

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN23MA034

OPERATIONAL FACTORS/HUMAN PERFORMANCE

Group Chair's Factual Report

November 30, 2023

TABLE OF CONTENTS

ACCIDENT	4
OPERATIONAL FACTORS/HUMAN PERFORMANCE GROUP	4
SUMMARY	4
1.0 DETAILS OF THE INVESTIGATION	5
2.0 HISTORY OF FLIGHT.....	7
3.0 PILOT INFORMATION	9
3.1 B-17 Pilots	9
3.1.1 Pilot.....	9
3.1.1.1 Certification Records.....	9
3.1.1.2 Certification and Ratings Held at the Time of the Accident.....	12
3.1.1.3 Training and Proficiency Checks	13
3.1.1.4 Flight Times	13
3.1.2 Co-Pilot	14
3.1.2.1 Certification Records.....	14
3.1.2.2 Certification and Ratings Held at the Time of the Accident.....	15
3.1.2.3 Training and Proficiency Checks	16
3.1.2.4 Flight Times	17
3.2 P-63F Pilot.....	17
3.2.1 Certification Records.....	17
3.2.2 Certification and Ratings Held at the Time of the Accident.....	19
3.2.3 Training and Proficiency Checks	20
3.2.4 Statement of Aerobatic Competency	21
3.2.5 Flight Times	21
4.0 AIR BOSS.....	22
4.1 Training and Proficiency Checks.....	22
4.2 FAA Requirements.....	23
4.2.1 Air Boss Letter of Authorization (LOA).....	23
4.2.2 Air Show	23
4.3 Duties, Responsibility, and Authority	24
5.0 AIRPLANE INFORMATION	24

5.1	Boeing B-17 Flying Fortress	24
5.2	Bell P63-F Kingcobra.....	25
6.0	AIRPORT INFORMATION.....	26
6.1	NOTAMs	27
6.2	Air Show Area.....	30
7.0	CAF OVERVIEW.....	30
7.1	Exemption 6802.....	31
7.2	Safety Program.....	32
7.2.1	Safety Management System (SMS).....	32
7.2.2	Safety Culture.....	33
8.0	ICAS OVERVIEW.....	33
8.1	Confidential Reporting.....	33
8.2	Air Boss Recognition Program	34
8.3	Aerobatic Competency Evaluation Program	37
9.0	FAA OVERSIGHT.....	38
10.0	FAA GUIDANCE.....	40
10.1	Order 8900.1 Flight Standards Information Management System	40
10.1.1	Volume 5 Airman Certification.....	43
10.2	Showlines.....	45
10.3	Preshow Briefing	47
10.4	Flying Participants.....	48
10.5	Living History Flight Experience	49
10.5.1	Federal Register Living History Flight Experience.....	50
10.6	Certificate of Waiver or Authorization.....	53
10.6.1	Certificate of Waiver/Authorization Issuance and Oversight Procedures 54	
11.0	WINGS OVER DALLAS CERTIFICATE OF WAIVER	54
11.1	Special Provisions	56
	ATTACHMENTS	57

ACCIDENT

Location: Dallas, Texas
Date: November 12, 2022
Time: 1320 central standard time (CST)
1920 coordinated universal time (UTC)
Airplane 1: N7227C, Boeing B-17G, SN: 77235
Airplane 2: N6763, Bell P-63F, SN: 296E1-1R

OPERATIONAL FACTORS/HUMAN PERFORMANCE GROUP

Group Co-Chair	Shawn Etcher ¹ National Transportation Safety Board Washington, D.C.
Group Co-Chair	Sabrina Woods National Transportation Safety Board Washington, D.C.
Group Member	Mathew Rigsby ² Federal Aviation Administration (FAA) Dallas, Texas
Group Member	Bob Heath Commemorative Air Force Dallas, Texas

SUMMARY

On November 12, 2022, about 1320 CST, N6763, a Bell P-63F Kingcobra, and N7227C, a Boeing B-17G Flying Fortress, collided in mid-air while participating in the airshow, "Wings over Dallas," (WOD) at Dallas Executive Airport, Dallas Texas (RBD). Both airplanes were destroyed in the post-impact fire that ensued. The P-63F pilot and all 5 crewmembers aboard the B-17G were fatally injured. No ground injuries were reported. Both airplanes were owned by American Airpower Heritage Flying Museum and operated by volunteers of the Commemorative Air Force (CAF). The flight was operated under Title 14 *Code of Federal Regulations (CFR)* Part 91 with a Certificate of Waiver (CoW) for the airshow. Both flights originated at the RBD with an intended destination of the RBD.

¹ James VanDerKamp was the original group chairman for this event; however, preparing for his separation from the agency, the above was assigned on June 22, 2023.

² Stephen Simpson was originally assigned to the group while on scene; however, on June 22, 2023, Mr. Rigsby stated he would be the group member going forward.

1.0 DETAILS OF THE INVESTIGATION

November 12, 2022 - The Operational Factors investigator was assigned to the investigation and began collecting information.

November 13, 2022 - The Operational Factors investigator traveled to Dallas Executive Airport and participated in the organizational meeting as well as inspected the wreckage. The Operations group was formed and interviewed 4 of the aircrew that participated in the accident event: the P-51D pilot / fighter flight leader³, the B-24 pilot, the B-24 flight engineer, the B-24 copilot. The B-24 was second in the bomber string. In addition, the group conducted a brief interview with the airshow "Air Boss"⁴ who requested to continue the interview later when he could bring a representative.

November 14, 2022 - The Operations group interviewed 2 other pilots of the CAF at the Dallas Executive Airport, the pilot of P-51C, the second fighter in the fighter formation, and a P-63 pilot. The group collected CAF manuals. The group traveled to the Dallas Executive Airport Air Traffic Control Tower and listened to portions of the recording of the event which was recorded on the Clearance Delivery frequency 118.625 MHz⁵.

November 15, 2022 - The Operations group interviewed the pilot of a Stearman, N7058Q, that landed during the accident event and touched down just as the crash occurred. In addition, the group interviewed the CAF Chief Aviation Officer, the CAF Director of Operations, the FAA inspector in charge of the airshow, and the FAA inspector in charge in training.

November 16, 2022 - The Operations group interviewed 3 pilots of the CAF at the Dallas Executive Airport. Those interviewed were the pilot of a SB2C Helldiver at the Wings Over Houston (WOH) and the copilot of a C-47 at WOH who also flew the B-17 at the WOD airshow, another Air Boss, and the WOD Air Boss.

November 17, 2022 - The Operational Factors Group interviewed the observing Air Boss of the WOD airshow and a CAF pilot in both airshows, flying the C-47 and the B-17 at the WOH and also flew SB2C Helldiver in the WOD airshow on Saturday November 12, 2022.

³ Of note: The B-17 (accident airplane) was the flight lead for the bomber group.

⁴ Air Boss was defined as *"The individual who, under operational authority delegated to him or her by the responsible person, has primary responsibility for control of air show operations (does not include transient or nonparticipating aircraft) on the active taxiways, runways, and the air show demonstration area for coordination with the jurisdictional air traffic control facility and the IIC while the CoW and associated Class D Notice to Airmen [Airmission] or temporary flight restriction (TFR) is in effect..."*
Source: [Dynamic Regulatory System \(faa.gov\)](https://www.faa.gov/dynamic-regulatory-system)

⁵ Megahertz - a unit of measurement used to quantify the frequency of an electronic signal.

January 3, 2023 - The human performance specialist was assigned to the investigative team. Limited information relevant to the accident pilots' pre-accident activities and 72-hour history was available at this time.

January 10, 2023 - A certified copy of the air boss airshow audio recording was provided to the NTSB via email by Dallas Executive Airport - Federal Contract Tower (FCT). The investigative team met at the NTSB's Vehicle Recorders lab to transcribe the recording (see Air Boss Airshow Audio Recording).

April 17, 2023 - The investigative team met with the Vice President, Safety and Operations for International Council of Air Shows (ICAS). During the meeting, the team discussed the relationship between ICAS and the FAA, and the air boss recognition program and ICAS's role in it.

May 17, 2023 - The operational factors investigator and human performance specialist met with Experimental Aircraft Association's (EAA) Vice President, Industry & Regulatory Affairs, and several other members of the senior leadership team.

May 31, 2023 - The operational factors investigator and human performance specialist had a meeting with the former CEO and President of Sun 'n Fun Aerospace Expo and the Aerospace Center for Excellence, and with the Sun 'n Fun promoter who was also the deputy for the Association of Professional Operators of Warbirds.

June 22, 2023 - The above group chairman was assigned to the investigation and began the review of the information gathered to date⁶.

July 27, 2023 - The human performance specialist was able to attend AirVenture and directly observe the warbird performance air boss for that day. The purpose of the visit was to gain a first-hand account of how the air boss managed the prebrief, witness air boss and performer interactions, observe FAA engagement, and observe how the warbird demonstration portion of that day's airshow was conducted.

August 9, 2023 - The group reinterviewed the CAF Chief Safety Officer and the Air Boss for the Wings Over Dallas Airshow.

August 10, 2023 - The group reinterviewed the CAF Director of Operations (DO), the two pilots in trail of the B-17, another pilot that flew the B-17 the morning of the accident, and the Wings Over Dallas airshow coordinator.

⁶ The original Operational Factors Investigator that was assigned to the case and took part in the initial launch and data collection period left the agency June 26, 2027 and a new investigator was assigned.

September 1, 2023 - The group interviewed the Vice President of Safety and Operations with ICAS via Zoom.

September 14, 2023 - The group conducted a second interview with an observing air boss that was at Wings over Dallas, attended the morning briefing and was on the air stairs next to the air boss when the accident occurred. The interview was conducted via Zoom.

October 4, 2023 - The group reinterviewed the following FAA personnel, via Zoom, the Inspector in Charge of the Wings Over Dallas air show and the FAA inspector that was in training at the air show.

2.0 History of Flight

About 0800 on the day of the accident the Air Boss conducted a safety briefing. The briefing included the Air Boss conducting roll call of the required participants of the briefing. Subsequently, the Air Boss provided an overview of the show including, in part, the waiver, weather, airspace, and the sequence of the airshow. A review of the "Safety Briefing Signature Page for Aviation Events" for November 12, 2022 indicated that the pilots of the P-63 and B-17 signed in.

According to the Air Boss's Flight Demonstration Sequence sheet the airshow was to start at 1050 with the playing of the National Anthem. At 1100 the "Trainer Parade" which include PT-17, BT-13, T-6 and C-45 was to occur. At 1130 "Tora" was to begin, there was a handwritten note that during this time there would be "no tours." At 1200 the "Twisted Texan" followed by the "T-6 Formation" at 1215. At 1230 the "Cargos." At 1245 the "Trojan Phlyers" were to begin and there was a handwritten note that during this 15-minute demonstration there would be "no tours." At 1305 the "Warbirds" which included "Bombers Launch," "Fighters Launch", and "Passes per AB." Approximately 15 minutes later "Launch B-29, "Passes per AB", "Arsenal of Democracy" "GF & P-63 Acro during recovery," and "Redtail Acro." The final demonstration was to occur at 1350 with the "Missing Man."

The following timeline was obtained from ADS-B⁸ data, see Section 6.0 of this report for the RBD airport diagram:

About 1257 N7227C (B-17) began to taxi from its parking position on runway 17/35. The airplane taxied via taxiway "C," taxiway "B," taxiway "A4", taxiway "A" and then taxiway "A1" to the hold short line of runway 31.

⁷ Tora Tora Tora was a scripted air demonstration sequence.

⁸ Automatic Dependent Surveillance Broadcast

At 1304:50 N7058Q⁹ a Stearman biplane, with a pilot and passenger, departed runway 31 and about 24 seconds later began a turn to the southwest and then to the south and climbed to about 1,600 ft above mean sea level (msl).

At 1309:12, N7227C (B-17) began to taxi onto runway 31, subsequently began the departure roll, and becoming airborne at 1310:29.

At 1309:14 and about 5 nm from the airport, the Stearman began a turn to the east and southeast for about 5 nm then flew northeast and joined an approximately 5 nm final to land on runway 31.

At 1311:16, N7227C (B-17) began a right turn towards the north and subsequently continued the turn to the southeast.

At 1312:40, N7227C (B-17) began a right turn to the south southwest overflying the airport near the intersection of runway 13/31 and 17/35. Over the course of the next 9 minutes, N7227C made at least four passes parallel to and to the south of runway 13/31.

At 1314:51, N6763 (P-63) began the departure roll from runway 31.

At 1315:04, N6763 (P-63) became airborne and conducted a right turn to the north and subsequently to the east.

At 1316:11 and approximately 1 1/2 nm to the northeast, N6763 (P-63) began a right turn towards the south then a left turn towards the west-southwest, the airplane overflew near the intersection of runway 13/31 and 17/35. The airplane continued on a west-southwest ground track until approximately 1 nm southwest of the airport where it began a left turn and subsequently flew parallel to and south of runway 13/31.

At 1319:16, N6763 (P-63) began a left turn towards the south and then a right turn towards the airport, flew parallel to and south of runway 31, remaining within 1 1/2 nm of the airport.

At 1320:45, N6763 (P-63) began a right turn towards the south, flew to approximately 2 nm to the south of the airport and began a left turn to the north towards the airport.

At 1321:49, N7058Q (Stearman) crossed the runway 31 landing threshold. The last data point recorded was at 1321:54 on runway 31 near the intersection of taxiway "A1".

⁹ N7058Q was a Boeing A75N1(PT17) fixed wing single-engine airplane, it was also known as a Stearman and will be referenced in the report as a Stearman.

At 1321:53, and approximately one-half nm from the intersection of runway 13/31 and 17/35, N7227C (B-17) and N6763 (P-63) were southeast of the airport on a ground track to the northwest and north respectively. That was the last ADS-B data recorded from either airplane.

3.0 Pilot Information

3.1 B-17 Pilots

3.1.1 Pilot

The pilot, age 66, held an Airline Transport Pilot (ATP) certificate with a rating for multiengine land, commercial pilot privileges for airplane single-engine land and sea; glider, and type ratings on the A-320¹⁰, B-17¹¹, B-727¹², B-737¹³, B-757¹⁴, B-767, B-777¹⁵, B-787¹⁶, DC-3¹⁷, EMB-145¹⁸, FK-100¹⁹, MD-11²⁰. He held an FAA first-class medical certificate dated September 2, 2022, with limitations of *"Must have available glasses for near vision."*

3.1.1.1 Certification Records

FAA records of the pilot indicated the following certificate history:

¹⁰ Airbus SAS, A-318 Series, A-319 Series, A-320 Series, A-321 Series. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹¹ The Boeing Company, B-17, B-B-17. Sources: FAA Order 8900.1 Figure 5-88 dated July 15, 2019.

¹² The Boeing Company, B-727, B-727-100, B-727-200. Source: FAA Order 8900.1, Figure 6-88, dated July 15, 2019.

¹³ The Boeing Company, 737-100, 737-200, 737-200C, 737-300, 737-400, 737-500, 737-600, 737-700, 737-700C, 737-800, 737-900, 737-900ER, 737-8, 737-9. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹⁴ The Boeing Company, 757-200 Series, 757-200PF Series, 757-200CB Series, 757-300 Series, 767-200 Series, 767-300 Series, 767-300F Series, 767-400ER Series, 767-2C Series. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹⁵ The Boeing Company, 777-200 Series, 737-300 Series, 737-300ER Series, 777-200 LR Series, 777F Series. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹⁶ The Boeing Company, 787-8, 787-9, 787-10. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹⁷ The Boeing Company, DC3-G102, DC3-G102A, DC3-G103A, DC3-G202A, DC3A-SCG, DC3A-SC3G, DC3A-S4C4G, DC3C-SC3G, DC3C-S1C3G, DC3C-R-1830-90C, DC3D-R-1830-90C. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹⁸ Embraer S.A., EMB-135ER, EMB-135LR, EMB-135KE, EMB-135KL, EMB-135BJ, EMB-145, EMB-145ER, EMB-145MR, EMB-145LR, EMB-145XR, EMB-145MP, EMB-145EP. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

¹⁹ Fokker, Netherlands, Fokker 28Mk 0100. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

²⁰ The Boeing Company, MD-10-10F, MD-10-30F, MD-11, MD-11F. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

Private Pilot - Airplane Single-Engine Land certificate issued on April 11, 1974.

Commercial Pilot - Airplane Single-Engine Land certificate issued on May 20, 1975.

Commercial Pilot - Airplane Single-Engine Land, Instrument - Airplane certificate issued on November 28, 1975²¹.

Flight Instructor - Airplane Single Engine certificate issued on February 6, 1976.

Ground Instructor - Basic Ground Instructor certificate issued on February 6, 1976.

Flight Instructor - Airplane Single Engine, Instrument- Airplane certificate issued on January 14, 1977.

Commercial Pilot - Airplane Single and Multiengine Land, Instrument Airplane certificate issued on March 8, 1977.

Flight Instructor - Airplane Single & Multiengine, Instrument - Airplane certificate issued on January 31, 1979. Reissued as a "Gold Seal Certificate" on April 8, 1980, April 9, 1982, March 16, 1984, March 13, 1986, March 18, 1988, March 30, 1990, March 23, 1992, March 8, 1994, March 21, 1996, March 31, 1998, March 16, 2000, March 21, 2002, March 26, 2024, March 17, 2006, March 25, 2008, March 15, 2010, March 20, 2012, March 19, 2014, March 15, 2016, March 18, 2018, March 11, 2020, March 10, 2022.

Airline Transport Pilot - Airplane Multiengine Land, Commercial Privileges Airplane Single Engine Land certificate issued on November 28, 1979.

Ground Instructor - Advanced Instrument certificate issued on April 8, 1980.

Flight Engineer - Turbojet Powered; Limitations: "This certificate is subject to the provisions of Exemption No. 2095²²" certificate issued March 27, 1986.

Flight Engineer- Turbojet Powered certificate issued April 30, 1986.

²¹ According to FAA records prior to the application for this rating the pilot answered "Yes" to the application Section 1, question M of "Have you had an airman certificate denied, suspended, or revoked?" The pilot reported that the Private pilot certificated had been "suspended 30 days." A review of his CAF records (see Operational Factors Attachment 6 - "B-17 Pilots CAF Training Records) the pilot reported "As a 100 hour private pilot had a radio failure at an airport with a control tower. According to the controller I mishandled the issue."

²² Exemption No. 2095 was an exemption granted by the FAA to Sierra Academy of Aeronautics to "conduct training and checking of flight engineer candidates on the normal procedures portion of the practical test in an approved simulator." Source FAA Regulatory Docket No. 25210 [FAA-2021-0389-0001 attachment 1.pdf](#)

Airline Transport Pilot - Airplane Multiengine Land, B-727, Commercial Privileges Airplane Single-Engine Land certificate issued on January 11, 1992.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, Commercial Privileges Airplane Single-Engine Land certificate issued on May 8, 1994.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, Commercial Privileges Airplane Single-Engine Land certificate issued on September 22, 1996.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, Commercial Privileges Airplane Single-Engine Land certificate issued on December 9, 1996.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, Commercial Privileges Airplane Single-Engine Land, Limitations: B-777 Valid for FAR 121.543 (b)(3)(i) certificate issued on October 20, 1998.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737 Commercial Privileges Airplane Single-Engine Land, Limitations: B-737 B-777 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA. certificate issued on October 24, 2003.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, Commercial Privileges Airplane Single-Engine Land; Glider, Limitations: B-737 B-757 B-767 B-777 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA, English Proficient certificate issued on January 19, 2012.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, A-320, Commercial Privileges Airplane Single-Engine Land; Glider, Limitations: A-320, B-737 B-757 B-767 B-777 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA, English Proficient certificate issued on October 4, 2013.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, A-320, Commercial Privileges Airplane Single-Engine Land; Airplane Single-Engine Sea; Glider, Limitations: A-320 B-737 B-757 B-767 B-777 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA, English Proficient certificate issued on November 3, 2018.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, A-320, B-787, Commercial Privileges Airplane Single-Engine Land; Airplane Single-Engine Sea; Glider, Limitations: A-320 B-737 B-757 B-767 B-777

B-787 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA, English Proficient certificate issued on March 8, 2019.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, A-320, B-787, DC-3, Commercial Privileges Airplane Single-Engine Land; Airplane Single-Engine Sea; Glider, Limitations: DC-3 SIC Privileges Only, A-320 B-737 B-757 B-767 B-777 B-787 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA, English Proficient certificate issued on December 12, 2019.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, A-320, B-787, DC-3, EMB-145, Commercial Privileges Airplane Single-Engine Land; Airplane Single-Engine Sea; Glider, Limitations: DC-3 SIC Privileges Only, A-320 B-737 B-757 B-767 B-777 B-787 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at AALA, English Proficient certificate issued on May 2, 2022.

Airline Transport Pilot - Airplane Multiengine Land, B-727, MD-11, B-17, FK-100, B-777, B-737, B-757, B-767, A-320, B-787, DC-3, EMB-145, Commercial Privileges Airplane Single-Engine Land; Airplane Single-Engine Sea; Glider, Limitations: A-320 B-737 B-757 B-767 B-777 B-787 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at American Airlines Inc., English Proficient certificate issued on September 13, 2022.

3.1.1.2 Certification and Ratings Held at the Time of the Accident

AIRLINE TRANSPORT PILOT (Issued September 13, 2022)

Airplane Multiengine Land

A-320, B-17, B-727, B-737, B-757, B-767, B-777, B-787, DC-3, EMB-145, FK-100, MD-11

Commercial Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider

Limitations: English Proficient, A-320 B-737 B-757 B-767 B-777 B-787 Circ Apch-VMC Only, B-777 Valid for FAR 121.543 (b)(3)(i) operations at American Airlines, Inc.

FLIGHT ENGINEER (dated April 30, 1986)

Flight Engineer- Turbojet Powered

FLIGHT INSTRUCTOR (dated January 31, 1979)

Airplane Single-Engine

Airplane Multiengine

Instrument - Airplane

MEDICAL CERTIFICATE FIRST-CLASS (issued September 2, 2022)

Limitations: Must have available glasses for near vision.

3.1.1.3 Training and Proficiency Checks

The following training record information was provided by the Commemorative Air Force:

Most Recent Biennial Flight Review	May 2021
Date of Most Recent Type Rating Checkride ²³	September 12, 2022
Most Recent Flight Training ²⁴	September 21, 2022
Most recent Ground Training Completion Date ²⁵	September 23, 2022
Most recent Crew Resources Management ²⁶	January 29, 2022

A review of the CAF LHFE²⁷ Maneuvers, the flight training form included 11 areas for observation each of the areas contained one to seven topics. Of those 11 areas, six were marked with an "S" on at least one of the topic areas. The other five areas were marked with an "X." The six areas covered were: Preflight, Takeoffs, Airshow Training, Air Drop Operations, Landings, Post Flight and Miscellaneous.

3.1.1.4 Flight Times

The pilot's approximate flight times were based on Commemorative Air Force and FAA records:

Previous 24 hours	0:00
Previous 30 days	1.7
Total Hours B-17 ²⁸	500
Total Hours CAF	464.2
Total Hours B-17 PIC ²⁹	450
Total Hours PIC	24,000
Total Flight Hours	28,000

²³ The observation was conducted in a C-47/C-53/R4D/DC-3 airplane and the instructor comments included "FAA type rating check-ride completed."

²⁴ The flight training was 0.8 hours of total flight time and included two endorsements: "Senior Pilot" and "2 ship formation." Additionally, the instructor comments included "FAA type rating check-ride completed."

²⁵ Ground training included 22 subjects of which all were marked as "completed."

²⁶ Crew Resources Management records indicated the training was 6.0 hours in length.

²⁷ Living History Flight Experience.

²⁸ Source: National Transportation Safety Board Pilot/Operator Aircraft Accident/Incident Report.

²⁹ Source: National Transportation Safety Board Pilot/Operator Aircraft Accident/Incident Report.

3.1.2 Co-Pilot

The co-pilot, age 67, held an ATP certificate with a rating for multiengine land, commercial pilot privileges for airplane single-engine land; rotorcraft - helicopter; glider aero tow, and type ratings on the A-310³⁰, B-757, B-767, B-777, DC-9³¹, FK-100. He held an FAA first-class medical certificate dated October 21, 2022, with limitations of *"Must have corrective lenses, possess glasses for near/intermediate vision."*

3.1.2.1 Certification Records

FAA records of the co-pilot indicated the following certificate history:

Notice of Disapproval - Private Pilot Airplane Single-Engine Land was issued on April 18, 1977. Unsatisfactory items: *"Complete Flight Test."*

Private Pilot - Airplane Single-Engine Land certificate was issued on April 30, 1977.

Private Pilot - Airplane Single-engine Land, Instrument - Airplane certificate was issued on February 9, 1979.

Commercial Pilot - Airplane Single-Engine Land, Instrument - Airplane certificate was issued on March 27, 1979.

Commercial Pilot - Airplane Single- & Multiengine Land, Instrument - Airplane certificate was issued on August 6, 1979.

Flight Instructor - Airplane Single-Engine certificate was issued on February 17, 1980.

Flight Instructor - Airplane Single-Engine, Instrument - Airplane certificate was issued on March 22, 1980.

Flight Engineer - Turbojet Powered certificate was issued on October 21, 1980.

Mechanic - Powerplant certificate was issued on May 21, 1981.

Mechanic - Airframe - Powerplant certificate was issued on June 17, 1981.

³⁰ Airbus SAS A300, Model B4-601; A300, Model B4-603; A300, Model B4-620; A300, Model B4-605R; A300, Model B4-622R; A300, Model F4-605R; A300, Model F4-622R; A300, Model C4-605R Variant F; A300, Model B4-622; A310, Model 204; A310, Model 221; A310, Model 222; A321, Model 324; A310, Model 304; A310, Model 325. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

³¹ The Boeing Company DC-9-11, DC-9-12, DC-9-13, DC-9-14, DC-9-15, DC-9-15F, DC-9-21, DC-9-31, DC-9-32, DC-9-32F, DC-9-33F, DC-9-34, DC-9-34F, DC-9-41, DC-9-51, DC-9-81, DC-9-82, DC-9-83, DC-9-87, MD-88, MD-90-30, 717-200. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

Flight Instructor - Airplane Single & Multiengine, Instrument - Airplane certificate was issued on December 7, 1982. Reissued on July 30, 1985, September 24, 1987, October 12, 1989, October 22, 1991, October 29, 1993, October 31, 1995, October 27, 1997, October 30, 1999, January 16, 2012, January 15, 2014, December 22, 2015, January 2, 2018, January 24, 2020, and January 24, 2022.

Ground Instructor - Advance, Instrument certificate was issued on December 8, 1982.

Airline Transport Pilot - Airplane Multiengine Land; Commercial Privileges - Airplane Single-Engine Land certificate was issued on January 3, 1983.

Airline Transport Pilot - Airplane Multiengine Land; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft Helicopter certificate was issued on June 27, 1984.

Airline Transport Pilot - Airline Multiengine Land; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider - Aero Tow Only certificate was issued on September 11, 1984.

Airline Transport Pilot - Airline Multiengine Land, B-757, B-767; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider - Aero Tow Only certificate was issued on March 4, 1989.

Airline Transport Pilot - Airline Multiengine Land, B-757, B-767, DC-9; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider - Aero Tow Only certificate was issued on March 28, 1990.

Airline Transport Pilot - Airline Multiengine Land, B-757, B-767, DC-9, FK-100; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider - Aero Tow Only certificate was issued on September 8, 1991.

Airline Transport Pilot - Airline Multiengine Land, B-757, B-767, DC-9, FK-100, A-310; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider - Aero Tow Only certificate was issued on March 30, 1996.

Airline Transport Pilot - Airline Multiengine Land, B-757, B-767, DC-9, FK-100, A-310, B-777; Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider - Aero Tow Only certificate was issued on April 25, 1998.

3.1.2.2 Certification and Ratings Held at the Time of the Accident

AIRLINE TRANSPORT PILOT (Issued April 24, 1998)
Airplane Multiengine Land

A-310, B-757, B-767, B-777, DC-9, FK-100
Commercial Privileges Airplane Single-Engine Land, Rotorcraft - Helicopter, Glider -
Aero Tow Only

FLIGHT ENGINEER (dated October 21, 1980)

Flight Engineer- Turbojet Powered

FLIGHT INSTRUCTOR (original issuance dated December 7, 1982)

Airplane Single-Engine

Airplane Multiengine

Instrument - Airplane

MECHANIC (issued June 17, 1981)

Airframe - Powerplant

MEDICAL CERTIFICATE FIRST-CLASS (issued October 21, 2022)

Limitations: Must wear corrective lenses, possess glasses for near/intermediate vision.

3.1.2.3 Training and Proficiency Checks

The following training record information was provided by the Commemorative Air Force:

Date of Most Recent FAA Flight Review	March 2022
Most Recent Flight Training ³²	March 4, 2022
Most recent Ground Training Completion Date ³³	January 30, 2022
Most recent Crew Resources Management ³⁴	January 29, 2022

A review of the CAF LHFE Maneuvers, the flight training form included 11 areas for observation. Each of the areas contained one to seven topics. Of those 11 areas, 6 were marked with an "S" on at least one of the topic areas. The other five areas were marked with an "X." The six areas covered were: Preflight, Takeoffs, Airwork, Landings, Post Flight and Miscellaneous.

³² The flight training was conducted in a C-45 airplane.

³³ Ground training included 22 subjects of which all were marked as "completed."

³⁴ Crew Resources Management records indicated the training was 6.0 hours in length.

3.1.2.4 Flight Times

The co-pilot's approximate flight times were based on Commemorative Air Force and FAA records:

Previous 24 hours	0.0
Previous 30 days	0.3
Total Hours B-17	90.0
Total Hours CAF	119.6
Total Hours B-17 PIC	0.0
Total Hours SIC	5,300
Total Hours PIC ³⁵	20,000
Total Flight Hours ³⁶	25,300

3.2 P-63F Pilot

The pilot, age 63, held an ATP certificate with a rating for multiengine land, commercial pilot privileges for airplane single-engine land; airplane single-engine sea; glider, and type ratings on the B-737, B-777, DA-50³⁷; DA-EASY³⁸. Authorized Experimental Aircraft³⁹ BL-P39⁴⁰, BL-P63⁴¹, CU-P40⁴² (VFR ONLY). He held an FAA first-class medical certificate dated November 1, 2022, with limitations of "None."

3.2.1 Certification Records

FAA records of the pilot indicated the following certificate history:

Private Pilot - Airplane Single-Engine Land certificate was issued on January 28, 1977.

Private Pilot - Airplane Single-Engine Land, Instrument certificate was issued on October 7, 1977.

³⁵ Of note, the operator's "National Transportation Safety Board Pilot/Operator Aircraft Accident/Incident Report" listed the pilot as having 22,000 total hours of flight experience as pilot-in-command but also listed zero (0) hours as pilot-in-command in the B-17.

³⁶ Flight time was based on FAA Form 8710-1 which was completed on January 2, 2022 for the reissuance of the pilot's flight instructor certificate.

³⁷ Dassault Aviation Mystère Falcon 50, Mystère Falcon 900, Falcon 900EX. Source : FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

³⁸ Dassault Aviation DA-900DX, DA-900LX, DA-900EX EASy. Source: FAA Order 8900.1, Figure 5-88, dated July 15, 2019.

³⁹ A special airworthiness certificate to operate an aircraft that does not have a type certificate or does not conform to its type certificate and is in a condition for safe operation. Source: [Experimental Category | Federal Aviation Administration \(faa.gov\)](#)

⁴⁰ Bell P-39 Airacobra. Source: [Bell P-39 Airacobra - fighter \(aviastar.org\)](#)

⁴¹ Bell P-63 Kingcobra. Source: [Bell P-63 Kingcobra - fighter, attacker \(aviastar.org\)](#)

⁴² Curtiss P-40 Warhawk. Source: [Curtiss P-40 Warhawk - fighter \(aviastar.org\)](#)

Notice of Disapproval - Commercial Pilot Airplane Single-Engine Land was issued on December 7, 1977. Unsatisfactory Items: Pilot Operations 4.

Commercial Pilot - Airplane Single-Engine Land, Instrument Airplane certificate was issued on December 10, 1977.

Notice of Disapproval - Flight Instructor - Airplane was issued on March 23, 1978. Unsatisfactory items: Item V. Analysis of standard flight training procedures and maneuvers.

Flight Instructor - Airplane Single-Engine certificate was issued on March 27, 1978. Reissued March 28, 1980.

Ground Instructor - Basic Ground Instructor certificate was issued on March 27, 1978.

Commercial Pilot - Airplane Single- and Multiengine Land, Instrument Airplane certificate was issued on June 25, 1978.

Flight Instructor - Airplane Single-Engine, Instrument - Airplane certificate was issued on June 30, 1980. Reissued: June 25, 1982, July 27, 2005, June 18, 2007, June 9, 2009, May 16, 2011, May 23, 2013.

Flight Instructor - Airplane Single-Engine, Airplane Multiengine, Instrument- Airplane certificate was issued on June 6, 2014. Reissued: April 20, 2016, June 7, 2018, May 11, 2020, May 26, 2022.

Airline Transport Pilot - Airplane Multiengine Land, Commercial Privileges Airplane Single-Engine Land certificate was issued on November 16, 1984.

Flight Engineer - Turbojet Powered certificate was issued on October 18, 1985.

Airline Transport Pilot - Airplane Multiengine Land, Commercial Privileges Airplane Single-Engine Land, Glider - Aero Tow Only certificate was issued on August 24, 1989.

Airline Transport Pilot - Airplane Multiengine Land, B-737, Commercial Privileges Airplane Single-Engine Land, Glider; Limitations: B-737 Circ Apch - VMC Only certificate was issued on November 11, 1999.

Airline Transport Pilot - Airplane Multiengine Land, B-737, Commercial Pilot Privileges, Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient, B-737 Circ Apch VMC Only certificate was issued on April 3, 2013.

Airline Transport Pilot - Airplane Multiengine Land, B-737, DA-50, Commercial Pilot Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient; B-737 Circ. Apch. - VMC Only, DA-50 SIC Privileges Only certificate was issued on February 20, 2015.

Airline Transport Pilot - Airplane Multiengine Land, B-737, DA-50, Commercial Pilot Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient; B-737 Circ. Apch. - VMC Only, DA-50 SIC Privileges Only; Authorized Experimental Aircraft: BL-P39/BL-P63 certificate was issued on March 12, 2016.

Airline Transport Pilot - Airplane Multiengine Land, B-737, DA-50, Commercial Pilot Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient; B-737 Circ. Apch. - VMC Only, DA-50 SIC Privileges Only; Authorized Experimental Aircraft: BL-P39 BL-P63, CU-P40, CU-P40 (VFR ONLY) certificate was issued on January 10, 2019.

Airline Transport Pilot - Airplane Multiengine Land, B-737, DA-50, DA-EASY, Commercial Pilot Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient; B-737 Circ. Apch. - VMC Only; DA-EASY, DA-50 SIC Privileges Only; Authorized Experimental Aircraft: BL-P39 BL-P63, CU-P40, CU-P40 (VFR ONLY) certificate was issued on August 21, 2019.

Airline Transport Pilot - Airplane Multiengine Land, B-737, B-777, DA-50, DA-EASY, Commercial Pilot Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient; B-777, B-737 Circ. Apch. - VMC Only; DA-EASY, DA-50 SIC Privileges Only; Authorized Experimental Aircraft: BL-P39 BL-P63, CU-P40, CU-P40 (VFR ONLY) certificate was issued on December 31, 2019.

Remote Pilot - Small Unmanned Aircraft System certificate was issued on February 9, 2022.

Airline Transport Pilot - Airplane Multiengine Land, B-737, B-777, DA-50, DA-EASY, G-V, Commercial Pilot Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider; Limitations: English Proficient; B-777, B-737 Circ. Apch. - VMC Only; DA-EASY, DA-50 SIC Privileges Only; Authorized Experimental Aircraft: BL-P39 BL-P63, CU-P40, CU-P40 (VFR ONLY) certificate was issued on February 21, 2022.

3.2.2 Certification and Ratings Held at the Time of the Accident

AIRLINE TRANSPORT PILOT (Issued February 21, 2022)

Airplane Multiengine Land
B-737, B-777, DA-50, DA-EASY, G-V

Commercial Privileges Airplane Single-Engine Land, Airplane Single-Engine Sea, Glider

Limitations:

English Proficient; B-777, B-737 Circ. Aprch - VMC Only; DA-EASY, DA-50 SIC Privileges Only; Authorized Experimental Aircraft: BL-P39, BL-P63, CU-P40, CU-P40 (VFR ONLY)

FLIGHT ENGINEER (dated October 18, 1985)

Flight Engineer- Turbojet Powered

FLIGHT INSTRUCTOR (original issuance dated June 6, 2014)

Airplane Single-Engine

Airplane Multiengine

Instrument - Airplane

REMOTE (issued February 9, 2022)

Small Manned Aircraft System

MEDICAL CERTIFICATE FIRST-CLASS (issued November 1, 2022)

Limitations: None.

3.2.3 Training and Proficiency Checks

The following training record information was provided by the Commemorative Air Force:

Endorsement for Solo Aerobatics	September 19, 2023
Most Recent Statement of Aerobatic Competency ⁴³	September 19, 2022
Bell P-63 Kingcobra ⁴⁴	September 19, 2023
Show Line Category for Kingcobra	September 19, 2023
Date of Most Recent FAA Flight Review	March 2022
Most Recent Annual Checkride ⁴⁵	March 19, 2022
Most recent Ground Training Completion Date ⁴⁶	February 12, 2022

⁴³ Since this was a renewal with no change *"practical flight maneuvers not required."*

⁴⁴ In addition to the P-63 the pilot was also authorized to operate the P-51 Mustang and T-6 Texan airplanes. Of note the show line category in the T-6 Texan was listed as "3." See Operational Factors - Attachment 7 - "P-63 Pilot CAF Training Records."

⁴⁵ The records indicated that the training was conducted in a P-51 airplane and was 1.0 hours in duration. See Operational Factors - Attachment 7 - "P-63 Pilot CAF Training Records" for further information.

⁴⁶ Ground training included 22 subjects of which all were marked as *"completed."*

Most recent Crew Resources Management ⁴⁷	March 19, 2022
Most Recent Proficiency Ride ⁴⁸	January 11, 2022

A review of CAF’s LHFE Maneuvers flight training form included 17 areas for observation each of the areas contained one to nine topics. Of those 17 areas, 13 areas were marked as completed” on at least one of the topic areas. The other four areas were not marked as completed or were marked as “waive.” The 17 areas covered were: Preflight, Ground Operations, Normal and Crosswind Takeoff, Short Field Takeoff, Steep Turns, Approaches to Stalls, Powerplant Failure, Normal and Crosswind Landings, Short Field Landing, No Flap Approach, Unusual Attitude Recovery, Emergency Landing, and Post Flight Procedures.

3.2.4 Statement of Aerobatic Competency

The pilot’s application for Statement of Aerobatic Competency (SAC) FAA Form 8710-7, indicated that the type of application was a “Renewal w/o Change (Practical Flight Maneuvers Not Required).” It also listed a “Summary of Flight Evaluation” under which it stated that the aircraft flown for the evaluation was a “North American P-51 Mustang” and that two performance demonstrations were evaluated. It further listed the following limitations:

ALL Aircraft to be on new card:

North American P-51 Mustang, North American T-6 Texan/SNJ/Harvard, Bell P-63 Kingcobra

All Act Types to be on new card (solo aerobatics, night pyro, etc.):

Solo Aerobatics, Solo Aerobatics

Level to be on Card: 250 ft.

There were no additional notes or restrictions listed on the application. The SAC card showed an issue date of September 19, 2022 and an expiration date of December 31, 2023.

3.2.5 Flight Times

The pilot’s approximate flight times were based on Commemorative Air Force and FAA records:

⁴⁷ Crew Resources Management records indicated the training was 3.0 hours in length.

⁴⁸ The proficiency ride instructor comment was “Proficiency ride flown in T-6 N7300C to simulate P-63” and included 1.1 hours of flight time.

Previous 24 hours	0
Previous 30 days P-63	2.8
Previous 30 days Total Flight	7.8
Experience	
Total Hours PIC ⁴⁹	20,000
Total Flight Hours ⁵⁰	34,000
Total P-63	108.0

4.0 Air Boss

FAA order 8900.1 CHG 694, Volume 3, "General Technical Administration" defined an Air Boss in as:

The individual who, under operational authority delegated to him or her by the responsible person, has primary responsibility for control of air show operations (does not include transient or nonparticipating aircraft) on the active taxiways, runways, and the air show demonstration area for coordination with the jurisdictional air traffic control (ATC) facility and the IIC while the CoW and associated Class D Notice to Airmen (NOTAM) or temporary flight restriction (TFR) is in effect. The air boss is responsible for the documentation of procedures between ATC and the air boss establishing the transition of airspace and control of participating and nonparticipating aircraft. The air boss is delegated the primary responsibility for preparation and presentation of a daily Participants Safety Briefing.⁵¹

4.1 Training and Proficiency Checks

During an interview of the air boss, it was asked if there was any formalized recurrent training to be an air boss, he stated "no⁵²." He went on to provided that "there's no training requirement. You do have to renew - - you have to renew your LOA every 3 years. And there's a renewal process...Generally you need letters of recommendation and you need to have - - depending on your level, you need to have met a certain minimum experience requirement...there's no observation requirement."⁵³

⁴⁹ Flight time was based on FAA Form 8710-1 which was completed on February 21, 2022 for the issuance of a G-V type rating to the pilot's certificate.

⁵⁰ Flight time was based on FAA Form 8710-1 which was completed on February 21, 2022 for the issuance of a G-V type rating to the pilot's certificate. The operator listed a total flight experience of 34,500 hours on the "NTSB Form 6120.1 Pilot/Operator Aircraft Accident/Incident Form."

⁵¹ Source: [Dynamic Regulatory System \(faa.gov\)](https://www.faa.gov/dynamic-regulatory-system)

⁵² Source: Operational Factors/Human Performance - Attachment 2 - "Air Boss and Observer Air Boss Statements and Transcripts" pg. 40, line 16.

⁵³ Source: Operational Factors/Human Performance - Attachment 2 - "Air Boss and Observer Air Boss Statements and Transcripts" pg. 40, line 23 thru pg. 41, line 9.

According to the Air Boss interview transcript and FAA records the Air Boss had a private pilot airplane single-engine land certificate. He also held an air boss letter of authorization with a level of “*recognized air boss multi-venue*.”⁵⁴

4.2 FAA Requirements

In a letter dated June 29, 2018, from the manager of General Aviation Operations Branch (AFS-800) to the President of the ICAS, the FAA accepted the ICAS Air Boss Recognition Program (ABRP) Manual as “...meeting the requirements for the issue of a FAA Letter of Authorization (LOA) to act as an air boss at an air show, as established in FAA Order 8900.1, volume 5, chapter 9, section 6...” (See Section 8 of this report for information on the ICAS ABRP)

4.2.1 Air Boss Letter of Authorization (LOA)

The FAA defines an Air Boss Letter of Authorization as⁵⁵:

A valid FAA air boss LOA, issued by the FAA in accordance with Volume 5, Chapter 9, Section 6, to a recognized air boss at an aviation event (air show only) delegated primary responsibility for control of air show operations after demonstrating competency to an industry air boss evaluator (ABE) authorized under an FAA-accepted Air Boss Recognition Program (ABRP). FAA Recognized Industry Organizations (RIO) that developed the ABRP will provide internet access to a current list of ABEs and recognized air bosses issued an LOA. (Refer to the FAA National Aviation Events Program website at <https://www.faa.gov/about/initiatives/airshow/> for a link.)

NOTE: After January 1, 2019, prior to acting as an air boss at an air show issued a CoW, an air boss designated for an air show must comply with the phased documentation procedures for the issuance of an FAA air boss LOA established on the FAA National Aviation Events Program website at <https://www.faa.gov/about/initiatives/airshow/>. After January 1, 2020, an air boss must be issued a current and valid LOA and must attach a copy of the LOA to the FAA Form 7711-2 for the event.

4.2.2 Air Show

The FAA defined an Air Show as: “An aviation event defined as an aerial demonstration/performance by one or more aircraft, which may also include a UAS,

⁵⁴ Source: Operational Factors/Human Performance – Attachment 2 “Air Boss and Observer Air Boss Summaries and Transcripts,” pg. 39 line 17.

⁵⁵ Source: [Dynamic Regulatory System \(faa.gov\)](https://www.faa.gov)

rocket, parachutist, or ultralight vehicle, before an invited assembly of persons. A rocket launch, parachute or UAS (civil or public) demonstration held in conjunction with an air show must be issued a CoA."⁵⁶

4.3 Duties, Responsibility, and Authority

According to the FAA 8900.1 CHG 694, Vol. 3, "General Technical Administration," Chapter 6 "Issue a Certificate of Waiver or Authorization for an Aviation Event," dated October 20, 2020, stated, in part, the following "The event organizer for the event is responsible for all aspects and special provisions of the CoW/A. This may also be a person designated by the event organizer and listed on the FAA Form 7711-2. This person must be acceptable to the CoW/A- issuing FSDO as being knowledgeable concerning the terms and provisions of the CoW/A for this aviation event. The responsible person(s) will be accountable to the FAA for the safe conduct of the aviation event."

It further defined the event organizer as "the person or agency responsible for the organization and conduct of the aviation event."

5.0 Airplane Information

5.1 Boeing B-17 Flying Fortress

The B-17G was manufactured in 1944 and was a low-wing monoplane that "combined aerodynamic feature of the XB-15 giant bomber, still in the design stage, and the Model 247 transport."⁵⁷ The airplane was powered by four 1,000-horsepower Wright R-1820-97 engines⁵⁸ and had a crew composition of two pilots, bombardier, navigator, and radio-operator. When used for the military, the crew had five additional members as gunners. The airplane had a wingspan of 103 ft 9 inches and a length of 74 ft 9 inches.⁵⁹ The airplane was equipped with 10 seats which included 4 crew seats and 6 passenger seats. According to the manufacture's website it had a top speed of 287 mph and a cruising speed of 150 mph with a maximum range of 3,750 miles.

⁵⁶ Certificate of Authorization. Source: [Dynamic Regulatory System \(faa.gov\)](https://www.faa.gov/dynamic-regulatory-system)

⁵⁷ Source: [Historical Snapshot: B-17 Flying Fortress \(boeing.com\)](https://www.boeing.com/history/boeing-17)

⁵⁸ Source: NTSB 6120.1 Pilot/Operator Accident/Incident Form. However, the Boeing Historical website for the B-17G provided technical specifications that stated 1,200 hp.

⁵⁹ Source: [Historical Snapshot: B-17 Flying Fortress \(boeing.com\)](https://www.boeing.com/history/boeing-17)



Figure 1: N7227C photograph (Source: Planespotters.net)

5.2 Bell P63-F Kingcobra

The P63-F certificate of airworthiness was issued in 1946⁶⁰ and was a fixed wing single-engine airplane. The airplane was powered by an Allison V-1710 engine, capable of producing 1,425-horsepower. The airplane was crewed by one pilot. The airplane had a wingspan of 39 ft 2 inches, a length of 32 ft 8 inches and a maximum speed of 410 mph at 25,000 ft.



Figure 2: N6763 Airplane (Source: JetPhotos.com)

⁶⁰ The airplane was constructed in 1943 and was the only "F" model built with "a much taller fin and rudder for better control." Source: [Aerial Visuals - Airframe Dossier - Bell P-63F-1-BE Kingcobra, s/n 43-11719 USAAF, c/n 296E-11, c/r N6763](#)

6.0 Airport Information

Dallas Executive Airport was located about 6 nm southwest of Dallas, Texas, had a field elevation of 660.5 ft msl, and was located at N032°40.53'/W096°52.08. The airport was owned by the City of Dallas and was serviced by an FAA Air Traffic Control Tower (ATCT). At the time of the accident the FAA ATCT had been turned over to the air boss for the air show.

At the time of the accident RBD had two paved landing surfaces for airplanes designated as runway 13/31 and 17/35. Runway 13/31 was 7,136 ft long and 100 ft wide. Runway 17/35 was 3,800 ft long and 150 ft wide.

KRBD/RBD
Apt Elev 661'
N32 40.9 W096 52.1

JEPPESEN
27 NOV 20 (50-9) Eff 3 Dec

DALLAS, TEXAS
DALLAS EXECUTIVE

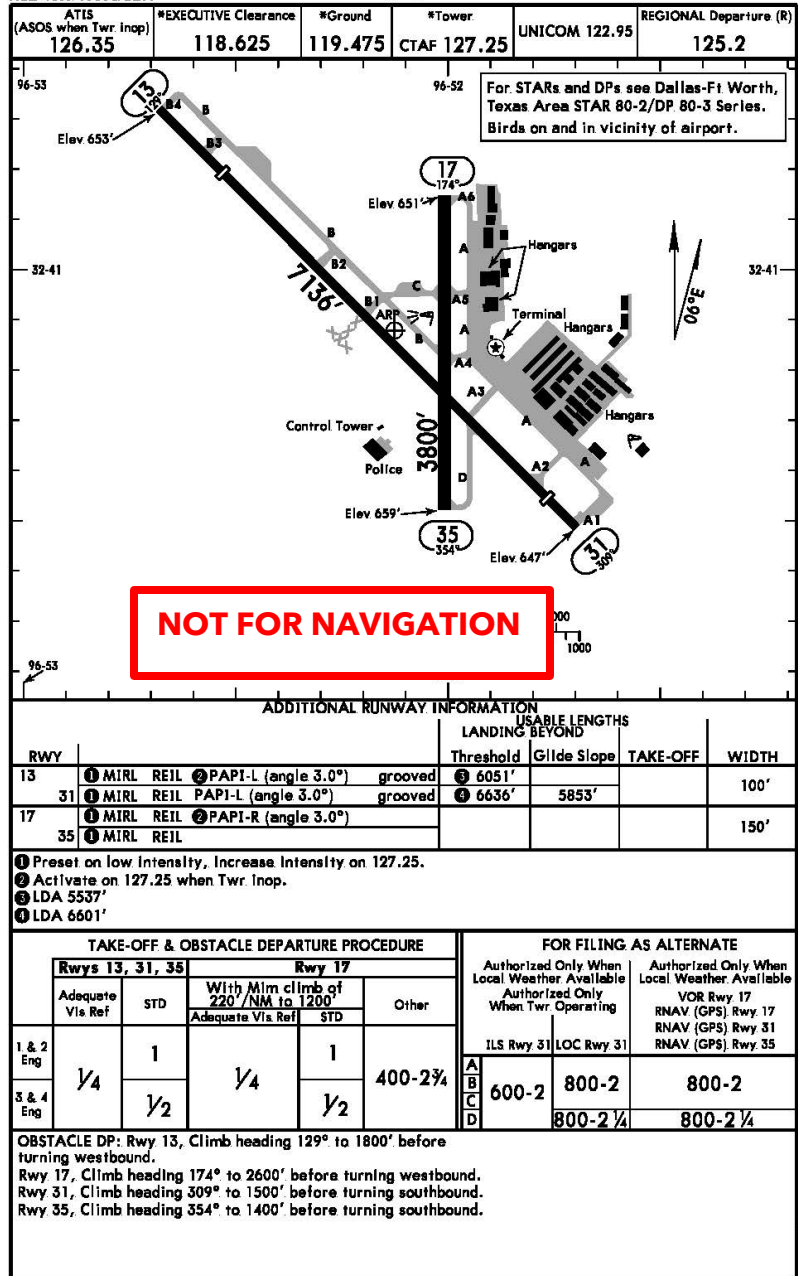


Figure 3: Dallas Executive Airport Diagram (Source: Jeppesen)

6.1 NOTAMs

At the time of the accident there were 37 Notice to Air Mission (NOTAM) in effect. Of those 37 NOTAMs the following 11 were specific for the airshow and airshow aircraft parking area:

!RBD 10/045 RBD TWY D CLSD 2211071300-2211152300
!RBD 10/046 RBD TWY A6 CLSD 2211071300-2211152300
!RBD 10/044 RBD RWY 17/35 N 2400FT CLSD EXC AIRSHOW ACFT AND XNG
AND TAX 2211071300-2211152300
!RBD 10/043 RBD RWY 17/35 S 1400FT CLSD 2211071300-2211152300
!RBD 11/004 RBD TWY A5 NONMOVEMENT AREA 2211081400-2211151400
!RBD 11/001 RBD APRON TERMINAL APN CLSD EXC AIRSHOW ACFT
2211081400-2211151400
!RBD 11/005 RBD TWY C NONMOVEMENT AREA 2211081400-2211151400
!RBD 11/006 RBD TWY A BTN TWY A5 AND TWY A4 CLSD EXC AIRSHOW ACFT
2211081400-2211151400
!RBD 11/002 RBD TWY A BTN TWY A6 AND TWY A5 NONMOVEMENT AREA
2211081400-2211151400
!RBD 11/015 RBD AIRSPACE SEE FDC 2/6874 ZFW 91.145
AIRSHOW221111700-2211132100
!RBD 11/023 RBD AD AP CLSD EXC EMERG ACFT 2211122112-2211142359EST

FDC NOTAM 2/6874⁶¹ ZFW TX...AIRSPACE DALLAS, TX...TEMPORARY FLIGHT RESTRICTIONS. PURSUANT TO 14 CFR SECTION 91.145, MANAGEMENT OF AIRCRAFT OPERATIONS IN THE VICINITY OF AERIAL DEMONSTRATIONS AND MAJOR SPORTING EVENTS. ACFT OPS ARE PROHIBITED WI AN AREA DEFINED AS 3NM RADIUS OF 324045N0965200W (CVE166012.8) SFC-3000FT. EFFECTIVE 221111700 UTC UNTIL 2211132100 DLY 1700-2100. DUE TO HIGH SPEED AERIAL DEMONSTRATIONS AT THE WINGS OVER DALLAS AIRSHOW. UNLESS AUTH BY ATC, RBD TOWER 127.25 THE AIR BOSS, [name given], TEL [number given], IS THE POINT OF CONTACT. THE DALLAS EXECUTIVE /RBD/ TWR, TEL [number given], IS THE CDN FAC. DLY 1700-2100 221111700-2211132100

The NOTAMs are listed below, in plain language, taken from standard code and abbreviation, with times converted from UTC to local CST:

Dallas Executive Airport issued in October number 045 Dallas Executive Airport taxiway D closed from November 7, 2022 at 0700 until November 15, 2022 at 1700.

Dallas Executive Airport issued in October number 046 Dallas Executive Airport taxiway A6 closed from November 7, 2022 at 0700 until November 15, 2022 at 1700.

⁶¹ Source: [2/6874 NOTAM Details \(faa.gov\)](https://www.faa.gov/NOTAMs/details/2/6874)

Dallas Executive Airport issued in October number 044 Dallas Executive Airport the north 2,400 ft of runway 17/35 closed except for airshow aircraft and crossing and taxiing from November 7, 2022 at 0700 until November 15, 2022 at 1700.

Dallas Executive Airport issued in October number 043 Dallas Executive Airport the south 1,400 ft of runway 17/35 closed from November 7, 2022 at 0700 until November 15, 2022 at 1700.

Dallas Executive Airport issued in November number 044 Dallas Executive Airport taxiway A5 is a nonmovement area from November 8, 2022 at 00800 until November 15, 2022 at 0800.

Dallas Executive Airport issued in November number 001 Dallas Executive Airport apron terminal apron closed except for airshow aircraft from November 8, 2022 at 0800 until November 15, 2022 at 0800.

Dallas Executive Airport issued in November number 005 Dallas Executive Airport taxiway C is a nonmovement area from November 8, 2022 at 0800 until November 15, 2022 at 0800.

Dallas Executive Airport issued in November number 006 Dallas Executive Airport taxiway A between taxiway A5 and taxiway A4 closed except for airshow aircraft from November 8, 2022 at 0800 until November 15, 2022 at 0800.

Dallas Executive Airport issued in November number 002 Dallas Executive Airport taxiway A between taxiway A6 and taxiway A5 is a nonmovement area from November 8, 2022 at 0800 until November 15, 2022 at 0800.

Dallas Executive Airport issued in November 015 Dallas Executive Airport airspace see flight data center NOTAM 2/6874 Fort Worth Center *CFR* 91.145⁶² for an airshow from November 11, 2022 at 0900 until November 13, 2022 at 1500.

Dallas Executive Airport issued in November number 023 Dallas Executive Airport aerodrome airport closed except for emergency aircraft from November 12, 2022 at 1512 until November 14, 2022 at 2259

Flight data center NOTAM number 2/6874 Fort Worth Center Texas airspace Dallas Texas temporary flight restrictions. Pursuant to 14 *CFR* Section 91.145 management of aircraft operations in the vicinity of aerial demonstrations and major sporting events. Aircraft operations are prohibited within an area defined as 3 nautical mile radius of

⁶² Management of aircraft operations in the vicinity of aerial demonstrations and major sporting events. Source: [eCFR :: 14 CFR 91.145 -- Management of aircraft operations in the vicinity of aerial demonstrations and major sporting events. \(FAR 91.145\)](#)

N32°40.45/W096°52.00 (Cowboy VOR⁶³ 166° radial at 12.8 nautical miles) from the surface to 3,000 ft. Effective from November 11, 2022 at 1100 until November 13, 2022 at 1500 daily 1100-1500. Due to high-speed aerial demonstrations at the Wings Over Dallas airshow. Unless authorized by air traffic control, Dallas Executive airport tower frequency of 127.25 MHz the Air Boss, [Air Boss name] telephone number [number provided] is the point of contact. The Dallas Executive tower telephone number [provided] is the coordination facility daily from 1100-1500 from November 11, 2022 at 1100 until November 13, 2022 at 1500.

6.2 Air Show Area

The Commemorative Air Force provided pictorial documentation of the designated areas that would be referenced during the area show. In Figure 3 below, the green line represents the 500 ft line, the purple line represents the 1,000 ft line, and the red line was the spectator's location. Additionally, the blue circle was the approximate location of where the Air Boss was located.



Figure 4: Airshow lines provided by the CAF (Note: Blue circle was added to show approximate Air Boss location)

7.0 CAF Overview

The CAF had a fleet of more than 175 aircraft, and 82 units within the USA, Canada, New Zealand, United Kingdom, France, and Switzerland. The CAF website⁶⁴ provided, in part, the following:

It began with a single plane.

⁶³ Very-high Omnidirectional Range.

⁶⁴ Source: [Our History & Mission \(commemorativeairforce.org\)](https://www.commemorativeairforce.org)

... a small group of ex-service pilots from the Rio Grande Valley in Texas pooled their money to purchase a P-51 Mustang in 1957. They formed a loosely defined organization to share the pleasure and expense of maintaining the Mustang.

A short while later, the group added a pair of F8F Bearcats to the P-51 Mustang. At this point, the mission of the CAF became clear: save an example of every aircraft that flew during World War II ~ a mission no one else was undertaking...

...On September 6, 1961, the CAF was chartered as a nonprofit Texas corporation in order to restore and preserve World War II-era combat aircraft. By the end of the year, there were nine aircraft in the CAF fleet...

...In 1965, the first museum building consisting of 26,000 square feet was completed at old Rebel Field, Mercedes, Texas. The CAF created a new Rebel Field at Harlingen, Texas, when they moved there in 1968, occupying three large buildings. The CAF fleet continued to grow and included medium and heavy bombers such as the B-29, B-25, B-17 and B-24.

The Headquarters of the CAF is located in Dallas. CAF members live in every state and 28 foreign countries. In 26 states and four foreign countries, our members have joined together and formed units to foster camaraderie and, in many cases, actively support one or more of the classic military aircraft operated by the CAF.

The CAF was founded to acquire, restore and preserve in flying condition a complete collection of combat aircraft which were flown by all military services of the United States, and selected aircraft of other nations, for the education and enjoyment of present and future generations of Americans.

More than just a collection of airworthy warplanes from the past, the CAF's fleet of historic aircraft, known as the CAF Ghost Squadron, recreate, remind and reinforce the lessons learned from the defining moments in American military aviation history.

7.1 Exemption 6802

The Commemorative Air Force was listed as having a Living History Flight Experience exemption. The North Texas Flight Standards District Office provided FAA oversight. According to FAA documentation, their exemption number was 6802T⁶⁵ and they had listed on that exemption 23 aircraft. Those LHFE aircraft were a B-29, 2 B-17/B-24/SB2C, 2 A-26/SBD⁶⁶, 3 TBM⁶⁷, 6 B-25's, 3 P-51, T-33, T-28A.

⁶⁵ Source: [6802 Exemption | cafoperations](#)

⁶⁶ Douglas SBD Dauntless

⁶⁷ Grumman Avenger

7.2 Safety Program

The Vice President (VP) of Safety Operations and Maintenance said CAF used a combination of safety videos; safety bulletins; a standardization/evaluation team to monitor pilot performance and adherence to standards; and recurrent reviews of their regulations and policies in their safety program⁶⁸. He said their volunteers were introduced to their safety program in ground school and have to test on aspects of the program. He also stated CAF had undergone an external safety audit in 2018 at the request of their insurance company following an accident where an aircraft was destroyed. The auditor visited three CAF units (small, medium, and large) and advised the VP on things that resulted in changes being made to their ground school process.

The VP also spoke about a software program that was designed specifically for CAF to monitor pilot data and ensure they were within regulatory standards to fly. The system also tracked aircraft maintenance status. It was the primary tool CAF's standardization team used to determine how a pilot was performing and make recommendations for the DO to consider.

The VP attended the National Warbird Operators, and the International Council of Airshows conferences each year to discuss safety topics with other warbird operators and airshow producers.

7.2.1 Safety Management System (SMS)

At the time of the accident, CAF had adopted the FAA's voluntary SMS program. It was dated January 2017 and approved by the president of the organization. The guide was posted to the CAF website and intended to be used *"to assist Unit Staff Officers and volunteers in performing their duties."*⁶⁹ The SMS, labeled "Guide 11" explained the purpose of the program; delineated the four safety pillars of SMS; explained the anonymous reporting system; discussed new positions that had been created in CAF for the purpose of managing their safety program; identified which areas of CAF had increased potential for risk; and detailed where CAF policies and regulations were housed on their website.

The SMS went through a revision dated November 2023⁷⁰. The revisions added: a note from the CEO/president of the organization; a publications management/revisions guide; a definitions page; and appendices for their emergency action program, aircraft contingency plan, and hazard reporting.

⁶⁸ Source: Attachment 1 CAF Personnel Transcripts Interview of Jim Lasche (pg. 387 - 395)

⁶⁹ Source: Attachment 18 Commemorative Air Force SMS Manual 2017

⁷⁰ Source: Attachment 19 Commemorative Air Force SMS Manual 2023

7.2.2 Safety Culture

CAF's VP said he and the Director of Operations had an open-door policy and both routinely fielded calls from CAF units about various issues. The VP stated issues came in at all times of the day and night and varied in subject from maintenance issues with specific aircraft, to pilot concerns about policy or interpersonal issues.

The VP also said the CAF had an anonymous reporting system that members and performers use to log their concerns or feedback. When asked, the VP said he received zero anonymous reports in the year prior to the accident but he was confident the volunteer force was aware of the option.

8.0 ICAS Overview

According to the International Council of Air Shows website it was *"dedicated to building and sustaining a vibrant air show industry to support its membership. To achieve this goal, ICAS demands that its members operate their business at only the highest levels of safety, professionalism and integrity."*⁷¹

Additionally, the website provided that ICAS was founded in 1967 when *"a handful of air show industry professionals recognized the need for an organization to protect and promote their interest in the growing North American air show marketplace. From the beginning, the group recognized the need for standardization of industry practices in key areas such as safety, insurance and the manner in which the industry interacted with government and military officials...to promote safety at all aviation events; and to work with government agencies to develop air show safety standards."*

ICAS was comprised of committees which included: ACE⁷² committee, Air Boss Committee, Ethics Committee, Pyro Safety Committee, and Safety and Operations Committee.

8.1 Confidential Reporting

ICAS has a confidential reporting system called ICARUS. The web address for the system is mentioned once in the Air Boss Recognition Program manual. The Vice President of Safety and Operations stated reports sent through the system go to a third party for deidentification before being sent back to ICAS for safety analysis. The VP said there is also an open reporting system where *"air show pilots or performers or anyone can call me and manifest or declare that they saw something that they thought is*

⁷¹ Source: [International Council of Air Shows](#)

⁷² Aerobatics Competency Evaluation.

unsafe...⁷³ When asked, the VP said that in the last 15 years the confidential ICARUS program had received approximately 10 reports however he had received approximately 60 phone calls in the last two years.

8.2 Air Boss Recognition Program

The ICAS ABRP manual, revised January 1, 2022, included nine chapters of information, ICAS Safety Creed, Air Boss standards and code of ethics, and application and evaluation forms. The intent and purpose of the ICAS ABRP was:

1.1.1 To ensure that inexperienced and unqualified individuals are not permitted to provide air boss services in an environment that jeopardizes the safety of air show performers and the general public;

1.1.2 To improve safety in the air show environment by developing an objective minimum standard for air boss experience/ training, and implementing a process that ensures that every individual providing air boss services at an air show in the United States has been evaluated and found to have met that minimum standard;

1.1.3 To identify and recognize those persons who meet Basic Air Boss (BAB) program requirements and, once those requirements have been met, to recommend to the FAA issuance of a Basic Air Boss Letter of Authorization (BAB LoA) to the individual who has met the requirements for that designation;

1.1.4 To identify and recognize those persons who meet Standard Air Boss (SAB) program requirements and, once those requirements have been met, to recommend to the FAA issuance of a Standard Air Boss Letter of Authorization (SAB LoA) to the individual who has met the requirements for that designation; and

1.1.5 To identify and recognize those persons who meet the requirements to successfully complete an RAB/SV and RAB/MV LoA evaluation by an ABE and, once those requirements have been met, to recommend to the FAA that an RAB LoA be issued to those persons.

1.1.6 Note: The recommendation to the FAA that it issue an SAB or RAB LoA to a specific individual shall attest that, on the day(s) of the evaluation, the applicant met the minimum requirements of the ABRP program.

The manual began with the FAA definition of an air boss as *"the individual who has the primary responsibility for air show operations on the active taxiways, runways,*

⁷³ Source: Operational Factors/Human Performance - Attachment 4 - " " pg. 27, line 24 thru pg. 28 line 2.

and the surrounding air show demonstration area.” Additionally, ICAS added the following requirements “...an air boss must be able to prepare and present a quality daily Air Show Participant Safety Briefing; possess a strong working knowledge of applicable regulations, policy and forms; and have a command and control ‘presence.’”

ICAS defined the air boss as “that individual who, under operational authority delegated to him/her by the event organizer/responsible person and with the mastery of air show regulations, guidance and documents, prepares and presents a daily Air Show Participant Safety Briefing such that his/her primary responsibility for control of air show operations on the active taxiways, runways, and the surrounding air show demonstration area will be conducted in a safe manner.”

The manual further defined and recognized four specific types of air bosses with their program. Those were a “Basic Air Boss,” “Standard Air Boss,” “Recognized Air Boss/Single Venue,” and “Recognized Air Boss/Multiple Venues.” Those definition were:

Basic Air Boss

A Basic Air Boss is an individual who has met the requirements described and itemized in Chapter 3 of this document to serve as an air boss at a Basic Air Show elsewhere in this document.

The Basic Air Boss (BAB) designation is made based on a) successful completion of the basic experience/air show education data sheet, b) completion (with a score of 75% or better) of the multiple-choice Air Boss test, and c) the recommendations of the applicant’s peers and/or performers.

The Basic Air Boss designation is documented in the form of a Basic Air Boss (BAB) Letter of Authorization (LoA) issued by the Federal Aviation Administration on the recommendation of ICAS. Unless specifically noted otherwise on the BAB LoA, a BAB may only provide air boss services at a Basic Air Show.

Standard Air Boss

A Standard Air Boss is an individual who has met the requirements described and itemized in Chapter 4 of this document to serve as an air boss at a Standard Air Show as defined below.

The Standard Air Boss (SAB) designation is made based on a) successful completion of the basic experience/air show education data sheet, b) completion (with a score of 75% or better) of the multiple-choice Air Boss test, and c) the recommendations of the applicant’s peers and/or performers as detailed in Chapter 4 of this document.

The Standard Air Boss designation is documented in the form of a Standard Air Boss (SAB) Letter of Authorization (LoA) issued by the Federal Aviation Administration on the recommendation of ICAS. Unless specifically noted otherwise on the SAB LoA, an SAB may provide air boss services at any venue that is not a Complex Air Show.

Recognized Air Boss/Single Venue

A Recognized Air Boss/Single Venue (RAB/SV) is an individual who has met the requirements described and itemized in Chapter 5 of this document to serve as an air boss at a Complex Air Show at one, specific venue as defined above and under the limitations and conditions set forth here and in Chapter 5 of this document.

The Recognized Air Boss/Single Venue (RAB/SV) designation is made based on a) successful completion of the basic experience/air show education data sheet, b) completion (with a score of 75% or better) of the multiple-choice Air Boss test, c) the submission and approval by the Air Boss Recognition Review Committee of formal, written air boss training program for that single venue, and d) EITHER the recommendations of the applicant's peers and/or performers as detailed in Chapter 5 of this document OR successful completion of an evaluation conducted by an ICAS recognized Air Boss Evaluator (ABE) as specified in Chapter 5 of this document.

The Recognized Air Boss/Single Venue designation is documented in the form of a Recognized Air Boss/Single Venue (RAB/SV) Letter of Authorization (LoA) issued by the Federal Aviation Administration on the recommendation of ICAS. Unless specifically noted otherwise on the RAB/SV LoA, an RAB/SV may provide air boss services at any Standard or Basic Air Show, as well as a Complex Air Show conducted at the venue specified on the RAB/SV's LoA.

Recognized Air Boss/Multiple Venues

A Recognized Air Boss/Multiple Venues (RAB/MV) is an individual who has met the requirements described and itemized in Chapter 6 of this document to serve as an air boss at a Complex Air Show as defined above and under the limitations and conditions set forth here and in Chapter 6 of this document.

The Recognized Air Boss/Multiple Venue (MAB/SV) [sic] designation is made based on a) successful completion of the basic experience/air show education data sheet, b) completion (with a score of 75% or better) of the multiple-choice Air Boss test, and c) the successful completion of an evaluation conducted by an ICAS recognized Air Boss Evaluator (ABE) as specified in Chapter 6 of this document.

The Recognized Air Boss/Multiple Venue designation is documented in the form of a Recognized Air Boss/Multiple Venue (RAB/MV) Letter of Authorization (LoA) issued by the Federal Aviation Administration on the recommendation of ICAS. Unless specifically noted otherwise on the RAB/MV LoA, an RAB/MV may provide air boss services at any Standard, Basic Air Show or Complex Air Show.

8.3 Aerobatic Competency Evaluation Program

The ICAS ACE manual, chapter 5 “Qualification, Proficiency, Currency and Reinstatement” effective January 1, 2019⁷⁴, provided, in part the following information:

General

In order to exercise the privileges of a Statement of Aerobatic Competency, a pilot must be qualified, proficient and current in the aircraft and endorsements being flown. The aircraft category, level and endorsements in which a performer is qualified and proficient may be found on the performer’s SAC card authorization.

Qualification

- A. Upon successful completion of an evaluation in an aircraft, a pilot is considered qualified to fly that aircraft for a period of thirty-six (36) months. A performer maintains this qualification by completing a valid renewal evaluation in the aircraft being flown or an aircraft of the same category.*
- 1. A renewal or addition of aircraft will further the qualification period for thirty-six (36) calendar months from the date of renewal or addition of aircraft.*
 - 2. A renewal for performers who are not currently qualified for the aircraft may not take place in airspace waived for an air show. In this case, renewals must be performed in an aerobatic practice area or in airspace authorized as a practice waiver.*
 - 3. Aircraft in which a pilot has been qualified will not be removed from their authorization if the pilot is no longer qualified.*
 - 4. It is recommended that pilots with multiple aircraft in one category rotate the aircraft type evaluated to maximize familiarity with the category of aircraft in which the pilot is qualified.*

⁷⁴ The manual was accepted by the FAA on October 12, 2018.

- B. Upon successful completion of an evaluation at a specific level, a pilot is considered qualified to fly at that level for a period of thirty-six (36) months. A performer maintains this qualification by completing a valid renewal evaluation at that level.
1. A renewal or change in level will further the qualification period for thirty-six (36) calendar months from the date of renewal or change in level.
 2. A renewal for performers who are not currently qualified for the level may not take place in airspace waived for an air show. In this case, renewals must be performed in an aerobatic practice area or in airspace authorized as a practice waiver.
- C. Upon successful completion of an evaluation for an endorsement, a pilot is considered qualified to execute that endorsement.
1. A renewal for performers who are not currently qualified for the endorsement may not take place in airspace waived for an air show. In this case, renewals must be performed in an aerobatic practice area or in airspace authorized as a practice waiver.

Proficiency

A pilot is considered proficient if the pilot has a current and valid SAC card for the aircraft category, level and endorsements being flown in accordance with Chapter 2.5 of this manual.

Currency

A pilot is considered current in the specific aircraft, level and endorsements that will be flown at an air show if the pilot has flown either a practice performance or an air show performance in the same aircraft, level and same endorsements within the previous forty-five (45) days.

9.0 FAA Oversight

Regulatory oversight and enforcement during aviation events, including airshows, were tasked to the FAA's Flight Standards Service. The following information was provided, in part, in the July/August 2022 issue of "FAA Safety Briefing":

This work is carried out at the local Flight Standards District Office (FSDO) level, where a qualified safety inspector is chosen to be the Inspector in Charge (IIC) for the event. The IIC is the FAA focal point for the event sponsor and performers and will liaise with other parts of the FAA as needed. Depending on the size of the event, an IIC may lead a team of inspectors to assist with compliance and

surveillance duties. Within Flight Standards, there is also a team of Aviation Event Specialists assigned to each FSDO to assist the IIC with any policy concerns for a certain event. Other areas of FAA involvement during an air show may include the Air Traffic Organization, Airports, Commercial Space, and the UAS Integration Office.

Preshow Prep

The multi-part process for getting an air show approved starts with a Certificate of Waiver or Authorization (CoW). If approved, it is issued to the event sponsor to allow participants to perform certain activities or maneuvers outside of the normal part 91 requirements but under conditions that ensure an acceptable level of safety. A good example of a commonly waived regulation at an air show would be allowing performers to “zero-out” their altimeters when on the ground to more easily gauge altitude during aerobatic maneuvers (14 CFR section 91.121). Other regulations commonly waived pertain to airspeeds, minimum safe altitudes, and aerobatic flight at less than 1,500 feet above the surface. The waivers required depend on the types of operations that will be conducted at the show.

The CoW process is accomplished via two forms, FAA Form 7711-1 and 7711-2. The latter is what an air show sponsor or organizer uses to apply for the CoW. The former is the actual certificate issued by the FAA with any special provisions the agency determines necessary to carry out the event safely. In addition to capturing the event details (date, location, regulations waived, the scope of planned operations, etc.), the CoW process also allows the IIC and the event sponsor to thoroughly evaluate risks and hash out any necessary mitigations...

For example, the IIC will check if the minimum horizontal distance required by policy exists between the showline and spectators. This depends on the type and speed of the aircraft used. The minimum distance ranges from 500 feet for category three aircraft (less than 156 knots) to 1,500 feet for category one aircraft (more than 245 knots). An event waiver will not be considered if these distances cannot be met. Note that a category one or two aircraft may still use the 500-foot showline distance provided they fly non-aerobatically and parallel to the spectator areas...

It's Show Time

If the IIC finds all parts of the waiver application process satisfactory, the air show is a go! But the work doesn't stop there. The FAA will continue to work with the organizer as needed and provide onsite surveillance of the event. That includes conducting any necessary ramp checks of performance aircraft and attending various meetings and briefings, none more important than the daily performer

briefing. "The daily briefings are vital to ensure everyone involved in the airshow understands their role and the terms of the CoW," says Joe. "It is the place to de-conflict and resolve any confusion."

During the air show, the IIC will usually monitor the performances from what's called the control point, a designated area where the air boss directs operations. That's followed by a debrief with the FSDO and responsible parties to review what went well and what areas need improvement...

10.0 FAA Guidance

10.1 Order 8900.1 Flight Standards Information Management System

FAA Order 8900.1, Volume 3 "General Technical Administration," Chapter 6 "Issue a Certificate of Waiver or Authorization for an Aviation Event", 3-143 "General" provided, in part, the following definitions:

- 1) *Aerobatic Box. The airspace at an air show where participating aircraft are authorized to perform aerobatic maneuvers appropriate to their category (see Figure 2-24).*
- 2) *Aerobatic Flight. When the event is conducted IAW a certificate of waiver or authorization, the definition in Title 14 of the Code of Federal Regulations (14 CFR) part 91, § 91.303 does not apply. Therefore, the portion of § 91.303 that defines aerobatic flight must always be waived. The following guidelines apply in determining what maneuvers are considered aerobatic flight in the flying display area.*

Airplanes. Where the pitch attitude exceeds 60 degrees of pitch in reference to the horizon (above or below) and/or the angle of bank exceeds 75 degrees in reference to the horizon (without an appropriate endorsement)...

- 3) *Air Boss. The individual who has the primary responsibility for air show operations on the active taxiways, runways, and the surrounding air show demonstration area.*
- 4) *Air show. An aviation event defined as an aerial demonstration by one or more aircraft before an invited assembly of persons.*
- 5) *Airworthiness Certificate. For a U.S.-registered experimental aircraft this would be a special flight permit, which must be accompanied by operating limitations. Foreign-registered experimental aircraft must have the special flight permit with operating limitations and a special flight authorization allowing air show operations in U.S. airspace.*
- 6) *Air show Demonstration Area. The total airspace (lateral and vertical limits) identified by the FAA waiver, temporary flight restriction (TFR), or the notice to*

airmen (NOTAM) issued for an air show (sometimes referred to as the waived airspace). (See Figure 3-24.)

7) *Altimeter Setting.* Many performers and jump aircraft may wish to set their altimeters to zero while on the ground to measure height above ground during their performance. This may require a waiver of part 91, § 91.121. The inspector-in-charge (IIC) should waive § 91.121 for any event where aircraft involved in that event are departing from a runway at that location. This does not require the affected aircraft to set their altimeter(s) to zero but gives the pilot the option to do so. ...

12) *Control Point.* A specified location where the event organizer, a designated representative, or an air boss manages the aviation event. The communications system with the capability necessary to control the aviation event must also be located here.

13) *Corner Markers.* An easily identifiable marker or landmark from the air, 500 feet or more right and left of primary spectator area along the crowd line from the primary spectator area to provide flybys and performers a 500-foot reference for proper separation from spectators.

NOTE: Markers that may be hazardous to aircraft operations should not be placed on runways, taxiways, or any other operational area. This includes the X on the end of runways to denote runway closure. They should be placed in a safe area adjacent to the designated spot...

15) *Crowd Line.* A physical barrier or a line marked on the ground that serves as a restraining line for designated spectator areas and provides the appropriate safety distances from the aerobatic box and/or show line...

17) *Event Organizer.* The person or agency responsible for the organization and conduct of the aviation event.

18) *Flyby.* A nonaerobatic pass or a series of nonaerobatic passes, performed by one or more aircraft, before an invited assembly of persons at an aviation event. No abrupt maneuvers between the corner markers may be performed along the 500-foot reference line by Category I or II airplanes. Abrupt maneuvers by Category I or II airplanes, although nonaerobatic (minimum radius 360-degree turn, banks in excess of 75 degrees, etc.), must be performed in that category area.

19) *Flying Display Area.* The airspace at an air show where participating aircraft are authorized to perform. This area includes all the aerobatic boxes and show line but does not include ingress/egress routes (see Figures 3-24 and 3-25)...

- 21) *Formation Flying.* When an aircraft is flown solely with reference to another aircraft and within 500 feet of the referenced aircraft. Air racing and simulated dog-fighting are not considered formation flying.
- 22) *Heritage Flight Program.* The U.S. Air Force (USAF)-approved military and civilian pilots flying formations consisting of USAF, former USAF, and U.S. Army Air Corps aircraft to demonstrate the history of USAF aircraft...
- 24) *Inspector-in-Charge (IIC).* The FAA aviation safety inspector (ASI) who has primary FAA responsibility for the aviation event (see subparagraph 3-143D)...
- 30) *Primary Spectator Area.* The main area designated by the event organizer for spectator use. It is bounded by the crowd line and has lateral limits (ends) that are well defined. This is the area from which the public is generally expected to view the air show. There may be more than one spectator area.
- 31) *Reference Lines.* Readily visible and easily identifiable lines that designate the appropriate minimum distance from designated spectator areas for each performer as appropriate. These are normally at 500 feet and 1,000 feet (see the subparagraph 3-147A note).
- 32) *Responsible Person.* A person designated by the event organizer to be responsible for all aspects and special provisions of the waiver/authorization. This person must be acceptable to the waiver/authorization-issuing Flight Standards District Office (FSDO) as being knowledgeable concerning the terms and provisions of the certificate of waiver/authorization for this aviation event. The responsible person will be responsible to the FAA for the safe conduct of the event...
- 35) *Show Line.* A readily visible reference line that provides the required distance from the spectators for Category I airplanes that enhances pilot orientation during the performance. Category I airplane teams or solos should be oriented over or along this line during aerobatic maneuvers (see the note under subparagraph 3-147A)...
- 38) *Waiver.* An official document issued by the FAA that authorizes certain operations of aircraft to deviate from a regulation but under conditions that ensure an equivalent level of safety. The sections of part 91 that can be waived are listed in § 91.905.

10.1.1 Volume 5 Airman Certification

FAA Order 8900.1, Vol. 5 Ch 9, Section 6 "Issue/Renew/Reevaluate/Rescind an Air Boss Letter of Authorization" change 679, dated October 25, 2019⁷⁵ provided in part the following guidance:

1) Air Boss. *The individual who has the primary responsibility for air show operations on the active taxiways, runways, and the surrounding air show demonstration area. Currently the FAA recognizes and issues an LOA for the following four types of air bosses:*

- a) *Basic Air Boss (BAB).*
- b) *Standard Air Boss (SAB).*
- c) *Recognized Air Boss (Single Venue) (RAB/SV)*
- d) *Recognized Air Boss (Multiple Venues) (RAB/MV)...*

Air Boss Types.

1) Basic Air Boss (BAB). *A BAB is an air boss who is recognized by a RIO in accordance with the RIO's⁷⁶ approved ABRP and has received an LOA from the FAA. A BAB may exercise the privileges of that LOA and provide air boss services at any basic air show only.*

2) Standard Air Boss (SAB). *An SAB is an air boss who is recognized by a RIO in accordance with the RIO's approved ABRP and has received an LOA from the FAA. An SAB may exercise the privileges of that LOA and provide air boss services at any basic air show or standard air show.*

3) Recognized Air Boss (Single Venue) (RAB/SV). *An RAB/SV is an air boss who is recognized by a RIO in accordance with the RIO's approved ABRP and has received an LOA from the FAA to conduct air boss operations at a single complex air show. The name and location of the single venue must be clearly listed on the LOA, along with any other relevant limitations. An RAB/SV may also provide air boss services at any basic air show or standard air show.*

4) Recognized Air Boss (Multiple Venues) (RAB/MV). *An RAB/MV is an air boss who is recognized by a RIO in accordance with the RIO's approved ABRP and has received an LOA from the FAA to conduct air boss operations at multiple complex air shows. The name and location of each venue must be clearly listed on the LOA, along with any other relevant limitations. An RAB/MV may also provide air boss services at any basic air show or standard air show.*

⁷⁵ Source: [Dynamic Regulatory System \(faa.gov\)](https://www.faa.gov/dynamic-regulatory-system)

⁷⁶ Recognized Industry Organization.

5-9-6-9 ISSUANCES OF AN AIR BOSS LOA. An ASI issues an air boss LOA upon an applicant's successful completion of a RIO's ABRP. The Air Boss Recommendation Committee (ABRC) develops the evaluation procedures and policy, and the FAA subsequently accepts them. An industry ABE conducts the evaluation.

A. *The ABE's Role.* After receiving the air boss application from the applicant, the ABE conducts the evaluation, if required, in accordance with the RIO's ABRP.

B. *Application Processing.* The completed application is forwarded to the RIO for processing, as stated in the RIO's ABRP. The RIO records the information and sends the application to the responsible Flight Standards office closest to the applicant's mailing address, or another location authorized by the General Aviation Operations Branch and the National Aviation Events Specialist (NAES). The ASI must ensure the cover letter includes a draft air boss LOA for the applicant. Applicants requesting renewal are encouraged to submit their application at least 15 business-days prior to the expiration date of the air boss LOA.

C. *Application for Issuance/Renewal.* Although the RIO administers the evaluation program, the FAA is the final authority on the issuance of an air boss LOA. The responsible Flight Standards office will deny the air boss application if the applicant is currently under investigation, or subject to a pending action by the RIO or the FAA ... The responsible Flight Standards office must review the following documents before issuing or renewing an air boss LOA:

1) The completed application (refer to the RIO's ABRP for an example of an application).

2) A copy of the evaluation, if required.

3) The RIO's cover letter, with the following information:

- The applicant's name;
- The qualifications sought (e.g., BAB, SAB, or RAB); and
- The list of authorized venues, if applicable.

NOTE: If any of the documentation or required information is missing from the application, contact the RIO before issuing the air boss LOA.

D. *Initial Issuance, Reinstatement, or Renewal.* An application for reissuance or renewal must contain the same documentation that is required for initial issuance.

E. Forms. Authorization to provide air boss services is issued in the form of an LOA.

...This air boss authorization expires in accordance with the RIO's ABRP.

F. Authorizations for an RAB/SV. The RIO's written recommendation for an RAB/SV will specify the air show venue for which the RAB may provide air boss services.

10.2 Showlines

FAA Advisory Circular 91-45C "Waivers: Aviation Events," Chapter 2 "Preparation for an Aviation Event," Subsection 15 "Establishing the Showlines," dated February 1, 1990 provided, in part, the following guidance in regard to show lines:

a. The establishment of the showlines as the first order of business is preferable to establishing the crowd line and then determining the showlines.

b. In order to enhance safety, the showline may be moved toward or away from the spectator area to give the performer a more identifiable reference. However, the showline should not be moved from specified distances.

c. The 500-foot showline represents the minimum horizontal distance that is authorized under FAR §91.79(c). The 500-foot showline is NEVER waived with regard to any spectator area. Routines that involve several aircraft in formation or nonaerobatic fly-bys must ensure that the nearest aircraft to the spectator area does not operate closer than 500 feet. This may require that the showline be more than 500 feet from the spectator area.

d. The showline is used as a reference by the performer or, in the case of formation flight, by the formation's leader. It is of paramount importance that showlines provide guidance to the performers during their routines. In the case of aircraft formations, performers must adjust to the showline to ensure that the critical aircraft is not closer than 500 feet from a spectator area. If the takeoff runway is closer than 500 feet from the primary or secondary spectator areas, no aerobatics may be permitted until the aircraft has passed the end of the spectator area and then only if there is no congested area or spectators under the performing aircraft. Under the same conditions, an acrobatic maneuver may be performed after takeoff following a turn away from spectator areas.

e. Pilots performing flight demonstrations must maintain the following minimum showline distances from the spectator areas. These distances are predicated on 75 percent power in straight and level flight for piston aircraft. For turbine aircraft, the distances are based on demonstrated normal cruise speed...

Table 1. Showline Categories, Speeds, and Distances (Source: AC 91-45C)

CATEGORY	CRUISE SPEED	SHOWLINE DISTANCE FROM SPECTATOR AREA
I	More than 245 knots (282 MPH)	1,500 feet
II	More than 156 knots Less than 245 knots (181 to 282 MPH)	1,000 feet
	Aerobatic Helicopters	1,000 feet
III	Less than 156 knots (180 MPH)	500 feet
	Aerobatic Gliders (Sailplanes)	500 feet
	Nonaerobatic Aircraft	500 feet

f. As described in the table below, three different showlines might be required when all three categories of aircraft are participating at a show site. Because all show sites do not have prominent surface lines for use as showlines that are located exactly 500, 1,000, or 1,500 feet from spectator areas, it may not be possible to move the spectator area to arrive at these distances. The optimum situation is when prominent showlines are 500, 1,000, or 1,500 feet from spectator areas as appropriate to the aircraft being operated at the show. These distances from the showline to the spectators for each category of aircraft are desirable, however, there are other considerations. There shall be no waiver of the 500-foot showline for Category III aircraft. For a show site where a runway is located less than that prescribed from an area that provides for the safety of the spectators, it is desirable to use the runway as the showline rather than a poorly marked line at the 1,000- or 1,500-foot mark. The safety of the performance and that of the spectators is enhanced by the participants using a well-defined showline. This is not to say that the spectator areas should be enlarged so that the optimum prescribed distances are not available. Again, for the safety of the performers and the spectators, the showline may be moved in or out to avoid antennas, windsocks, tree lines, etc. The showline, however, may not be closer than the minimums specified in the following paragraphs.

*(1) Category I Showline. The optimum showline distance from spectator areas for Category I aircraft shall be 1,500 feet or greater... If the only well-defined showline is closer than 1,500 feet to a spectator area and it is not possible to move the spectator area so that it is 1,500 feet from the showline, the showline may be approved down to **AN ABSOLUTE MINIMUM DISTANCE OF 1,200 FEET**. When there is a reduction in the distance from the showline to the primary spectator area, a similar reduction **SHALL NOT BE PERMITTED** on the secondary spectator area side of the showline... For example, if the showline is 1,300 feet from the primary spectator area; there must remain 1,500 feet from the showline*

to the secondary spectator area. **IN NO CASE SHALL THERE BE LESS THAN 2,700 FEET BETWEEN THE PRIMARY AND THE SECONDARY SPECTATOR AREAS.**

(2) *Category II Showline.* The optimum showline distance from spectator areas for Category II aircraft shall be 1,000 feet. If the only well-defined showline is closer to a spectator area than 1,000 feet, and it is not possible to move the spectator area so that it is 1,000 feet from the showline, it may be approved down to **AN ABSOLUTE MINIMUM DISTANCE OF . 800 FEET** ... When there is a reduction in the distance from the showline to the primary spectator area, a similar reduction **SHALL NOT BE PERMITTED** on the secondary spectator side. For example: If the showline is 800 feet from the primary spectator area, there must remain 1,000 feet from the showline to the secondary spectator area. **IN NO CASE SHALL THERE BE LESS THAN 1,000 FEET BETWEEN THE PRIMARY AND THE SECONDARY SPECTATOR AREAS.**

(3) *Category III Showline.* The showline **SHALL NOT** be closer than 500 feet from the primary or secondary spectator areas ...

g. The 500-foot showline may also be used for Category I or II aircraft being flown nonaerobically and parallel to the primary and/or secondary spectator area.

h. An arc directed away from the crowd, i.e., "Pass in Review" maneuver, may be flown provided the aircraft remain at least 500 feet from the primary and/or the secondary spectator area...

10.3 Preshow Briefing

FAA Advisory Circular 91-45C "Waivers: Aviation Events," Section 2. "Managing the aviation Event" dated February 1, 1990, provided, in part, the following guidance in regard to preshow briefing:

b. Preshow Briefing. One thing that is required of all waivers for aerial demonstrations is the preshow briefing of all performers. For performing teams, it is permissible for just the team leader or other performing member to attend in lieu of every member. The team leader or other performing member must then assume the responsibility for briefing each of the other members of the team. It is imperative that the briefing cover every aspect of the event. The following list of subjects shall be covered at every briefing:

(1) Weather brief.

- (i) *Who gives the briefing, i.e., sponsor, Flight Service Station specialist, etc.*
- (ii) *Source of information.*
- (iii) *If forecasts are involved, the valid time of forecasts.*

- (2) *Runway in use.*
- (3) *Taxi instructions.*
- (4) *Performer aircraft parking.*
- (5) *Aviation event radio communication frequencies.*
- (6) *Emergency procedures.*
- (7) *Showlines.*
- (8) *Area avoidance.*
- (9) *Review of provisions on the FAA waiver.*
- (10) *Review of the schedule.*
- (11) *Aircraft departure plan.*
- (12) *Next briefing (if necessary).*
- (13) *Questions.*
- (14) *Credential check and signing area.*
- (15) *ALL participants sign waiver.*
- (16) *Fueling procedures.*

c. Departure from Other Airports. At an airport location where a performing or fly-by aircraft will depart from a location other than the airshow site, a telephone briefing must be conducted with the pilots of those aircraft.

d. Nonairport Location Briefing. If the event is to be conducted at a nonairport location, special procedures for the briefing of the performers must be established. The performers must be informed well in advance of the briefing date, time, location, and if appropriate, directions to where the briefing will take place. In addition to the subjects listed in paragraph 25b, the briefing should cover any subjects unique to the aviation event location (e.g., desert terrain, mountainous area, site near water, etc.)

10.4 Flying Participants

FAA Advisory Circular 91-45C "Waivers: Aviation Events," Section 2. "Managing the Aviation Event," Subsection 27 "Flying Participants" dated February 1, 1990 provided, in part, the following guidance in regard to aircraft rides for hire and media flights:

*a. **Each participant** should have operational information pertinent to the scheduled aviation event before arriving at the site. It is recommended that a copy of the completed FAA Form 7711-2, including diagrams, maps, charts, photos, etc., be forwarded to participants at the same time the application is*

submitted to the FAA. It is recommended that participants be made aware of aircraft servicing procedures, where and when the aviation event briefing will take place, the time and location of any airworthiness inspections, and any additional information which will help participants be informed before their arrival. The idea is to impart as much operational information as practical in advance so that participants are not deluged at the last minute with operational procedures and instructions on top of an already packed schedule of activities.

b. **Aircraft rides for hire and media flights** are two unique flight operations which frequently must be addressed by aviation event organizers. Permission to conduct aircraft rides for hire is based upon the same criteria that is applied to any other participant. Thorough planning and thought should also be given to the times rides are allowed, the ingress/egress safety of passengers, and positive security control of the entire aircraft-ride ground operation.

c. **Qualified aviation event participants** have a keen interest in the conduct of a safe operation. The primary safety check-and-balance used by the aviation event organizer is the establishment of the credentials of each participant and his or her aircraft, confirmation of the participants' experience in an aviation event environment, and provision to each -flying participant with the proper information regarding operations at that specific event.

10.5 Living History Flight Experience

The FAA National Policy (N 8900.604), "Living History Flight Experience Enhanced Oversight," dated November 22, 2021, provided, in part, the following:

a. LHFE Definition.

- (1) LHFE exemptions, generally, are granted to authorize the carriage of persons for compensation in aircraft holding limited or experimental category airworthiness certificates. These historically significant, former military aircraft provide short in-flight experiences. They are operated under Title 14 of the Code of Federal Regulations (14 CFR) part 91. A grant of exemption with its specific conditions and limitations (C/L) constitutes a regulatory requirement. The FAA set forth general policy considerations regarding LHFE operations on July 21, 2015. Refer to 80 FR 43012, Policy Regarding Living History Flight Experience Exemptions for Passenger Carrying Operations Conducted for Compensation and Hire in Other Than Standard Category (the Policy). The Policy identifies certain aircraft the FAA generally considers eligible for an exemption under LHFE, and specifies certain risk mitigation measures that apply to each LHFE operation. Regulatory relief extends only to those regulations specifically identified in each individual LHFE exemption.
- (2) A grant of exemption with its specific C/Ls constitutes a regulatory requirement. A petitioner must apply for exemption under 14 CFR part 11.

Regulatory relief extends only to those regulations specifically identified in each individual exemption. For aircraft with a Special Airworthiness Certificate, an exemption does not grant relief from operating limitations unless specifically identified in the exemption. (For example, LHFE grants relief from part 91, § 91.9, only to allow for carriage of passengers for hire. No other relief is granted from § 91.9 or operating limitations.) Inspectors must familiarize themselves with the aircraft operating limitations, the exemption, and its C/Ls to ensure compliance during the inspection.

b. Reason for Change. A fatal B-17 accident in 2019, operated under an LHFE exemption⁷⁷, revealed the need to standardize surveillance and oversight of LHFE exemption holders. LHFE aircraft and pilots are routinely subjected to ramp inspections, but oversight of operators' overall safety culture and compliance with the exemptions, C/Ls, training, testing, and manual systems is unique to these types of exemption holders and requires increased oversight.

10.5.1 Federal Register Living History Flight Experience

Federal Register, Volume 80, No. 139, dated July 21, 2015⁷⁸ created a "Policy Regarding Living History Flight Experience Exemptions for Passenger Carrying Operations Conducted for Compensation and Hire in Other Than Standard Category Aircraft." That policy, in part stated the following:

The FAA has historically found the preservation of U.S. aviation history to be in the public interest, including preservation of certain former military aircraft transferred to private individuals or organizations for the purpose of restoring and operating these aircraft. In 1996, the FAA received exemption requests from not-for-profit organizations to permit the carriage of persons for compensation in both Limited and Experimental category, former-military, historically-significant aircraft. These requests offered to provide a short in-flight experience to these aircraft in exchange for compensation, leading to the term Nostalgia Flights, then later Living History Flight Experience (LHFE), and provided a means for private civilian owners to offset the considerable restoration, maintenance and operational costs. The FAA determined that, in certain cases, operators could conduct LHFE flights at an acceptable level of safety and in the public interest, in accordance with appropriate conditions and limitations. These original requests involved large, crew-served, piston-powered, multi-engine World War II (WWII) vintage aircraft. In order to maintain safe operations of these aircraft, the FAA required flight crewmembers to meet certain qualifications and training requirements that included FAA approved training, maintaining training

⁷⁷ Reference NTSB Accident number ERA20MA001 [Report ERA20MA001_100356_10_12_2023_3_51_51 PM.pdf](#)

⁷⁸ Source: [2015-17966.pdf \(govinfo.gov\)](#)

records, and reporting procedures. As the public availability of purchase for former military aircraft increased, along with an increase in public interest for maintaining and operating these aircraft, so grew the requests for LHFE relief...

FAA Policy

The FAA announces the end of the FAA-imposed moratorium on new petitions for exemption, or amendments to existing exemptions, from certain sections of 14 CFR for the purpose of carrying passengers for compensation or hire on LHFE flights. The FAA is also cancelling all previously issued LHFE policy statements. The FAA will now consider new petitions for exemption, or requests for extensions or amendments to current exemptions in accordance with the following criteria.

A. Aircraft Must Be “Historically Significant” Each aircraft must be “historically significant” according to the following criteria:

1. *U.S. operated: The aircraft must meet a documented set of U.S. military standards for its airworthiness and operations in U.S. military service.*
2. *Not in service: Aircraft currently operated by the U.S. military or in civilian service will not be considered. This exclusion includes variants of those aircraft.*
3. *Fragile: The aircraft must be “fragile.” Accepted practices in the collection of aircraft include “fragility” as a factor that necessitates preservation. If there are hundreds of models of a particular aircraft still flying, that aircraft’s existence would not be considered “fragile.” If, on the other hand, there are few remaining aircraft and the model could become “extinct” without preservation efforts, that aircraft would be considered “fragile.” Each aircraft request will be reviewed for “fragility” on a case-by-case basis.*
4. *Age: The original type design must be at least 50 years old. This requirement is consistent with the policy used by the National Register of Historical Places to determine historical significance (Reference: National Register Bulletin: Guidelines for Evaluating and Documenting Historic Aviation Properties. US Department of Interior, 1998, p. 34-35).*
5. *No Available Standard Category Aircraft: Aircraft for which a standard category civilian model is available will not be considered. (e.g., the T-28A achieved certification as a standard aircraft, while the other versions, T-28B/C, etc., were strictly military variants and not eligible for certification in the standard category). Replicas will not be considered. This element*

relates to the “integrity” of the structure or object as defined by the National Register of Historical Places, as described in the GAO report on Aircraft Preservation (Reference: Aircraft Preservation: Preserving DOD Aircraft Significant to Aviation History, GAO/ NSIAD-8-170BR, May 1988, Appendix III, p. 13).

B. Designation of a Responsible Person and Operational Control Structure

The FAA will review each petition to identify a responsible party, and an operational control structure or chain of command within the manual system for pilots, maintenance, and support personnel. Consequently, each petition should designate a responsible person whom the FAA can contact for both operations and maintenance functions.

C. Safety & Risk Analysis The FAA will use Safety Risk Management (SRM) and Equal Level of Safety (ELoS) principles to guide its safety review in connection with any future LHFE exemption petition or request. This safety review will include, but will not be limited to, an analysis of whether hazards and risks have been identified and responded to through appropriate mitigating strategies. As such, each petitioner should be guided by the following criteria:

- An understanding and use of Safety Risk Management (SRM) principles.
- A plan to mitigate risks as they become known, or to correct an unsafe condition or practice. This includes, but is not limited to, risks in design, manufacturing, maintenance and operations.
- A detailed explanation of all supporting and historical safety-related data, such as: Maintenance history, airworthiness status, conformity to the Type Certificate Data Sheet (TCDS—for Limited category airworthiness certificates), operational failure modes, aging aircraft factors, and civilian and military accident rates. For example, the FAA will consider:
 - Operator history, including accidents and incidents, regulatory compliance and FAA surveillance history.
 - Maintenance records, including modifications.
 - Training records.
 - The aircraft’s operational history, including the operator’s proposed mitigation of known risks.
 - Operating limitations to enhance safety, clarify, and remediate differences in like aircraft.
 - The FAA will assess and, if necessary, require changes to passenger safety in terms of configuration, seats, crashworthiness, and emergency egress, etc.

- *The operator should be able to demonstrate to the FAA, upon request, the passenger's ability to egress each aircraft in the event of an emergency in which the crewmember(s) is unable to assist.*

D. Manual System *LHFE operators should be able to demonstrate the existence of a manual system similar in terms of intent and scope of those in 14 CFR part 135. The FAA will evaluate the operator's manuals, including:*

- *Operations Manual (General Operations Manual-GOM).*
- *Pilot Training Manual and Qualifications.*
- *Maintenance and Line Support Training Manuals.*
- *Maintenance Manual (AIP) including, but not limited to:*
 - *Review of previously approved AIPs as provided by 14 CFR 91.415*
 - *Maintenance training elements.*
 - *Replacement plan for time-limited parts or development of an on-condition inspection program for such parts.*
 - *Aging aircraft inspection program.*
 - *Corrosion inspection program.*
 - *Continued Operational Safety (COS).*
- *SMS Manual.*

E. Other Considerations *LHFE operations, as it applies to the passenger(s) experience, is limited to the sole purpose of being onboard the aircraft during flight. The FAA will not consider expanded operations such as flight training, aerobatics, and passenger manipulation of the flight controls.*

The FAA will always consider whether a request benefits the public as a whole and how the request would provide a level of safety at least equal to that provided by the rule in accordance with 14 CFR 11.81. Moreover, the FAA may impose additional conditions and limitations or deny petitions regardless of this policy statement to adequately mitigate safety concerns and risk factors as they become known...

10.6 Certificate of Waiver or Authorization

According to FAA Order 7210.3CC "Facility Operation and Administration," Section 19-1 "Waivers and Authorizations"⁷⁹, dated November 3, 2022, the FAA can grant a Certificate of Waiver or Authorization to provide relief from specific regulations for a set period. However, the certificate does not waive any state law or local ordinance.

⁷⁹ Source: [Waivers and Authorizations \(faa.gov\)](https://www.faa.gov)

10.6.1 Certificate of Waiver/Authorization Issuance and Oversight Procedures

FAA order 8900.1 CHG 694, Volume 3, "General Technical Administration", stated, in part, that "the event organizer must submit applications (FAA Form 7711-2) for a CoW for air shows, balloon events, or air races at least 90 days before the date of the event; 120 days is recommended. An application for a flyover (military) should be submitted 45 days before the date of the event. Approval of the application will be completed only after the event organizer has met all requirements. Within 30 days of receipt by the FSDO, the FSDO must notify the event organizer of any discrepancies or omissions. Notification of approval or disapproval must be completed 30 days prior to the event. It is preferable the CoW be issued 30 days prior to the aviation event. In all cases, all approved CoWs must be issued at least 15 days prior to the aviation event.

Additionally the guidance provided the following procedures flowchart:

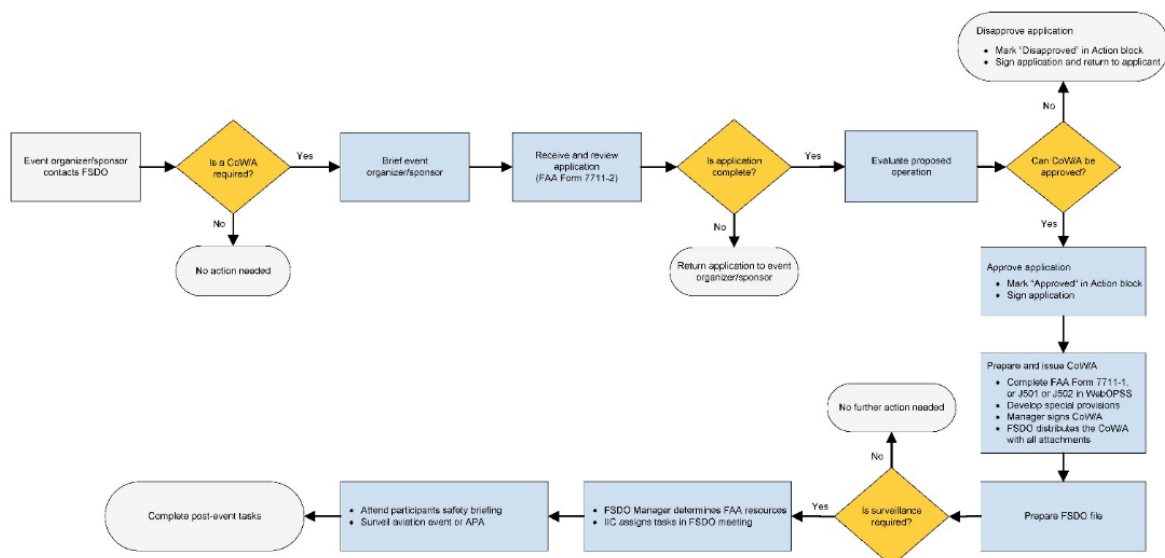


Figure 5: CoW/A Issuance and Oversight Procedures Flowchart (Source: FAA 8900.1 Figure 3-23)

11.0 Wings Over Dallas Certificate of Waiver

The Wings Over Dallas Certificate of Waiver (CoW), FAA Form 7711-1, was issued by the North Texas FAA Flight Standards District Office on November 2, 2022. The CoW was "...effective from November 11, 2022 1000 CDT[sic] to November 13, 2022, 1700 CDT [sic] daily..." The CoW authorized the following operations:

Over-land air show conducted at Dallas Executive Airport (KRBD) with CAT II, and III aerobatic performances, and civilian fly-bys.

The area of operations will be within a 5 nm radius of Dallas Executive Airport (KRBD) surface to 6,000 ft msl.

Additionally, the CoW listed the regulations that were waived for this specific CoW. Those waived regulations were:

14 CFR §91.107(a)(2)(3), Use of Safety Belts, Shoulder Harnesses, and Child Restraint Systems. 91.117(a)(b)(c), Aircraft Speed; 91.119(b)(c), Minimum Safe altitudes - General; 91.121, Altimeter Settings; 91.129, Operations in Class D Airspace; 91.155, Basic VFR Weather Minimums; 91.303(c)(d)(e), Aerobatic Flight; and 91.515, Flight Altitude Rules.

In addition, the CoW provided 19 "Common Special Provisions", three of those provisions were:

...name in Item 2 on FAA Form 7711-2 must ensure that participants are thoroughly briefed on special field rules, the established demonstration area, flying display area, and aerobatic box (other defined areas within the waived/authorized airspace), manner and order of events, and special provision of the CoW or CoA, before beginning the activities each day.

- a. No person may participate in any event listed on the CoW unless that person has signed a statement acknowledging receipt of a briefing on the provisions of the CoW.*
- b. For team performances, only the team leader is required; however, a delegate may represent the team leader, provided the person is a pilot member of the team. The team leader or delegate must brief each member of the team and will provide the name of each person on the team he/she will brief before the performance...*

In lieu of placing a large "X" on the runways to indicate the airport is closed, the control point may have spotters dedicated to detection of non-participating aircraft encroaching on the waived airspace. In the event that communications cannot be established with the encroaching aircraft, operations will be suspended until the aircraft either departs the area or lands and clears the active runways...

Unmanned Aerial Systems (UAS) Demonstrations are not authorized under this CoW...

11.1 Special Provisions

The CoW also listed "Air Show Special Provisions"⁸⁰ the following were, in part, those provisions:

1. *All civil pilots who perform aerobatics and dynamic maneuvering must possess:*
 - a. *A valid FAA Form 8710-7, Statement of Acrobatic Competency, or Transport Canada Aviation (TCA), Form 26-0307, Statement of Aerobatic Competency. All limitations and endorsements on the form will be adhered to including altitude restriction for the entire performance.*
2. *All civil aircraft pilots must show evidence of performing or practicing their performance(s) within the previous 45 days.*
3. *All civil aircraft pilots that perform formation dynamic maneuvering or aerobatics must ensure the following requirements are met:*
 - a. *The members of the aerobatic team must comply with practice requirements of the applicable FAA accepted RIO ACE Program; and*
 - b. *All persons conducting formation dynamic maneuvering or aerobatics must have demonstrated or substantiated their skills as a team and have the formation dynamic maneuvering or aerobatics notation placed on their SAC.*

Note: *An air show performance conducted under a CoW issued for an "air show" is never counted as a practice.*

Note: *This evidence of performing or practicing can be a logbook endorsement, a written statement, or by noting this on the Participants Safety Briefing Signature Page for Aviation Event. The required practice or performance must be in the same aircraft make and model and the same maneuvers that will be performed at this event.*

⁸⁰ Special Provisions are conditions, requirements, or limitations necessary to protect persons and property on the surface and other users of the national airspace system. A. ensuring Safety. The special provisions on FAA Form 7711-1 ensure that the aviation event can be conducted with an adverse effect on safety. Every airshow waiver shall contain special provision to ensure adequate public and non-airshow traffic safety. There may be a wide variation in the type of special provisions called for... Source: FAA Advisory Circular 91-45C, Chapter 7 "Waiver Provisions" subchapter 88 "Special Provisions" [AC 91-45C - Waivers: Aviation Events \(faa.gov\)](#)

4. *All military pilots must have command approval and FAA approval to conduct a demonstration in accordance with an approved maneuvers package.*
5. *Civilian pilots who wish to conduct Standard formation flight in airspace issued a CoW for an aviation event must possess a valid industry formation credential acceptable to the FAA.*
6. *A fly-by can be performed by a single aircraft, by aircraft in formation, or by aircraft in trail, along show lines at a minimum horizontal distance of not less than 500 feet from spectator area(s), congested areas, or occupied buildings; and in accordance with the conditions established in the following table.*

ATTACHMENTS

1. CAF Personnel Interview Transcripts and Statements
2. Air Boss and Observer Air Boss Statements and Transcripts
3. ICAS Personnel Interview
4. FAA Personnel Transcripts and Statements
5. Interview Summaries with EAA and Sun-N-Fun Personnel
6. B-17 Pilots CAF Training Records [Excerpts]
7. P-63 Pilot CAF Training Records [Excerpts]
8. CAF Provided Pilot Flight Times
9. P-63 Pilot SAC and Formation Cards
10. Wings Over Dallas Certificate of Waiver
11. Dallas Executive Airport NOTAMs in Effect
12. FAA 8900.1 CHG 694 Vol 3 [Excerpts]
13. FAA Publication "All About Airshows" [Excerpt]
14. Aerobatic Competency Evaluation Manual [Excerpts]
15. Air Boss Recognition Program Manual [Excerpts]
16. FAA Letter of Authorization on Air Boss Recognition Program
17. Commemorative Air Force SMS Refresher Training [Excerpts]
18. Commemorative Air Force SMS Manual - 2017
19. Commemorative Air Force SMS Manual - November 2023
20. FAA Living History Flight Experience [Excerpt]
21. FAA National Policy N8900.604
22. Wings Over Dallas Preshow Briefing
23. Wings Over Dallas Briefing Sign-In Sheets and Saturday Sequence
24. NASA ASRS Results for "See and Avoid" [Excerpts]

Submitted by:

Shawn Etcher
Operational Factors Investigator

Sabrina Woods
Human Performance Investigator