Aviation Investigation Final Report

Location:	San Diego, California	**Accident Number:**	WPR21LA110
Date & Time:	February 13, 2021, 11:50 Local	**Registration:**	N823RC
Aircraft:	Dassault Falcon900EX	**Aircraft Damage:**	Substantial
Defining Event:	Runway excursion	**Injuries:**	5 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The flight crew was conducting a flight with two passengers and one flight attendant onboard the multiengine jet airplane. The flight crew later stated that at rotation speed, the captain applied back pressure to the control yoke; however, the nose did not rotate to a takeoff attitude. The captain attempted to rotate the airplane once more by relaxing the yoke then pulling it back again, and, with no change in the airplane's attitude, he made the decision to reject the takeoff by retarding the thrust levers and applying maximum braking. The airplane overran the end of the runway onto a gravel pad where the landing gear collapsed.

Continuity was confirmed from the flight controls to the control surfaces. No mechanical anomalies with the engines or airplane systems were noted during the investigation that would have precluded normal operation. A review of performance data indicated that the flight crew attempted to takeoff with the airplane 2,975 lbs over the maximum takeoff weight (MTOW), a center of gravity (CG) close to the most forward limit, and an incorrect stabilizer trim setting. The digital flight data recorder (DFDR) data indicated that the captain attempted takeoff at a rotation speed 23 knots (kts) slower than the calculated rotation speed for the airplane at maximum weight. Takeoff performance showed the departure runway was 575 ft shorter than the distance required for takeoff at the airplane's weight.

The captain, who was the pilot flying, did not hold any valid pilot certificates at the time of the accident because they had been revoked 2 years prior due to his falsification of logbook entries and records. Additionally, he had never held a type rating for the accident airplane and had started, but not completed, training in the accident airplane model before the accident. The first officer had accumulated about 16 hours of flight experience in the make and model of the airplane and was not authorized to operate as pilot-in-command.

The airplane's flight management system (FMS) data were not recovered; therefore, it could not be determined what data the flight crew entered into the FMS that allowed the airspeed numbers to be generated. The investigation revealed that had the actual performance numbers been entered, a "FIELD LIMITED" amber message would have illuminated warning the crew that the MTOW was exceeded, and airspeed numbers would not have been generated. Therefore, it is likely that the crew entered incorrect data into the FMS either by manually entering a longer runway length and/or decreased the weight of the fuel, passengers, and/or cargo.

Probable Cause and Findings

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

The flight crew's operation of the airplane outside of the manufacturer's specified weight and balance limitations and with an improper trim setting, which resulted in the airplane's inability to rotate during the attempted takeoff. Contributing to the accident, was the captain's lack of proper certification and the crew's lack of flight experience in the airplane make and model.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Understanding/comprehension - Copilot
Personnel issues	Performance calculations - Pilot
Personnel issues	Fuel planning - Pilot
Personnel issues	Weight/balance calculations - Pilot
Aircraft	Takeoff distance - Capability exceeded
Aircraft	CG/weight distribution - Capability exceeded
Aircraft	Stabilizer position ind system - Incorrect use/operation
Aircraft	Airspeed - Not attained/maintained
Aircraft	Configuration - Incorrect use/operation
Personnel issues	Qualification/certification - Pilot

Factual Information

History of Flight

Prior to flight	Preflight or dispatch event
Takeoff-rejected takeoff	Runway excursion (Defining event)
Takeoff-rejected takeoff	Collision with terr/obj (non-CFIT)

On February 13, 2021, about 1150 Pacific daylight time, a Dassault Falcon 900EX EASy, N823RC, was substantially damaged when it was involved in an accident in San Diego, California. The two pilots, flight attendant and two passengers were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

According to the flight crew, the accident flight was their third flight in the airplane. They planned to depart from runway 28R at Montgomery-Gibbs Executive Airport (MYF), San Diego, California, with a destination of Ellison Onizuke Kona International at Keahole (PHKO), Kailua/Kona, Hawaii. The captain was the pilot flying (PF), and the first officer was the pilot monitoring (PM). Both crewmembers reported that before departure, the airplane had no preflight anomalies, and all pre-takeoff checks, the engine start, taxi, and engine run-ups were normal. The first officer reported they planned for a maximum performance takeoff.

A review of the cockpit voice recorder (CVR) confirmed there were no anomalies with the airplane announced by the pilots during preflight or while taxiing to the runway. The automatic terminal information service was obtained at 1115:21 and the crew briefed the departure and general routing. The crew discussed fuel, stating, “19.5 required” and that they we’re going to burn “11.5,” but they had an extra “6 to 7 onboard.” At 1136:58 the crew performed the after-start/before-taxi checklist, which included a brief discussion on what the preferred trim setting should be and a comment stating, “we’re pretty far aft.” The airspeeds were acknowledged with the comment “green, 112.” The crew reviewed their departure plan and discussed their takeoff reject plan, including their intention not to reject the takeoff after reaching 80 kts. The crew then called the air traffic control tower at 1142:16 to request a momentary takeoff delay for a short field takeoff.

The takeoff was initiated at 1146:13. The crew noted the airspeed was alive, they cross-checked 80 kts, and the first officer stated they were committed to takeoff. The crew then called out, “V1”, and at 1146:52 the first officer called “rotate.” However, 7 seconds later, the captain responded that they “couldn’t take off.”

The first officer called for “thrust reversers,” and the captain stated that “he couldn’t,” followed by repeated exclamations of “we can’t.” Sounds consistent with the airplane departing the

paved runway surface were recorded, followed by several master caution aural alerts, and the captain stating, “kill it” just before the recording ended.

The airplane overran the departure end of the runway by about 315 ft and struck a berm, which sheared off all three-landing gear. The airplane slid an additional 230 ft and came to rest on a gravel overrun pad. The airplane sustained substantial damage to the wings and fuselage, and the fuel tanks were ruptured (see figure). Continuity was confirmed from the flight controls to the control surfaces, and significant fuel leakage was present, but no fire ensued.

Due to COVID restrictions, the National Transportation Safety Board (NTSB) did not travel to this accident, and data were gathered by responding representatives from the Federal Aviation Administration (FAA) and the airplane manufacturer, Dassault Aviation.

Figure - View of Airplane Damage (Source: FAA)

Pilot Information

Certificate:	None	**Age:**	52,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	September 1, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 8800 hours (Total, all aircraft), 1 hours (Total, this make and model)		

Co-pilot Information

Certificate:	Commercial; Flight instructor; Private	**Age:**	34,Male
Airplane Rating(s):	Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	November 18, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 29, 2020
Flight Time:	(Estimated) 567 hours (Total, all aircraft), 17 hours (Total, this make and model), 406 hours (Pilot In Command, all aircraft), 65 hours (Last 90 days, all aircraft), 24 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Captain

The captain stated he was employed directly by the owner of the airplane and had previously flown another airplane for the same owner. He reported having multiple type ratings in corporate jets. FAA safety inspectors, who arrived on scene the day of the accident, stated that when the captain was asked for his pilot certificate, he was not able to locate it but eventually produced a certificate later in the day after continued requests. The airplane type rating for the accident airplane was not listed, and a review of airmen records revealed that the FAA had issued an emergency revocation of all his certificates 2 years earlier on February 13, 2019.

FAA records indicated that the reason for the emergency revocation was because he had violated 14 *CFR* §61.59(a)(2) while employed as a check pilot for a Part 135 operator by falsifying logbook entries and records for pilot proficiency checks, competency checks, and training events on 15 separate occasions.

The captain stated that he used his tablet and Aircraft Performance Group (APG) performance data software to calculate performance and file the flight plan for the accident flight. When NTSB investigators asked the pilot for his tablet, he reported it was destroyed. He reported he could not recall any weight and balance or performance information from the accident flight and did not respond to any further correspondence.

The captain was enrolled for the DA-900EX EASy initial training on October 1, 2020, at Flight Safety International. He was not issued a type rating because he never finished the ground or flight simulator training although he attended the ground school portion of training.

First Officer

The first officer stated he was also employed directly by the owner of the accident airplane. Two years before the accident, he was hired as the owner's helicopter pilot and security specialist. When the accident airplane was purchased, he was offered the first officer position. At the time of the accident, he reported a total of 568 hours flight experience, which included 380 flight hours in helicopters.

According to Flight Safety International, the first officer was also enrolled for the DA-900EX EASy initial training on August 31, 2020. He completed training on September 28, 2020, and received his type rating with pilot-in-command limitations on his second checkride attempt. At the time of the accident, he had logged 16 hours in the Falcon 900EX EASy.

In an interview with NTSB investigators, the pilot stated that he confirmed the FMS inputs that were made by the captain but later revealed that he was not proficient regarding the FMS.

Aircraft and Owner/Operator Information

Aircraft Make:	Dassault	**Registration:**	N823RC
Model/Series:	Falcon900EX Easy	**Aircraft Category:**	Airplane
Year of Manufacture:	2008	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	201
Landing Gear Type:	Retractable - Tricycle	**Seats:**	13
Date/Type of Last Inspection:	June 18, 2020 Condition	**Certified Max Gross Wt.:**	49000 lbs
Time Since Last Inspection:		**Engines:**	3 Turbo fan
Airframe Total Time:	2914.9 Hrs	**Engine Manufacturer:**	Honeywell
ELT:	Installed, not activated	**Engine Model/Series:**	TFE 731-60-1C
Registered Owner:	Aerospike Iron Aero, LLC	**Rated Power:**	4750 Lbs thrust
Operator:	Aerospike Iron Aero, LLC	**Operating Certificate(s) Held:**	None

The airplane was manufactured in 2008, and its most recent annual inspection was completed June 18, 2020, at 2,977 total hours. The airplane was modified after delivery by a Supplemental Type Certificate (STC) No.ST02188SE held by Aviation Partners which consists of the addition of winglets. Such a modification changes the aircraft weight, balance, and trim settings according to the data provided by the STC holder in an AFM Supplement. Honeywell conducted a review of the central maintenance computer and found no anomalies with the engines or airplane systems that would have precluded normal operation. Similarly, a review of the DFDR and maintenance data recorder (MDR) revealed no mechanical anomalies.

The airplane was equipped with an FMS interfaced with the aircraft communications addressing and reporting system (ACARS), which sends information from the ground to the FMS for performance, weather, and flight planning.

According to the ACARS manufacturer, Collins Aerospace, data transmissions for the takeoff and landing data (TOLD) were available but were not utilized on the day of the accident. They reported that the same city pairing, KMYF – PHKO was entered into the FMS several days before. The investigation did not recover a paper copy of a TOLD card and was not able to retrieve performance data from the FMS at the accident site because power could not safely be applied to the airplane due to the fuel spill from the ruptured tanks.

With the airplane configured at slats/flaps 20° (SF2) and the available takeoff run of 4,598 ft, the maximum takeoff weight (MTOW) limit to depart was 45,064 lbs. According to the DFDR and data provided by the pilots, 20,500 lbs. of fuel was onboard. Therefore, based on aircraft loading, the actual takeoff weight was 48,039 lbs. Takeoff performance data showed the balance field length required at this weight was 5,173 ft.

The forward center of gravity (CG) limit per the STC Aircraft Flight Manual (AFM) was 15% for takeoff with SF2. The calculated CG for the accident flight, based on the seating location of the occupants, was 15.2%.

According to the STC AFM supplement, the recommended pitch trim position for a heavy gross weight takeoff with a forward CG is -7.5°. The pilots would visually see a configuration alert or a “NO TAKEOFF” warning if the stabilizer trim was outside of the green band (-4.5° to -7.5°). The DFDR indicated that the stabilizer trim was set at -5.73° and SF2 was selected. This was confirmed by physical examination after the accident.

According to the airplane manufacturer, an amber “FIELD LIMITED” message would illuminate on the TOLD page of the FMS if the MTOW is exceeded, and it would not compute takeoff speeds; therefore, no takeoff card would have been displayed for the crew. Under this condition, the crew would be unable to acknowledge the TOLD performance calculations, thus preventing the correct airspeed bugs (V1, Vr) from appearing on the airspeed tape. According to the airplane manufacturer, it is possible for the pilots to change FMS-suggested runway length or takeoff weight for the computation of takeoff speeds.

The DFDR data indicated that the captain attempted takeoff at a rotation speed (Vr) of 110 knots indicated airspeed (KIAS). At the airplane's MTOW, Vr was calculated to be 133 KIAS.

The data further indicated that rejected takeoff was initiated once the speed had reached 123 KIAS, and the maximum airspeed recorded was 127 KIAS. After the airplane decelerated to 102 KIAS and traveled 3,770 ft down the runway, the thrust reversers were fully deployed. The airplane exited the departure end of the runway at 75 KIAS and impacted a berm at 59 KIAS. The CVR, DFDR, and MDR showed that the engines, flight controls, and brakes were functioning.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KMYF,427 ft msl	**Distance from Accident Site:**	
Observation Time:	11:00 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered	**Visibility**	10 miles
Lowest Ceiling:	Broken / 2900 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.97 inches Hg	**Temperature/Dew Point:**	14°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Diego, CA	**Type of Flight Plan Filed:**	IFR
Destination:	Kailua/Kona, , HI (PHKO)	**Type of Clearance:**	IFR
Departure Time:		**Type of Airspace:**	Class D

Airport Information

Airport:	MONTGOMERY-GIBBS EXEC MYF	**Runway Surface Type:**	Asphalt
Airport Elevation:	427 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	28R	**IFR Approach:**	None
Runway Length/Width:	4598 ft / 144 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	3 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	5 None	**Latitude, Longitude:**	32.81511,-117.14104

Flight recorders

The airplane was equipped with an L3 SRVIVR series CVR that could record a minimum of 6 hours of digital data stored on solid-state modules. The CVR contained four channels of audio input: one channel for each flight crew, one spare channel (for an observer), and one channel for the cockpit area microphone (CAM). Upon arrival at the laboratory, it was evident that the CVR had not sustained any heat or structural damage and the audio information was extracted from the recorder normally without difficulty. The NTSB Vehicle Recorders Laboratory completed a summary report of the recorded audio.

The airplane was also equipped with a Honeywell ARFDR, 256wps DFDR that recorded about 27 hours of digital data stored using solid-state flash memory. The NTSB Vehicle Recorders Laboratory completed a specialist's report and found the recorder was in good condition and the data were extracted normally.

Additional Information

The Crew Operational Documentation for Dassault EASy aircraft (CODDE2) directs the pilot to set the trim indicator in the green band for takeoff and includes the following two notes:

NOTE

Appropriate position within this green band depends on location of airplane CG:

- ? Nose Up (NU) if airplane is balanced towards forward limits of CG envelope (i.e., if fuel tanks are fully loaded),
- ? Nose Down (ND) if airplane balanced aft.

NOTE

During take-off with heavy gross weight and forward CG, and if aircraft has not been trimmed toward nose-up limit of green take-off range, rotation may require full aft control yoke and a delay may be noticed between reaching full aft control and actual rotation."

According to the FAA's Aircraft Weight and Balance Handbook (FAA-H-8083-1-A), Chapter 10: Weight and Balance:

Loading in a nose-heavy condition causes problems in controlling and raising the nose, especially during takeoff and landing.

Administrative Information

Investigator In Charge (IIC):	Blum, Contessa
Additional Participating Persons:	Oded Moore; FSDO; San Diego, CA Jon Berges; FSDO; San Diego, CA David Studtmann; Honeywell; Phoenix, AZ
Original Publish Date:	June 8, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102629

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.