops and/or maintains a pre-accident plan and supervises its implementations when necessary.
5. Conducts accident and incident investigations.
6. Makes regular reports to upper level management on activities associated with safety management, specifically including specific safety problems and measures taken to mitigate those problems.
7. Implements suggestions from upper level management related to safety issues.
8. Takes measures as necessary to ensure the continuity of the Safety Management System Program – Including discussing with upper management, department managers, etc. the necessity to encourage participation in the Safety Management System Program.

According to the Trans-Pacific GOM, the Company Safety Officer position was established to monitor company activities from the perspective of safety assessments, identify areas where corrective measures were necessary, recommend improvements and ensure continued compliance with best practices for operational safety. At the time of the accident, the Trans-Pacific Director of Operations also held the title of Company Safety Officer.

[100] See Attachment 1 – Interview Summaries.

The duties for the Charter Coordinator were defined in the Trans-Pacific GOM (Section 1.2.8). The Charter Coordinator supervised the flight scheduling and assisted with monitoring the flight operation. The position also assisted with flight following, oversight of flight operations and flight coordination. According to interviews, the Coordinator took calls from charter brokers, assembled trips, conducted flight following, and disseminated trip information to the pilots. Multiple references were made in the Trans-Pacific GOM to a "flight coordinator" position, but according to the Director of Operations, the Charter Coordinator and flight coordinator positions were the same. At the time of the accident, the Director of Operations also held the title of Charter Coordinator.

11.2 Captain Duties

The Captain's duties as PIC were defined in the Trans-Pacific GOM, Section 1.2.6. According to the GOM, the Captain reported directly to the Chief Pilot and was responsible for the safe and efficient execution of the flight assignment. He was responsible for the flight operation to which the crew was assigned, the safety and security of the aircraft, and the safety of the crewmembers, passengers and cargo.

The Captain was required to determine that the crew was adequately rested and in proper dress, and the Captain would plan the flight assignment and obtain briefing information regarding the purpose of the flight, weather conditions, operating procedures and special instructions.

11.3 Second-in-Command Duties

The Trans-Pacific SIC duties were defined in the Trans-Pacific GOM, Section 1.2.7. According to the GOM, the SIC was administratively responsible to the Chief Pilot and was functionally responsible to the Captain (Pilot in Command) on the flight to which he or she was assigned.

The SIC's duties were delegated by the Captain, or may delegate duties when designated by the Captain or if the Captain became incapacitated. The SIC was required to be highly knowledgeable of the Operations Manual, FAA Regulations, the Operations Specifications, aircraft flight manuals, company policies and other instructions pertinent to his duties.

11.3.1 SIC-0

According to the Director of Operations, Trans-Pacific had a policy of designating new or low-time pilots with an SIC status that restricted the type of flying the SIC was authorized to conduct for Trans-Pacific. SIC pilots were assigned a ranking from 0 to 4 denoting their authorization to act as Pilot Flying. The duty position assignments and their authorizations were found in the following table:

Duty Position Assignment	
Position	**Authorizations**
SIC-0	Pilot may only perform SIC duties as Pilot Not Flying (PNF).
SIC-1	Pilot may act as Pilot Flying (PF) on empty legs when authorized for observation by a Trans-Pacific Air Charter check airman or management pilot.
SIC-2	Pilot is authorized to act as Pilot Flying (PF) from the right side pilot seat position on flights conducted without passengers.
SIC-3	Pilot is authorized to act as Pilot Flying (PF) from the left side pilot seat position on flights conducted without passengers.
SIC-4	Pilot is authorized to act as Pilot Flying (PF) on alternating legs, from the left side pilot seat position at the discretion of the Pilot-in-Command.
PIC	Pilot is assigned all duties and responsibilities of Pilot-in-Command.

Figure 11: Trans-Pacific Duty Position Assignment Table.[101]

In order for an SIC to serve in the capacity of a ranking SIC-3 at Trans-Pacific, that SIC was required to have 3,000 hours total time, 1,000 hours total turbine time, and 100 hours in the type of airplane on which the SIC would serve as pilot flying. In order to become an SIC-4, the SIC was required to be type rated (PIC type), hold a First Class Medical Certificate, and obtain approval from the Director of Operations to operate in the left seat on passenger legs.[102]

According to the Director of Operations, the intent of this policy (SIC-0) was to provide SICs an opportunity to grow and master their duty position, and as they moved up they would be ready for upgrade. The concept was borrowed from Trans-Exec Air Services (based in VNY), where the Director of Operations was formerly employed. The Director of Operations stated that he had gone through the process at Trans-Exec Air Services, and thought it made the upgrade to captain much easier. According to the Director of Operations, the SIC-0 policy at Trans-Pacific had been in place since 2014 in one form or another.

At the time of the accident, the SIC was listed on Trans-Pacific Form 1201 as an SIC-0. The Director of Operations said that the SIC was improving, and he thought the SIC would be moving to SIC-1 the month of the accident and allowed to fly empty legs from the right seat.

According to Trans-Pacific documents (Trans-Pacific Form 1201, dated April 14, 2016) at the time of the accident the company had two SICs available to operate the Lear 35A, and neither was rated by Trans-Pacific above an SIC-0. The company only had one SIC available on the DA-50 (Falcon 50) airplane, and that SIC was listed as an SIC-1.

12.0 Relevant Systems[103]

12.1 Stall Warning System

The Lear 35A was equipped with a stall warning system to prevent the crew with visual and tactile warning of an impending stall. It included left and right stall vanes on the forward fuselage, a stick

[101] Source: Trans-Pacific GOM, Section 11.3.3, page 11-4.
[102] According to the Trans-Pacific GOM, Section 11.3.3, normally the PIC would occupy the left seat and the SIC would occupy the right seat in the cockpit.
[103] Source: Learjet 35A/36A Pilot's Manual, dated February 1992, and Learjet 35A/36A FAA approved Airplane Flight Manual (AFM), dated January 25, 2017 (Change 15 from original AFM, dated April 30, 1976).

shaker, a stick nudger and stick pusher, an angle-of-attack indicator for each crew position, L and R STALL warning lights, and L and R STALL warning switches. Flap position switches provided bias information to a computer-amplifier which would decrease stall indication speeds as the flaps went from 0^{o} to 40^{0}.

During flight, the stall warning vanes would align with the local airstream and transducers would produce a voltage proportional to the airplane angle of attack. The transducer signals were transmitted to the appropriate computer-amplifier channel along with the flap position information from the flap position switches and altitude information from the altitude switches.

As angle of attack increased to an angle of attack which corresponded to a speed approximately 7% above pusher speed for the appropriate configuration, the angle-of-attack indicator pointer would enter the yellow segment and the L and R STALL lights would illuminate and flash, and the stick shakers and the stick nudgers would activate. Should the angle-of-attack increase to a point just below aerodynamic stall, yaw damper force would be reduced, the angle-of-attack indicator pointers would enter the red segment, and the stick pusher (elevator servo) would command an aircraft nose-down attitude. The elevator servo force applied to the control column was approximately 50 pounds. The pusher force would remain until angle of attack was below the pusher angle-of-attack. During accelerated entry rate stalls, an angle-of-attack rate sensor circuit (alpha dot) would cause shaker, nudger and pusher activation at lower angle-of-attack.

The Lear 35A Pilot's Manual, page 8-1 through 8-2, stated the following in part:

> *The dual stall warning and pusher system provides an excellent indication of impending airplane stall and also commands an airplane nose-down attitude change (pusher) prior to actual airplane stall if the pilot has not initiated corrective action in response to the stick shaker and flashing STALL lights. The shaker actuates at a speed approximately 7% above the pusher speed just above the aerodynamic stall. Control effectiveness is good throughout the approach to the stall, pusher actuations, and recovery. No unusual characteristics or airframe buffet are exhibited during the approach to the stall with the landing gear and flaps down. A slight 'tail rumble' usually precedes shaker actuation during the approach to a stall with the landing gear and flaps up. Recovery is easily accomplished by lowering the nose of the airplane while simultaneously advancing power as necessary to accelerate out of the stall regime.*

12.1.1 Stall Warning Switches

The L and R STALL WARNING switches, located on the center switch panel, provided power to the corresponding stall warning system. Each switch had two positions: On and Off. The L STALL WARNING switch also provided power for the stick puller.[104]

[104] The stick puller function signaled the pitch servo to torque the elevators nose-up if M_{MO} or 359 knots V_{MO} (maximum operating limit speed) was exceeded.

Photo 2: Lear 35A Stall Warning Switches on Captain's side forward instrument panel, indicated by red circle.[105]

The Control Wheel Master Switch (MSW), located on the outboard horn of the pilot's and copilot's control wheels, provided a means of electrically disabling the stick nudger in the event of a malfunction. Depressing either switch would electrically disengage the elevator servo capstan, thereby removing elevator servo force at the elevator. When the switch was released, the capstan would reengage and the pusher force would resume until disabled by other means.

12.1.2 Stick Shaker

According to the Learjet 35A/36A Pilot's Manual, the stick shakers were "eccentric weights" driven by an electric motor and actuation were evidenced by a high-frequency vibration of the control columns.

12.1.3 Stick Nudger

The stick nudger was a pulsed actuation of the elevator servo and was evidenced by a low-frequency fore-and-aft movement of the control column. The nudger control circuits utilized the autopilot pitch axis circuitry when the autopilot was engaged to pulse the elevator servo. If the autopilot was engaged, activation of the nudger would cancel any selected autopilot vertical modes and inhibit the autopilot pitch axis until the nudger was released. In the event the nudger failed to activate, a warning horn would sound.

[105] See Attachment 18 - CEN17FA183 - TEB Simulator Observation.

12.2 Angle of Attack Indicators

The angle-of-attack (AOA) indicators, located on the pilot's and copilot's instrument panels, translated signals from the stall warning computer-amplifier into a visual indication of stall margin. The left stall warning system utilized the pilot's AOA indicator and the right stall warning system utilized the copilot's AOA indicator. Each indicator face was divided into three segments: green – safe; yellow – caution/shaker and nudger; red – danger/pusher.

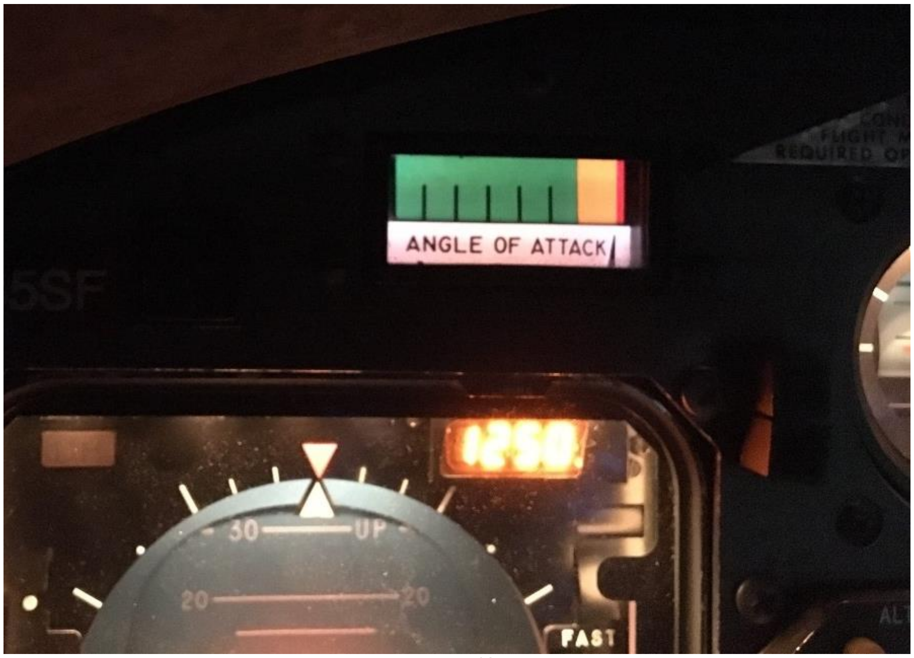

Photo 3: Photo of Lear 35A AOA gauge.[106]

According to one CAE Lear 35A instructor, when asked if the AOA indicator was a useful tool, said he never used it and did not want to rely entirely on the AOA. He did not know the threshold for stick shaker or pusher activation, and assumed a stick nudger and pusher were the same things.

Another CAE Lear 35A instructor said the stick pusher would lower the nose at the red/yellow AOA indicator, which was 1 knot above the stall. He also said CAE did not train for accelerated stalls. Another CAE Lear 35A instructor stated that the AOA indicator was actually a stall margin indicator, not an AOA indicator similar to what a fighter pilot would use to fly an airplane, and the "threshold of stick activation for the shaker was 7 percent above stall, and the pusher was 1 knot above stall." Another CAE Lear 35A instructor said the AOA indicator green to yellow indication was about 7% above the stall, and the yellow to red was about 1% above the stall. The speed the indicator went through the color bands, which may change based on loads on the airplane, but it was still measuring the margin and not AOA.[107]

[106] See Attachment 18 - CEN17FA183 - TEB Simulator Observation.
[107] See Attachment 1 – Interview Summaries.

12.2.1 Stall Warning Lights

The red L and R Stall warning lights, located in the glareshield annunciator panel, were installed to indicate impending stall or a system malfunction. During flight operations, the lights would illuminate and flash when the stick shaker was activated. The lights were pulsed at the same frequency and duration as the shakers; therefore, the flash duration would increase as the angle-of-attack increased from initial shaker activation. At or just prior to pusher actuation, the flash duration was sufficient to cause the lights to appear steady. Steady illumination of the lights at any time other than pusher actuation indicated a computer loss or an internal malfunction. The light would illuminate whenever the STALL WARNING switches were off and the battery (BAT) switches were on.

13.0 Relevant Procedures

13.1 Approach Briefing

According to the Trans-Pacific GOM (Section 12.4.4) and the Trans-Pacific SOP Manual (Section 5.1.5), pilots were required to conduct an approach briefing for every approach and landing, and may be completed any time prior to the aircraft reaching 10,000 height above the airport (HAA).[108] The following items were to be included in the approach briefing:

- Type of approach (approach chart page number and revision date).
- Impaired runway conditions.
- The use of anti-ice.
- Approach navigation aids frequencies and identifying code, as defined by the approach chart.
- Initial and final approach course as defined by the approach chart.
- Intercept altitude or altitude stepdowns as defined by the approach chart.
- Expected altitude of the FAF.
- Airspeed restrictions, if applicable.
- The MAP [missed approach point], MDA [minimum descent altitude], and/or DA [decision altitude] as defined by the approach chart.
- Weather conditions at the airport of arrival and any applicable alternate airports, verifying that adequate weather conditions exist to execute the approach.
- Runway exit point and expected taxi routing.
- Emergency contingencies.
- Any deviations from the SOP.
- Comments or inputs.

A former Trans-Pacific SIC on the Lear for Trans-Pacific stated that the company had an emphasis on doing briefings.

[108] According to the Trans-Pacific SOP Manual, Section 5.1.5, "dictating 'Standard Briefing' is not considered a proper briefing by Trans-Pacific Air Charter and should not be used." The SOP Manual further stated "operations defined in these SOPs are applicable to a standard approach, and when abnormal routing is expected the flight crew shall brief any divergence from these SOPs."

13.2 Crew Coordination

Activities involving crew coordination were defined in the Trans-Pacific GOM, Section 12.4.5, which also stated the following:

> *A coordinated crew is required for maximum workload dispersal, awareness, and general safety. Seemingly small duties can lead to serious distractions if a divergence from the standard protocols occurs.*

When Autopilot is Disengaged		
UNIT/CONTROL	**PF**	**PNF**
Altitude alerter	----	Set
Heading bugs	----	Set for both sides.
Bearing/course pointers	----	Set for both sides (PF first whenever possible).
FMS/GPS (all functions)	Command, monitor, and crosscheck the PNF	Perform all functions.

When Autopilot is Engaged		
UNIT/CONTROL	**PF**	**PNF**
Altitude alerter	----	Set
Heading bugs	Set own bug	Set own bug
Bearing/course pointers	Set own course/bearing	Set own course/bearing
FMS/GPS (all functions)	Command, monitor, and crosscheck the PNF	Perform all functions

Figure 12: Lear 35A crew coordination duties when operating with the autopilot disengaged or engaged.[109]

Flight Preparation Duties		
TASK	**PIC**	**SIC**
Mission briefing	Conduct	Attend
Deferred Maintenance Log	Check	----
Aircraft preflight inspection	Verify completion	Complete
Weather briefing	Complete	----
Verify correct approach and enroute charts	Complete	----
Computer flight planning	Complete	----
Weight and balance	Complete	Review
Load manifest	Complete	Review and transmit
Trip Confirmation Sheet	Complete	Review and transmit
Fuel order	Complete, brief SIC, and pay FBO	Monitor fueling
Galley and cabin preparation.	----	Complete

Figure 13: Lear 35A flight preparation duties.[110]

Alerting callouts were defined in the Trans-Pacific GOM, Section 12.4.29. The same section stated the following:

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[109] Source: Trans-Pacific GOM, Section 12.4.5.
[110] Source: Trans-Pacific GOM, Section 12.4.5.

This section will address call-outs related to aircraft flight such as altitude to go, navigational deviations, altitude deviations, and so forth. It is not possible to list all abnormal procedures and the altering call-outs; therefore deliberate CRM [crew resource management] is required for situations that cannot be foreseen. Clear and concise terminology must be used to express the concern as appropriate.

Alerting Call-Outs		
ALERT	**PF**	**PNF**
A new altitude has been assigned by ATC or is required for a procedure(1)	----	After ATC read back of the new assigned altitude, the PNF will point to the altitude alerter system Call: "XXXX feet set" OR Call: "Flight level XXX set"
	After visually confirming the proper altitude has been set Call: "I see XXXX"	----
1000 feet altitude remaining in climb or descent(2)		Call: "One thousand to go"
	Confirm altitude Call: "One thousand to go"	----
Altitude deviation greater than 100 feet (except during approach) OR Altitude deviation of plus 50 feet to minus 10 feet during approach	----	Call: "Altitude"
	Call: "Correcting" Make necessary corrections to altitude	----
Airspeed +/- 10 knots from normal of briefed airspeed	----	Call: "Airspeed"
	Call: "Correcting" Make necessary corrections to airspeed	----
Vertical speed is greater than 1000 FPM on precision approach or 1500 FPM on non-precision approach (unless otherwise briefed)	----	Call: "Sink rate is XXXX FPM"
	Call: "Correcting" Make necessary corrections to sink rate	----
Nav CDI is off course by one dot or more while tracking a course	----	Call: "One dot left/right of course"
	Call: "Correcting" Make necessary corrections to re-intercept and track course	----
Glideslope indicator is off by one dot or more when tracking a glidepath	----	Call: "One dot high/low"
	Call: "Correcting" Make necessary correction to re-intercept and track glidepath	----

(1) Note: Only after the PNF has made an ATC read back, set, and called the newly assigned altitude to the PF will the PF verify the altitude set and respond.

(2) Note: If the PF or PNF is unable to verbally indicate when 1000 feet of altitude is remaining in a climb or descent, one index finger displayed in full view of the PF or PNF will substitute for the verbalization.

Figure 14: Lear 35A alerting callouts for Trans-Pacific Pilots.[111]

[111] Source: Trans-Pacific GOM, Section 12.4.29.

Altitude Alerter and Flight Director Use		
FLIGHT PHASE	**PF**	**PNF**
Departure	---	Set first altitude to be maintained(1)
Climbing	---	Set assigned altitude
	Utilize Vertical Speed, Pitch or Airspeed Mode	---
Normal Cruise	---	Set cruise altitude
Climbing inside a block altitude(2)	---	Set uppermost block altitude limit
	Utilize Vertical Speed Mode set to 100 FPM to 300 FPM and Altitude Hold selector to maintain intermediate altitudes	---
Descending inside a block altitude(2)	---	Set lowest block altitude limit
	Utilize Vertical Speed Mode set to 100 FPM to 300 FPM and Altitude Hold selector to maintain intermediate altitudes	---
Descending	---	Set assigned altitude
	Utilize VNAV Mode or Vertical Speed Mode ensuring that the last 1000 feet is flown at 1000 FPM or less	---
Precision Approach	---	After glideslope intercept, set to missed approach altitude
Non-precision Approach	---	Set each MDA successively after the current MDA is captured and held. After the lowest MDA is captured and held, set missed approach altitude
	Utilize Vertical Speed and 1500 FPM for maximum rate of descent	---

Figure 15: Lear 35A altitude alerter and flight director use for Trans-Pacific pilots.[112]

According to the FAA POI that gave the Captain a line check on October 7, 2016, the Captain required a debriefing on CRM and standardization of his callouts rather than using plain language.[113] The POI stated that the Captain "needed to be standardized, since it was common in the 135-world that callouts become less formalized because pilots tend to fly with the same guy more frequently than in the 121-world."[114]

13.3 Sterile Cockpit

Title 14 CFR 135.100 Flight crewmember duties, stated the following:

> *(a) No certificate holder shall require, nor may any flight crewmember perform, any duties during a critical phase of flight except those duties required for the safe operation of the aircraft. Duties such as company required calls made for such nonsafety related purposes as ordering galley supplies and confirming passenger connections, announcements made*

[112] Source: Trans-Pacific GOM, Section 12.4.30.

[113] Trans-Pacific pilots were trained on CRM during basic indoctrination ground school training in HNL. See Attachment 23 - Trans-Pacific CRM Training. The Captain received his CRM training from Trans-Pacific on July 8, 2016, and the SIC received his CRM training on August 26, 2016. The Trans-Pacific Director of Operations conducted the CRM training for both accident pilots.

[114] See Attachment 1 – Interview Summaries.

to passengers promoting the air carrier or pointing out sights of interest, and filling out company payroll and related records are not required for the safe operation of the aircraft.

(b) No flight crewmember may engage in, nor may any pilot in command permit, any activity during a critical phase of flight which could distract any flight crewmember from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties. Activities such as eating meals, engaging in nonessential conversations within the cockpit and nonessential communications between the cabin and cockpit crews, and reading publications not related to the proper conduct of the flight are not required for the safe operation of the aircraft.

(c) For the purposes of this section, critical phases of flight includes all ground operations involving taxi, takeoff and landing, and all other flight operations conducted below 10,000 feet, except cruise flight.

The Trans-Pacific GOM, Section 12.4.19, stated the following:

Flight crewmembers are prohibited from engaging in any duty or activity during the critical phase of flight, except those required for the safe operation of the aircraft. A critical phase of flight is considered to be taxi, takeoff, landing, and flight below 10,000 feet MSL excluding cruise flight.

It is the Trans-Pacific Air Charter policy to maintain the highest possible level of situational awareness during these critical phases of flight. Al conversation during these times of sterile cockpit must pertain to the flight at hand.

13.4 Stabilized Approach

Stabilized Approach criteria for Trans-Pacific pilots was defined in the Trans-Pacific GOM (Section 12.4.28) and the Trans-Pacific SOP Manual (Section 6.1.1). According to both manuals, all Trans-Pacific flights were required to be stabilized by 1,000 feet HAA "unless the criteria defined in this section as 'stabilize' cannot be met due to approach considerations or abnormal conditions." At Trans-Pacific, an approach was stabilized by meeting the following criteria.

- On the correct vertical and lateral path.
- Requiring only small changes to pitch and heading.
- Within 10 knots of target speed as defined by the approach briefing.
- Aircraft configured for landing.
- Sink rate of no greater than 1,200 feet per minute, unless required by the approach.
- Appropriate power settings for the approach without need for drastic changes.
- Aircraft aligned with the runway for straight-in landing by no less than 500 feet HAA.
- All briefings and checklists complete.

13.5 Use of Checklists

According to the Trans-Pacific GOM (Section 12.4.2), Trans-Pacific was approved to utilize the checklists as published by the aircraft manufacturer for Normal and Abnormal Checklists and company-specific checklists accepted by the FAA. Lear 35A checklists were published by the manufacturer in the Bombardier Learjet 35/36 Crew Checklist and Quick Reference Handbook.[115]

According to an email from the Trans-Pacific Chief Pilot to the NTSB, dated November 6, 2017, Trans-Pacific pilots used CAE Simuflite checklists when operating their airplanes, and further stated the following:

> *The CAE checklists that we use was presented to the FAA when we started using CAE for our pilot training. The checklist was accepted by the POI, however no action was taken by the POI or is required when a document is accepted. To my knowledge a copy of applicable checklists were presented to the Van Nuys FSDO [flight standards district office] and retained in their records for the operator, this includes the CAE Checklist for the LR-35A and DA-50. Several records audits and 135.299 route checks were performed by the POI in which the CAE Simuflite checklist was used and at no time have any objections been noted.*

According to an email to the NTSB, dated November 14, 2017, the FAA stated that the VNY POI did not review the Trans-Pacific Lear 35A checklist for acceptance.[116]

All manufacturer-issued checklists were to be conducted as challenge and response as they were written. As previously mentioned, Trans-Pacific Lear 35A pilots used checklists contained in the CAE Learjet 35/36 Operating Handbook, dated 2012.[117] The Trans-Pacific GOM, page 12-16 stated the following in part:

> *It is Trans-Pacific Air Charter's policy that the use of checklists are [sp] to be as they are written – verbatim, smartly, and professionally. Skipping items, modifying checklist flow or adding items undermines the effectiveness, standardization and is prohibited. If divergence from standard checklist use is observed, it is the duty of any Trans-Pacific Air Charter employee to query the divergence and, if necessary, restart the checklist as it is written.*
>
> *Checklists should be initiated by command of the PF. Good resource management requires that, if in the opinion of the PNF (pilot not flying), the initiation of a checklist has been overlooked, the PNF inquire with the PF as to whether that checklist should commence.*

[115] See Attachment 8 - Bombardier Learjet 35 Checklists.

[116] FAA Order 8900.1 Volume 3, Chapter 32, Section 12, paragraph 3-3401 discusses material presented to the FAA for "acceptance."

[117] CAE Simuflite published a Learjet 35/36 Operating Handbook (copyright 2012) that contained normal and abnormal checklists for use during simulator training. The manual indicated "For Training Purposes Only" on each page of the checklists, and included the following notice: "This Learjet 35/36 Operating Handbook is to be used for aircraft familiarization and training purposes only. It is not to be used as, nor considered a substitute for, the Manufacturer's Pilot or Maintenance Manuals." See Attachment 17 - CAE Lear 35A Checklists.

Such prompting is appropriate for any flight situation whether the operation is conducted under 14 CFR 91 or Part 135, training flight or check rides.

Whenever the PF calls for movement of the flaps, gear, or any other control regarding change in aircraft configuration, the PNF will verbalize his actions to minimize the chance of a communication error. For example, when the PF call, "Flaps 10^0 *and Approach checklist" the PNF will echo "Flaps 10º and Approach checklist to follow as he or she moves the flap handle and prior to beginning the checklist. Additionally, the PNF will always verbalize when a checklist has been completed and the subsequent checklist that is standing by.*

According to the GOM, Trans-Pacific pilots conducted their checklists using one of three methods accepted by the FAA:

Do List: The do list is a checklist that must be completed as written, but may be done silently by a single pilot crewmember. It is standard practice that when a "do list" checklist is completed by a single pilot crewmember, that the other pilot crewmember conduct a second check to assure that all items are completed. In the event that an item is found to have not been completed as required by the "do list" checklist, the checklist is to be completed in its entirety again.

Challenge and Response: Challenge and response checklists require the presence and participation of both flight crew members. This method of checklist completion is typically utilized when the aircraft is not in motion. During the use of this checklist completion method the PNF will read the checklist items and elicit a response from the PF. Any movement of controls or switches or operational checks will be verbalized and conducted by the PF. The PF may command the PNF to complete all or some of an operational check or control movement, but only if ordered should the PNF do so. Additionally, if ordered to manipulate any controls or switches, the PNF must verbalize all actions as they occur.

Challenge and Self-Response: When an aircraft is in motion checklists are usually conducted as a challenge and self-response checklist. While completing a checklist using this method, the PF will focus on control of the aircraft and monitoring the surrounding ramp, taxiways, or airspace. The PNF will read the checklist aloud while responding aloud with the action taken with regards to the checklist items. This is done so that the PF can monitor the actions are being taken as required without distracting him or her from flying the aircraft.

According to the Trans-Pacific SOP manual, the Before Taxi Checklist was to be accomplished as a Challenge and Response Checklist. The Taxi, Before Takeoff, After Takeoff, Climb, Cruise, Descent, Approach and Before Landing Checklists were all to be accomplished as Challenge and Self-response.[118]

The Trans-Pacific GOM, Section 12.4.3, page 12-18 stated the following in part:

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[118] The Runway Lineup Checklist found in the CAE Learjet 35/36 Operating Handbook was not addressed in the Trans-Pacific GOM or SOP manuals.

Only memory items and flows that are published by the aircraft manufacturer or approved by the FAA may be utilized by Trans-Pacific Air Charter. Conducting flows or memory-based checklists that have not been approved by the manufacturer or FAA is strictly prohibited by Trans-Pacific Air Charter. Checklists that do not have an approved flow or memory items must be read and conducted form a published checklist unless it is the opinion of the PF that doing so would be contradictory to the safety of the flight.

According to the Trans-Pacific SOP Manual (Section 5.1.6), the Approach Checklist was required to be accomplished when the airplane was within 25 NM track distance to the destination airport and the airplane was stable at 200 knots. The PF would call "Flaps 8, Approach Checklist", and the PM confirm the flap setting and complete the Approach checklist as a challenge and self-response checklist.

The Before Landing Checklist was to be accomplished when passing the FAF, and the standard call from the pilot flying was "gear down, Before Landing Checklist," and the pilot not flying would then complete the checklist. If still holding on a final configuration (i.e. waiting on full flaps until leaving the MDA on a circle-to-land approach), pilots should state "Before Landing Checklist, holding on final flaps and yaw damper." Once the airplane was established on the final approach to the landing runway, the pilot flying would call "Flaps 40" and the pilot not flying would set the flaps to 40º and call "Flaps 40 set" followed by "Flaps 40 indicating."[119]

13.6 Circle to Land

Trans-Pacific was authorized to conduct circle-to-land approaches per the company Operations Specifications C075. Pilots were authorized to use the lowest IFR landing minimums for instrument approaches, which required a circle-to-land maneuver to the runway of intended landing, using the speed category appropriate to the highest speed used during the circle-to-land maneuver. Pilots were also required to complete an approved training program and a proficiency check for the circle-to-land maneuver.

13.7 Circle-to-Land Profile

The Trans-Pacific Lear 35A SOP manual did not contain a specific circle-to-land profile. Lear 35A pilots were taught at CAE Simuflite to fly the circling maneuver at an approach speed of VREF+20 knots. For a precision approach, in accordance with the Trans-Pacific SOP Manual, the pilot should slow the airplane to VREF+20 knots when one dot below the glideslope, and remain at VREF+20 with the gear down until the airplane was established on the final approach to landing. In accordance with the Trans-Pacific SOP Manual and CAE Simuflite training, when maneuvering visually on a circle-to-land approach, the pilot would wait until "landing assured," then call for Flaps 40, slow to VREF+10, and begin a descent to landing, and slow the airplane to VREF. As the airplane reached 50 feet above the ground, the pilot flying would begin a gradual landing flare and call for the yaw damper to be selected OFF at 20 feet.

[119] For additional information, see Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

According to CAE instructors, Lear 35A pilots were taught to fly circle-to-land approaches using minimums for Category D aircraft. Trans-Pacific pilots would determine their approach speeds by referencing charts contained in the CAE Learjet 35/36 Operating Handbook.

LANDING WEIGHT LIMITS

TEMP °F	PRESSURE ALTITUDE — FEET										
	S.L.	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
100	15300	15300	15300	15100	14600	14100	13600				
80				15300	15300	15300	15300	15000	14450	13900	13400
60								15300	15300	15300	15150
40											15300
20											
0											
ISA	15300	15300	15300	15300	15300	15300	15300	15300	15300	15300	15300

NOTE: Good for zero winds and headwinds

Figure 16: Lear 35A Landing Weight Limits Chart.[120]

LANDING SPEEDS

SPEED	WEIGHT — LB						
	10,000	11,000	12,000	13,000	14,000	15,000	15,300
V_{REF} LDG CLIMB	105	110	115	119	123	127	129
V_{AC} APPROACH CLIMB	111	116	121	125	130	134	135

Figure 17: Lear 35A Landing Speeds.[121]

[120] Source: CAE Learjet 35/36 Operating Handbook, page F-22.
[121] Source: CAE Learjet 35/36 Operating Handbook, page F-22.

CAE **Flight Planning**

LANDING DATA FLAPS 40° PA S.L.

	OAT F°	0	20	40	60	80	100
	OAT C°	-17	-7	5	16	27	38
15.3	V_{REF}	129	129	129	129	129	129
	V_{AC}	135	135	135	135	135	135
	91	2825	2900	2976	3051	3127	3203
	121/135	4709	4834	4961	5086	5213	5339
15	V_{REF}	127	127	127	127	127	127
	V_{AC}	134	134	134	134	134	134
	91	2791	2864	2936	3009	3082	3155
	121/135	4653	4774	4894	5016	5138	5259
14	V_{REF}	123	123	123	123	123	123
	V_{AC}	130	130	130	130	130	130
	91	2679	2742	2805	2868	2931	2995
	121/135	4466	4571	4676	4781	4886	4992
13	V_{REF}	119	119	119	119	119	119
	V_{AC}	125	125	125	125	125	125
	91	2549	2608	2667	2726	2785	2844
	121/135	4249	4348	4446	4544	4642	4740
12	V_{REF}	115	115	115	115	115	115
	V_{AC}	121	121	121	121	121	121
	91	2422	2479	2536	2594	2651	2709
	121/135	4037	4132	4228	4324	4418	4515
11	V_{REF}	110	110	110	110	110	110
	V_{AC}	116	116	116	116	116	116
	91	2314	2366	2417	2469	2521	2572
	121/135	3857	3944	4029	4115	4202	4287
10	V_{REF}	105	105	105	105	105	105
	V_{AC}	111	111	111	111	111	111
	91	2208	2255	2302	2348	2395	2442
	121/135	3681	3759	3837	3914	3992	4070

Landing distance for Parts 91, 121 and 135 is based upon smooth dry, hard surfaced runway with all systems operational.

Contaminated Runway Factor:

Part 91	Part 121/135 Scheduled and Alternate
Wet = Dry X 1.4 Freezing = Dry X 1.7 Frozen = Unknown	Wet = Dry X 1.15

NOTE: Hydroplaning speed is approximately 110 Kts.
Touchdown speed should never be less than V_{REF} – 10.

Figure 18: Lear 35A Landing Data Chart for Flaps 40º at Sea Level.[122]

13.7.1 Wind Additives

The Lear 35A AFM, page 1-18A, required the airplane to be configured for landing at least 500 feet AGL, and the yaw damper disengaged during the landing flare. The AFM provided the following caution:

> *If landings are attempted in turbulent air conditions with the yaw damper OFF, the airplane may exhibit undesirable later-directional (Dutch-Roll) characteristics. These*

[122] Source: CAE Learjet 35/36 Operating Handbook, page F-23.

characteristics are improved as the wing/tip fuel is consumed. The pilot shall observe the NOTE relative to turbulence contained in the APPROACH procedure (Section II) and increase airspeed as required.

Section II of the Lear 35A AFM stated the following Note:

It is recommended that if turbulence is anticipated due to gusty winds, wake turbulence, or wind shear, the approach speed be increased. For gusty wind conditions, an increase in approach speed of one half the gust factor is recommended.

There was no reference in the Trans-Pacific GOM or SOP manuals as to the amount of approach speed increase pilots should use when flying an approach in gusty wind conditions. The CAE Lear 35/36 Operating Handbook also did not reference any approach speed additives in gusty conditions.

According to interviews, one CAE Simuflite Lear 35A instructor, when asked if there were any wind additives on the approach in the Lear 35A, said they would fly VREF plus the steady state wind plus ½ the gust factor. Another CAE Simuflite Lear 35A instructor, when asked the same question, said he would add 5 knots "or so" to the approach speed if it was windy, but there was no specific amount of additive for winds on the Lear 35A.[123]

13.8 Terminal Area

According to the Trans-Pacific SOP Manual (Section 5.1.6), the Terminal Area was considered any airspace below 10,000 HAA and within 20 nautical miles of the airport of intended landing. Pilots operating in the terminal area were required to maintain a vigilant watch for conflicting traffic and adhere to any TCAS (traffic collision avoidance system) RA (resolution advisory).

[123] See Attachment 1 – Interview Summaries.

EVENT	PF	PNF
Aircraft passes through 10,000 feet HAA.	Aircraft passes 10,000 feet HAA at an indicated speed no greater than 250 KIAS.	Cycles the No Smoking/Fasten Seatbelt switch once, to notify the passengers that you have passed 10,000 feet HAA.
Aircraft is within 25 NM track distance to the destination airport.	Begin slowing the aircraft to be at 200 KIAS within 20 NM track distance to the destination airport.	
	Aircraft is stable at 200 KIAS. "Flaps 8, Approach Checklist".	Sets flaps to 8° down position. "Flaps 8 set". Observe that flaps have moved to the 8° position. "Flaps 8 indicating". Completes the Approach Checklist as a Challenge and Self-Response Checklist. "Approach Checklist complete, Before Landing Checklist next".

Figure 19: Trans-Pacific Lear 35A Terminal Area SOPs.[124]

13.9 ILS Approach Profile

The initial portion of the approach to TEB was conducted using an ILS precision approach (TEB ILS06). According to the Trans-Pacific SOP Manual (Section 5.1.6), a precision approach was any instrument approach with vertical and lateral guidance, and when a precision approach was accepted by the flight crew, the Precision Approach procedures were required to be followed even if that precision approach was executed in VMC (visual meteorological conditions).

[124] Trans-Pacific SOP Manual, Section 5.1.6. See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

EVENT	PF	PNF
Aircraft is on vectors or expected to intercept the final approach course OR aircraft is on a feeder or initial approach point.	Selects Green Nav, verifies that the HSI is set to the proper inbound course and the navigation radio is set to the proper frequency. Reduce speed to VREF+30. "Green Nav selected".	Identifies the navigation radio to ensure the proper navigation aid is transmitting. Identifies the navigation aid. "Nav 1/2 identified".
Cleared by ATC for a precision approach.		Arms the approach mode for the FD. "Approach armed".
	Verifies that approach mode is armed and all navigation radios and LNAV are properly set in Green Nav. "Approach set".	
Localizer captured.	"Loc captured".	Verify both course indicators concur. "Loc captured".
Two dots below glideslope.	"Flaps 20".	Sets flaps to 20° down position. "Flaps 20 set". Observe that flaps have moved to the 20° position. "Flaps 20 indicating".
One dot below glideslope.	"Gear down, Before Landing Checklist".	Select landing gear handle to the down position. "Gear selected down". Verify that three green lights indicate that all landing gear have deployed to the down position and locked. "Three green, no red".
	Verify three green, no red lights indicating for landing gear. "Three green, no red".	Performs Before Landing Checklist as a challenge and self-response checklist, holding on flap movement. "Before Landing Checklist holding on final flaps and yaw damper".
	Slow aircraft to VREF+20.	

Figure 20: Trans-Pacific Lear 35A Precision Approach SOPs.[125]

[125] Source: Trans-Pacific SOP Manual, Section 5.1.7. See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

EVENT	PF	PNF
Glideslope intercept.	"Glideslope capture, Flaps 40".	Verify that both glideslope indicators concur. Sets flaps to 40° down position. "Glideslope capture, flaps 40 set". Observe that flaps have moved to the 40° position. "Flaps 40 indicating".
	Slow aircraft to VREF+10.	
Aircraft is 1000 feet above DH.		"1000 above mins".
	"Continuing".	
Aircraft is 100 feet above DH.		"100 above mins".
	"Continuing".	
Runway environment is sighted.		"Runway in sight".
	"Landing".	
Aircraft reaches DH and runway environment is not in sight.		"Mins, runway not in sight".
	Initiate missed approach procedure. "Going missed".	Perform missed approach items as defined by Section 5.1.12 of this manual. Notify ATC of missed approach.
Aircraft reaches DH and approach light system is in sight.		"Mins, approach lights in sight".
	Continue to 100 feet above TDZE. "Continuing".	
50 feet AGL.	Begin gradual landing flare. As aircraft reaches 20 feet AGL: "Yaw away".	Disengage yaw damper. "Yaw away".

Figure 21: Trans-Pacific Lear 35A Precision Approach SOPs (continued).[126]

[126] Source: Trans-Pacific SOP Manual, Section 5.1.7. See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

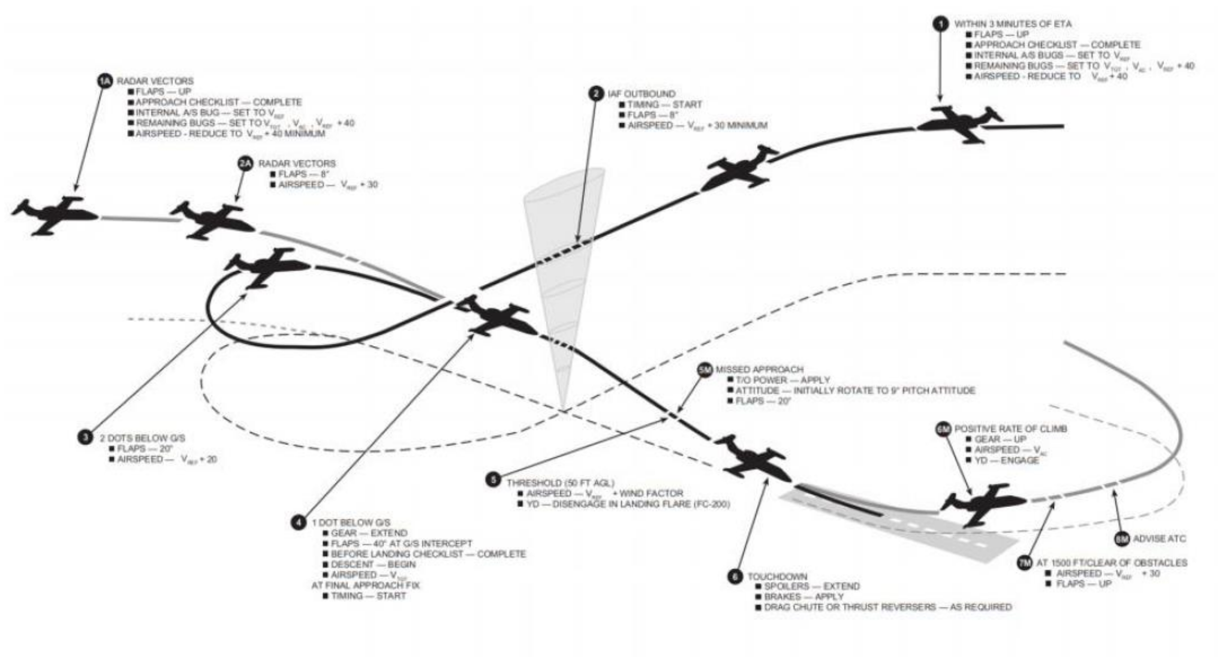

Figure 22: Trans-Pacific Lear 35A Precision Approach Profile.[127]

13.10 Visual Approach Profile

Following an intercept of the ILS 06 approach, the accident flight was cleared to begin a circle maneuver at the TORBY intersection.

[127] See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

EVENT	PF	PNF
Aircraft has been cleared the visual approach and approaches the traffic pattern.	Reduce speed to VREF+30.	
Aircraft enters traffic pattern at 1500 feet AGL and abeam the landing runway.	"Flaps 20".	Sets flaps to 20° down position. "Flaps 20 set". Observe that flaps have moved to the 20° position. "Flaps 20 indicating".
	"Gear down, Before Landing Checklist".	
	"Gear down, Before Landing Checklist".	Select landing gear handle to the down position. "Gear selected down". Verify that three green lights indicate that all landing gear have deployed to the down position and locked. "Three green, no red".
	Verify three green, no red lights indicating for landing gear. "Three green, no red".	Performs Before Landing Checklist as a challenge and self-response checklist, holding on flap movement. "Before Landing Checklist holding on final flaps and yaw damper".
	Slow aircraft to VREF+20.	

Figure 23: Trans-Pacific Lear 35A Visual Approach SOPs.[128]

EVENT	PF	PNF
Aircraft is established on final approach to landing runway.	"Flaps 40".	Sets flaps to 40° down position. "Flaps 40 set". Observe that flaps have moved to the 40° position. "Flaps 40 indicating".
	Slow to VREF+10.	
50 feet AGL.	Begin gradual landing flare. As aircraft reaches 20 feet AGL: "Yaw away".	Disengage yaw damper. "Yaw away".

Figure 24: Tran-Pacific Lear 35A Visual Approach SOPS (continued).[129]

[128] Source: Trans-Pacific SOP Manual, Section 5.1.9. See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).
[129] Source: Trans-Pacific SOP Manual, Section 5.1.9. See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

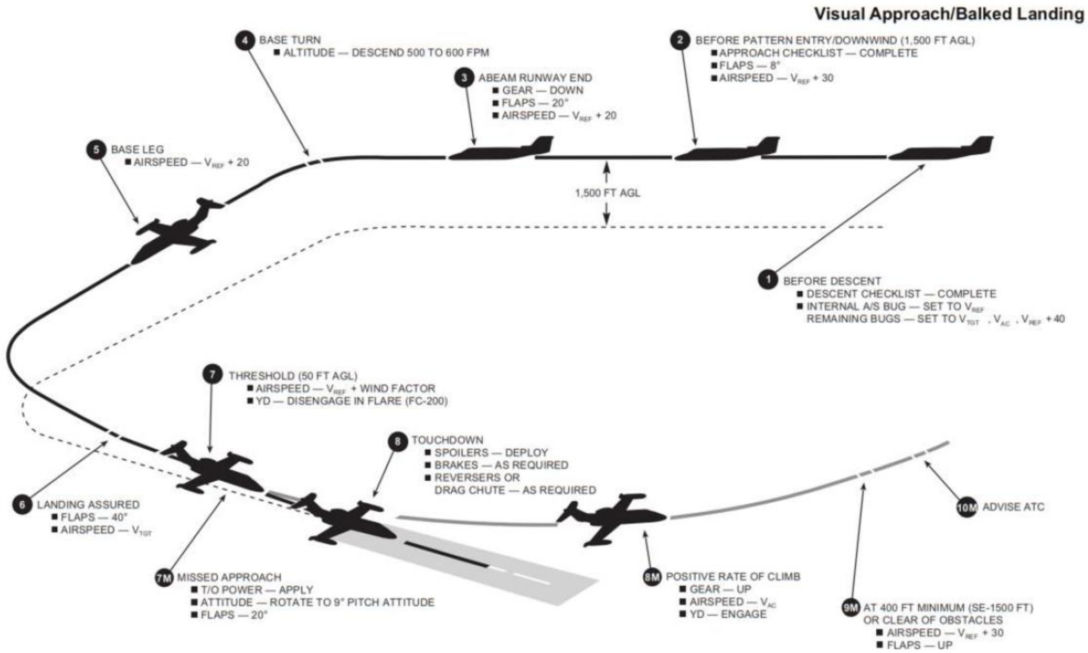

Figure 25: Tran-Pacific Lear 35A Visual Approach Profile.[130]

13.11 Stall Recovery

Procedures associated with the illumination of the L or R STALL Warning lights were defined in the CAE Lear 35/36 Operating Handbook. The procedure included the following note:

> *If the pusher is activated, or the aircraft is decelerating rapidly below shaker, priority must be given to immediately reducing the angle-of-attack rather than attempting to maintain altitude. If the aircraft is forced beyond the pusher angle-of-attack, a deep stall is possible, which may result in insufficient nose-down elevator authority to recover from a stall. In this event, retracting the flaps (if extended) may improve the elevator authority sufficiently to recover.*

[130] Source: Trans-Pacific SOP Manual, Section 5.1.9. See Attachment 16 - Trans-Pacific Lear 35A SOPs (Excerpts).

STALL WARNING ACTIVATES

(25) L STALL R STALL

The stall warning computer has sensed a limit angle of attack. The red STALL lights will flash, the control column stick shaker will activate, and the angle-of-attack indicators will be in the yellow segment. If the angle of attack continues to increase, the stick pusher will activate.

1. **Lower the pitch attitude to reduce angle of attack**
2. **Thrust Levers — Set to takeoff power**
3. **Level the wings**
4. **Accelerate out of the stall condition**

Figure 26: Lear 35A Stall Warning procedure.[131]

14.0 FAA

At the time of the accident, Trans-Pacific's Principal Base of Operations (PBO) was in HNL (effective April 5, 2016), and FAA oversight of the Trans-Pacific certificate was in the process of transferring from the VNY FSDO to the HNL FSDO beginning April 24, 2017.[132] According to a letter from Trans-Pacific to the FAA, dated March 15, 2017, the company's intent was to domicile employees primarily in HNL, with pilot domiciles remaining in VNY and SLC until Tran-Pacific gained Class III Navigation authority, whereby the majority of the company's flight operations would be conducted to and from HNL.[133]

The VNY FSDO retained oversight of the Trans-Pacific certificate prior to the accident, and the POI responsible for operational oversight was still located in VNY. On June 29, 2017, after the accident, the VNY FSDO released all documents related to Trans-Pacific to the HNL FSDO, and according to the FAA, transfer of operational oversight of Trans-Pacific to the HNL FSDO was completed July 14, 2017.

The VNY POI had overseen the Trans-Pacific certificate for about 5-6 years. According to the POI's interview, his primary method of conducting oversight was looking at the company records. He was not aware of Trans-Pacific's intent to establish an SMS program, and was not aware of the Trans-Pacific SIC-0 policy. The POI had observed the Trans-Pacific Basic Indoctrination Training from August 24, 2016 to August 26, 2016 in HNL, but had never observed a Trans-Pacific pilot check ride at CAE Simuflite.[134]

[131] Source: CAE Lear 35/36 Operating Handbook, page E-51.
[132] Source: Email to the NTSB from the FAA, dated September 18, 2017. The Trans-Pacific GOM still listed VNY as having oversight of the operations (Section 0.11, dated April 1, 2017).
[133] See Attachment 10 - FAA FSDO Correspondence.
[134] Source: Email to the NTSB from the FAA, dated September 18, 2017. At the time of the accident, the Trans-Pacific GOM still listed VNY as having oversight of the operations (Section 0.1.1, dated April 1, 2017). See also Attachment 1 – Interview Summaries.

The POI considered his working relationship with the Director of Operations at Trans-Pacific as "amicable," but stated that Trans-Pacific had "buried us [FAA] in paperwork" associated with the company's impending move of its operations to HNL. He had never done an enroute inspection on any Part 135 operator, stating that "the operator would not like it on a revenue flight, and it is also a one way, and they would have to commercial back. It was also an on-demand operation, so it would be difficult to schedule."[135] He added that "you would never really know if pilots were complying with SOPs for every flight," and the primary method of ensuring compliance with SOPs was through a line check for the Captain.

The POI said that there seemed to be a high turn-over rate of pilots at Trans-Pacific, and "that could be considered a red flag." The turn-over rate did not concern him, and he did not do anything special other than looking at the PRIA records.[136]

Following transfer of the certificate's oversight to the HNL FSDO, the FAA provided the following list to the NTSB of pending change items being reviewed on the Tran-Pacific certificate:

- Operations inspectors from HNL FSDO are scheduled to conduct validation test flights September 6-7, 2017. If the validation test flights are successful, 1QUA will be issued Operations Specification B036, Oceanic and Remote Continental Navigation Using Multiple Long-Range Navigation Systems (M-LRNS), for the Falcon AMD-50-50 aircraft.
- Airworthiness inspectors are waiting for Minimum Equipment List (MELs) manual revisions for the Lear LR-31-A, Lear LR-35-A, and Falcon AMD-50-50, but the MELs have not been submitted for review at this time.
- The current 1QUA POI is scheduled to observe Trans-Pacific's Basic Indoctrination Training on or about September 8 and 11, 2017, with follow-up check rides on September 13, 2017.

15.0 Independent Auditing

ARGUS, International, INC. (ARGUS), was an independent aviation audit company that maintained a database of participating operators in order to evaluate their history, pilot information, and aircraft information. According to it's website, "ARGUS International, Inc. (ARGUS) is a specialized aviation services company whose mission is to provide the aviation marketplace with data and information necessary to make informed decisions and manage risk."

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135 A review of FAA Safety Assurance System (SAS) records indicated no enroute inspections were conducted on Sunquest or Trans-Pacific between the dates of May 15, 2014 and June 1, 2017. The last SAS assessment of Trans-Pacific operations occurred on September 27, 2016 with "no issues or findings observed."

136 FAA Order 8900.279 (dated December 12, 2014) discusses the pilot record retention requirements of the Pilot Record Database (PRD) provision in the Airline Safety and Federal Aviation Administration (FAA) Extension Act of 2010 and the related requirements of the Pilot Records Improvement Act of 1996 (PRIA). The statute requires Title 14 of the Code of Federal Regulations (14 CFR) Part 119 certificate holders (all air carrier and operating certificate holders conducting operations under 14 CFR Parts 121, 125, and 135) to retain certain pilot training records and other records for entry into the PRD. Principal operations inspectors (POI) must review and evaluate their assigned part 119 certificate holder's records to ensure that the appropriate records are being retained.

The company used FAA and NTSB databases to verify the information they collected and monitored. Operators were rated in four categories; Does Not Qualify, Gold, Gold Plus, and Platinum. According to the ARGUS website, an ARGUS Gold rating was issued to operators for the following:

- Operating certificate for at least one year
- At least one turbine aircraft on certificate
- In-depth historical safety analysis
- Pilot background check and aircraft operational control validation

For a Gold Plus, the items included those for a Gold rating, including completing an ARGUS on-site audit with no safety of flight findings. For an ARGUS Platinum rating, it included those for a Gold Plus, including completing an ARGUS onsite audit with zero findings, and a functional SMS (Safety Management System) and emergency response plan.[137]

According to the Director of Operations, Trans-Pacific held a Gold rating with ARGUS prior to the accident. According to the ARGUS Director, Safety Analysis, Trans-Pacific's Gold rating was removed about an hour after the accident. He further said that ARGUS had never done an onsite audit on Trans-Pacific, which was not required for a Gold rating.

ARGUS also provided an audit program for charter brokers called the ARGUS Charter Broker Program. The ARGUS Certified Charter Broker Program contained two levels of recognition, ARGUS Registered and ARGUS Certified. A Registered Charter Broker provided ARGUS with documented proof of specific requirements, and annually pledges their commitment to adhering to industry best practices and applicable regulations. A Certified Charter Broker submitted the same documentation and annual pledge, and would undergo an on-site audit, once every two years to prove their compliance with industry best practices and applicable regulations. Any willful misrepresentation or proven violation of industry best practices or legal requirements could cause a company the loss of their ARGUS Registered or Certified status. ARGUS integrated those ratings with other web-sites that make charter broker information available to the public or marketplace.

According to ARGUS, the broker for the BED-PHL, JetSmarter, Inc., did not participate in the ARGUS Certified Charter Broker Program at the time of the accident.

16.0 Charter Broker

According to the Director of Operations, Trans-Pacific received their charter customers exclusively from several charter brokers. The Chief Pilot stated that the clients would contact the brokers, and the brokers would then contact Trans-Pacific since Trans-Pacific did not do any direct sales nor advertisements.

According to interviews, a customer contacted JetSmarter, Inc. via a mobile application (app) to arrange for a charter flight from BED-PHL. According to an email sent to the NTSB, JetSmarter

[137] Source: http://argus.aero/product/charter-operator-ratings/.

required the operators that operated flights for its members and customers to have either Argus Gold or Wyvern Wingman certifications.[138] Prior to the accident, JetSmarter had checked each operator's ratings prior to executing the charter agreement using Avinode search (the platform links to fleet-management software used by charter brokers, so the inventory is automatically tracked and uploaded, and the information is available to all subscribers).

According to JetSmarter, prior to reserving the May 15, 2017 charter flight with Trans-Pacific, JetSmarter utilized Avinode's operator database, according to which Trans-Pacific was rated Argus Gold and was Wyvern registered. JetSmarter then contacted Trans-Pacific to negotiate the charter on behalf of its customer.

JetSmarter had used Trans-Pacific for two prior charters: on February 1, 2017 for a SLC-TEX flight, and on May 6, 2017 for TEB-SDF-TEB flights. According to JetSmarter, neither of the flights had any issues, and JetSmarter was not aware of any safety issues or concerns related to Trans-Pacific prior to the accident. Following the accident, JetSmarter no longer reserves flights with Trans-Pacific.[139]

Following the accident, JetSmarter made several operational changes to increase accuracy of the data that it collected on the operators. JetSmarter has subscribed to Argus TripCheq and Wyvern Pass services. The charter team obtains a report on each operator prior to booking each charter flight to confirm that 1) the operator is either Argus Gold or Wyvern registered and 2) once the crew is assigned, that the crew meets recency experience, including total flight time and type of aircraft standards.

17.0 Past Recommendations

17.1 NTSB Report #AAR-10-02

On September 19, 2008, about 2353 eastern daylight time, a Bombardier Learjet Model 60, N999LJ, owned by Inter Travel and Services, Inc., and operated by Global Exec Aviation, overran runway 11 during a rejected takeoff at Columbia Metropolitan Airport, Columbia, South Carolina. The captain, the first officer, and two passengers were killed; two other passengers were seriously injured. The nonscheduled domestic passenger flight to Van Nuys, California, was operated under 14 *CFR* Part 135. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed.

The NTSB determined the probable cause(s) of this accident to be the operator's inadequate maintenance of the airplanes' tires, which resulted in multiple tire failures during the takeoff roll due to severe underinflation, and the captain's execution of a rejected takeoff (RTO) after V1, which was inconsistent with her training and standard operating procedures. A contributing factor included the flight crew's poor crew resource management (CRM).

<u>A-10-57</u>

[138] Source: Email to the NTSB from JetSmarter, dated November 3, 2017.
[139] Source: Email to the NTSB from JetSmarter, dated November 3, 2017.

TO THE FEDERAL AVIATION ADMINISTRATION: Require that pilots who fly in *CFR* Part 135 operations in aircraft that require a type rating gain a minimum level of initial operating experience, similar to that specified in 14 *CFR* 121.434, taking into consideration the unique characteristics of Part 135 operations.
Overall Status: Closed - Unacceptable Action

<u>A-10-58</u>
TO THE FEDERAL AVIATION ADMINISTRATION: Require that pilots who fly in 14 *CFR* Part 135 operations in an aircraft that requires a type rating gain a minimum level of flight time in that aircraft type, similar to that described in 14 *CFR* 121.434, taking into consideration the unique characteristics of Part 135 operations, to obtain consolidation of knowledge and skills.
Overall Status: Closed - Unacceptable Action

17.2 NTSB Report #AAR-11-01

On July 31, 2008, about 0945 central daylight time, East Coast Jets flight 81, a Hawker Beechcraft Corporation 125-800A airplane, N818MV, crashed while attempting to go around after landing on runway 30 at Owatonna Degner Regional Airport (OWA), Owatonna, Minnesota. The two pilots and six passengers were killed, and the airplane was destroyed by impact forces. The nonscheduled, domestic passenger flight was operating under the provisions of 14 *CFR* Part 135. An instrument flight rules flight plan had been filed and activated; however, it was canceled before the landing. Visual meteorological conditions prevailed at the time of the accident.

The NTSB determined that the probable cause of this accident was the captain's decision to attempt a go-around late in the landing roll with insufficient runway remaining. Contributing to the accident were (1) the pilots' poor crew coordination and lack of cockpit discipline; (2) fatigue, which likely impaired both pilots' performance; and (3) the failure of the Federal Aviation Administration (FAA) to require crew resource management (CRM) training and SOPs for 14 *CFR* Part 135 operators.

<u>A-11-020</u>
TO THE FEDERAL AVIATION ADMINISTRATION: Require 14 *CFR* Part 135 and 91 subpart K operators to establish, and ensure that their pilots adhere to, standard operating procedures.
Overall Status: Closed - Unacceptable Action

17.3 NTSB Report #AAR-10-01

On February 12, 2009, about 2217 eastern standard time, a Colgan Air, Inc., Bombardier DHC-8-400 (Q400),2 N200WQ, operating as Continental Connection flight 3407, was on an instrument approach to Buffalo-Niagara International Airport, Buffalo, New York, when it crashed into a residence in Clarence Center, New York, about 5 nautical miles northeast of the airport. The 2 pilots, 2 flight attendants, and 45 passengers aboard the airplane were killed, one person on the ground was killed, and the airplane was destroyed by impact forces and a postcrash fire. The flight, which originated from Liberty International Airport (EWR), Newark, New Jersey, was operating under the provisions of 14 Code of Federal Regulations (CFR) Part 121. Night visual meteorological conditions prevailed at the time of the accident.

The NTSB determined that the probable cause of this accident was the captain's inappropriate response to the activation of the stick shaker, which led to an aerodynamic stall from which the airplane did not recover. Contributing to the accident were (1) the flight crew's failure to monitor airspeed in relation to the rising position of the lowspeed cue, (2) the flight crew's failure to adhere to sterile cockpit procedures, (3) the captain's failure to effectively manage the flight, and (4) Colgan Air's inadequate procedures for airspeed selection and management during approaches in icing conditions.

A-10-013
TO THE FEDERAL AVIATION ADMINISTRATION: Issue an advisory circular with guidance on leadership training for upgrading captains at 14 Code of Federal Regulations Part 121, 135, and 91K operators, including methods and techniques for effective leadership; professional standards of conduct; strategies for briefing and debriefing; reinforcement and correction skills; and other knowledge, skills, and abilities that are critical for air carrier operations.
Overall Status: Open - Unacceptable Response

A-10-014
TO THE FEDERAL AVIATION ADMINISTRATION: Require all 14 Code of Federal Regulations Part 121, 135, and 91K operators to provide a specific course on leadership training to their upgrading captains that is consistent with the advisory circular requested in Safety Recommendation A-10-013.
Overall Status: Open - Unacceptable Response

A-10-015
TO THE FEDERAL AVIATION ADMINISTRATION: Develop, and distribute to all pilots, multimedia guidance materials on professionalism in aircraft operations that contain standards of performance for professionalism; best practices for sterile cockpit adherence; techniques for assessing and correcting pilot deviations; examples and scenarios; and a detailed review of accidents involving breakdowns in sterile cockpit and other procedures, including this accident. Obtain the input of operators and air carrier and general aviation pilot groups in the development and distribution of these guidance materials. (Supersedes Safety Recommendation A-07-8)
Overall Status: Open - Unacceptable Response

17.4 NTSB Report #AAR-6-03

On November 10, 2015, about 1453 eastern standard time, Execuflight flight 1526, a British Aerospace HS 125-700A (Hawker 700A), N237WR, departed controlled flight while on a nonprecision localizer approach to runway 25 at Akron Fulton International Airport (AKR) and impacted a four-unit apartment building in Akron, Ohio. The captain, first officer, and seven passengers died; no one on the ground was injured. The airplane was destroyed by impact forces and postcrash fire. The airplane was registered to Rais Group International NC LLC and operated by Execuflight under the provisions of 14 *CFR* Part 135 as an on-demand charter flight. Instrument meteorological conditions prevailed, and an instrument flight rules flight plan was filed. The flight departed from Dayton-Wright Brothers Airport, Dayton, Ohio, about 1413 and was destined for AKR.

The NTSB determined the probable cause(s) of this accident to be: the flight crew's mismanagement of the approach and multiple deviations from company standard operating procedures, which placed the airplane in an unsafe situation and led to an unstabilized approach, a descent below minimum descent altitude without visual contact with the runaway environment, and an aerodynamic stall. Contributing to the accident were Execuflight's casual attitude toward compliance with standards; its inadequate hiring, training, and operational oversight of the flight crew; the company's lack of a formal safety program; and the FAA's insufficient oversight of the company's training program and flight operations.

A-16-34
TO THE FEDERAL AVIATION ADMINISTRATION: Require all 14 *CFR* Part 135 operators to install flight data recording devices capable of supporting a flight data monitoring program.
Overall Status: Open - Acceptable Response

A-16-35
TO THE FEDERAL AVIATION ADMINISTRATION: After the action in Safety Recommendation A-16-34 is completed, require all 14 *CFR* Part 135 operators to establish a structured flight data monitoring program that reviews all available data sources to identify deviations from established norms and procedures and other potential safety issues.
Overall Status: Open - Acceptable Alternate Response

A-16-36
TO THE FEDERAL AVIATION ADMINISTRATION: Require all 14 *CFR* 135 operators to establish safety management system programs.
Overall Status: Open - Acceptable Response

A-16-041
TO THE FEDERAL AVIATION ADMINISTRATION: Review the Safety Assurance System and develop and implement procedures needed to identify 14 *CFR* Part 135 operators that do not comply with standard operating procedures.
Overall Status: Open - Acceptable Response

F. LIST OF ATTACHMENTS

Attachment 1 - Interview Summaries
Attachment 2 - Witness Statements
Attachment 3 - Flight Release
Attachment 4 - Pilot PRIA Records
Attachment 5 - Captain Records
Attachment 6 – Captain Previous Employer Records
Attachment 7 - SIC Records
Attachment 8 – Bombardier Learjet 35 Checklists
Attachment 9 – DUATS Flight Plan
Attachment 10 – FAA FSDO Correspondence
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Attachment 15 – Aircraft Logs
Attachment 16 – Trans-Pacific Lear 35A SOPs (Excerpts)
Attachment 17 – CAE Lear 35A Checklists
Attachment 18 – CEN17FA183 – TEB Simulator Observation
Attachment 19 – FAA Circle Approach Guidance
Attachment 20 – FAA TERPS Change 21
Attachment 21 – TEB Protected Airspace Charts
Attachment 22 – TEB ILS06 Flight Inspection
Attachment 23 - Trans-Pacific CRM Training
Attachment 24 – Party Forms

Submitted by:

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