Aviation Investigation Final Report

Location:	Reno, Nevada	**Accident Number:**	WPR23FA345
Date & Time:	September 17, 2023, 13:55 Local	**Registration:**	N2897G (A1); N57418 (A2)
Aircraft:	North American T-6G (A1); North American AT-6B (A2)	**Aircraft Damage:**	Substantial (A1); Substantial (A2)
Defining Event:	Midair collision	**Injuries:**	1 Fatal (A1); 1 Fatal (A2)
Flight Conducted Under:	Part 91: General aviation - Air race/show (A1); Part 91: General aviation - Air race/show (A2)		

Analysis

The pilots of the accident airplanes were participating in a closed-course air race. Both pilots had just completed the race and entered the airport traffic pattern for runway 8. Several witnesses observed the airplanes, Race 14 and Race 6, collide while Race 14 was on the base leg (a southerly heading) and Race 6 was on the downwind leg (a west-southwest heading). Witnesses, including the pilot of another race airplane, reported that Race 14 was on a wide base leg for the runway, while Race 6 was closer in on the downwind leg for the runway. While the exact flight path of each airplane could not be determined, based upon witness and other pilots' statements, along with Race 14's radio transmissions, it's likely that the wider pattern flown by Race 14, and the tighter pattern flown by Race 6, placed Race 14 to the right of Race 6's flight path. Given the pilot of Race 14's transmission "base with gear," it's likely that the pilot of Race 6 may have been looking to the left for Race 14.

Sun data at the time of the accident showed that the center of the sun's disk would have been ahead and slightly to the right of Race 14's flight path, and to the left of Race 6's flight path, about 50° above the horizon.

The person who was in the Race Control position reported that he was in the control tower providing advisory functions for the T-6 Gold Race. At the conclusion of the race, after the participants had exited the race course, Race 14 reported midfield abeam for runway 08 (meaning the aircraft was abeam the tower on downwind for runway 8); Race Control then advised Race 14 that he was in the No. 1 position to land. After Race 6 then reported midfield abeam, Race Control advised Race 6 that he was following traffic ahead on downwind. He

further stated that when Race 14 reported base and gear, he had cleared him to land on runway 8. Soon after, other aircraft in the cool-down pattern started to report midfield abeam the tower; he advised them of traffic ahead on the downwind. Race Control then observed an aircraft falling from the sky about the location of the base leg for runway 08; he then alerted the people in the tower. Shortly after, he observed a second airplane falling and impacting the ground. A witness located along the edge of airport property captured audio transmissions during the race. The recording includes various transmissions from Race 14 and Race 6. Although there were multiple unintelligible transmissions, no discernible transmissions regarding a traffic alert from Race Control could be identified.

Standard operating procedures outlined the duties for various positions of personnel in the tower at the time of the race along with expected radio transmissions by the pilots and tower controller. The operating procedures provided no distinct procedures for tower personnel to provide traffic separation. Additionally, the air boss stated that it was an expectation but there was no written guidance.

Probable Cause and Findings

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

The failure of both the Race 14 and Race 6 pilots to see and avoid each other while in the airport traffic pattern. Contributing to the accident was both pilots' failure to fly the standard downwind and base legs.

Findings

Personnel issues (A1)	Monitoring other aircraft - Pilot
Personnel issues (A1)	Decision making/judgment - Pilot
Personnel issues (A1)	Lack of communication - ATC personnel
Personnel issues (A2)	Monitoring other aircraft - Pilot
Personnel issues (A2)	Decision making/judgment - Pilot
Personnel issues (A2)	Lack of communication - ATC personnel

Factual Information

History of Flight

Approach-VFR pattern downwind (A1)	Midair collision (Defining event)
Approach-VFR pattern downwind (A2)	Midair collision

On September 17, 2023, about 1355 Pacific daylight time, a North American T-6G, N2897G (Race 6), and a North American AT-6B, N57418 (Race 14), were destroyed when they were involved in an accident near Reno, Nevada. The pilots of both airplanes were fatally injured. Both airplanes were operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

Several witnesses reported observing both Race 14 and Race 6 collide while in the airport traffic pattern for runway 8. One witness reported that Race 14 was on the base leg (southerly heading) for runway 8, oriented along the airport perimeter fence line about 300 ft above ground level (agl), and Race 6 was on the downwind leg (a west-southwest heading) about 300 ft agl. The witness stated that at the time of the collision, Race 6 was at about a 75° angle in relation to the flight path of Race 14.

The pilot of Race 66, who was in the third position to land, reported that after he had completed the race he began a slow left turn to downwind. Just before turning onto downwind, he heard the pilots of Race 14 and Race 6 transmit “downwind, abeam.” The pilot of Race 66 stated that he continued to slow his airplane to “create some space and time to see them” as he heard Race 14 transmit “base with gear.” As he got close to turning onto the base leg for the runway, he spotted Race 6, and he transmitted downwind abeam. The pilot of Race 66 stated that he “finally spotted” Race 14 below his position to the right and on the base leg, and saw Race 6 in level flight, to his left, noting both airplanes were not where he expected them to be. He added that Race 14 was on a “wider base” than the previous 2 flights, and Race 6 was “tighter” than he was. Race 14 then crossed in front of his position from the right to the left and disappeared on the right side of the engine cowling, and Race 6 disappeared under his left wing. The pilot of Race 66 transmitted base with gear and began a left turn to the base leg for runway 8. Shortly after, he observed Race 14 in level flight, where he expected him to be, but with “nothing behind the passenger seat.” Race 14 then began to roll to the right and descend in a nose-low attitude.

The pilot of Race 88 reported that he pulled up into a high, wide downwind to land on runway 8, and while on downwind he saw Race 66 ahead and slightly inside of him, with Race 6 ahead of Race 66, lower, and well inside of both Race 66 and 88. He stated that he could not see Race 14.

The pilot of the pace airplane reported that he recalled seeing Race 6 pull off the course more aggressively than the other racers, “which may have contributed to him flying a closer in downwind than normal.”

A video recorded by a witness captured the collision between Race 6 and Race 14. The video showed Race 14 about wings-level over the witnesses’ location; about 6 seconds later, Race 6 appeared. Race 6 appeared to be in a left bank and, about a second later, both airplanes collided.

Figure 1: Excerpt from a video at the time of the collision. Courtesy of a witness.

Review of recorded radio transmissions after the completion of the race revealed that the pilot of Race 14 reported downwind abeam about 41 seconds after the checkered flag was announced. About 30 seconds later, the pilot of Race 6 reported downwind abeam, which was followed by the pilot of Race 14 reporting base with gear about 5 seconds later. Several transmissions were heard from pilots of other aircraft reporting downwind abeam in addition to multiple unintelligible transmissions until the announcement of a “red flag” about 1 minute, 14 seconds after Race 14’s initial transmission.

The person who was in the Race Control position reported that he was in the control tower providing advisory functions for the T-6 Gold Race. At the conclusion of the race, after the participants had exited the race course, Race 14 reported midfield abeam for runway 08, Race Control then advised Race 14 that he was in the No. 1 position to land. After Race 6 then reported midfield abeam the tower, Race Control advised Race 6 that he was following traffic

ahead on downwind. He further stated that when Race 14 reported base and gear, he had cleared him to land on runway 8. Soon after, other aircraft in the cool-down pattern started to report midfield abeam the tower; he advised them of traffic ahead on the downwind. Race Control then observed an aircraft falling from the sky about the location of the base leg for runway 08; he then alerted the people in the tower. Shortly after, he observed a second airplane falling and impacting the ground.

Pilot Information (A1)

Certificate:	Commercial	**Age:**	67,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	May 11, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 27, 2022
Flight Time:	10976 hours (Total, all aircraft)		

Pilot Information (A2)

Certificate:	Commercial	**Age:**	65,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	July 11, 2023
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	July 6, 2023
Flight Time:	3404 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information (A1)

Aircraft Make:	North American	**Registration:**	N2897G
Model/Series:	T-6G	**Aircraft Category:**	Airplane
Year of Manufacture:	1959	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	49-3492
Landing Gear Type:	Retractable - Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	May 7, 2023 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	6232.4 Hrs as of last inspection	**Engine Manufacturer:**	P & W
ELT:		**Engine Model/Series:**	R-1340-AN-1
Registered Owner:	SIX CAT RACING INC	**Rated Power:**	550 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Aircraft and Owner/Operator Information (A2)

Aircraft Make:	North American	**Registration:**	N57418
Model/Series:	AT-6B	**Aircraft Category:**	Airplane
Year of Manufacture:	1942	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	84-7748
Landing Gear Type:	Retractable - Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	July 7, 2023 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5602 Hrs as of last inspection	**Engine Manufacturer:**	P&W
ELT:		**Engine Model/Series:**	R1340 SERIES
Registered Owner:	On file	**Rated Power:**	600 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Race 6 was painted all black with silver lettering on the left and right fuselage.

Race 14 was painted all gray with red wing tips and red diagonal stripes on the vertical stabilizer and rudder. The U.S. Military stars and bars insignia was painted on both sides of the aft fuselage, the top of the left wing, and the bottom of the right wing. Several sponsor logos were painted on the fuselage sides.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KRTS,5053 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	13:55 Local	**Direction from Accident Site:**	164°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/ 13 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.13 inches Hg	**Temperature/Dew Point:**	27°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Reno, NV (A1); Reno, NV (A2)	**Type of Flight Plan Filed:**	
Destination:	Reno, NV (A1); Reno, NV (A2)	**Type of Clearance:**	VFR (A1); VFR (A2)
Departure Time:		**Type of Airspace:**	Class G (A1); Class G (A2)

Sun data at the time of the accident showed that the center of the sun's disk would have been at an azimuth of 204° true at an altitude of 50° above the horizon.

Airport Information

Airport:	Reno Stead Airport KRTS	**Runway Surface Type:**	Asphalt
Airport Elevation:	5050 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	8	**IFR Approach:**	None
Runway Length/Width:	7608 ft / 150 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information (A1)

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.668177,-119.87644(est)

Wreckage and Impact Information (A2)

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.668177,-119.87644(est)

Examination of the accident site revealed a debris path originated about 7,881 ft northwest of the approach end of runway 8 and extended south to the main wreckage of Race 14 and was about 1,366 ft in length.

The wreckage of Race 14 came to rest in an open sagebrush field. The entire wing section was separated from the fuselage and located about 10 ft from the main fuselage wreckage. Identified pieces of Race 14 in the debris field included segments of the left aileron, segments of the left flap, right horizontal stabilizer, right elevator, sections of aft fuselage skin, and a plastic pouch with the airplane documents. Small pieces of black painted skin and plexiglass were identified in the debris field.

The wreckage of Race 6 came to rest in an open sagebrush field. The wing structure was separated from the fuselage and the outboard left wing was separated at the attach joint. The wing sections were located about 30 ft south of the main wreckage. The fuselage was compressed aft significantly. The vertical stabilizer, rudder, tailwheel, left horizontal stabilizer, left elevator, and portions of fuselage skin from Race 14 were recovered from the wreckage of Race 6. All major structural components of Race 6 were located within about 50 ft of the main wreckage.

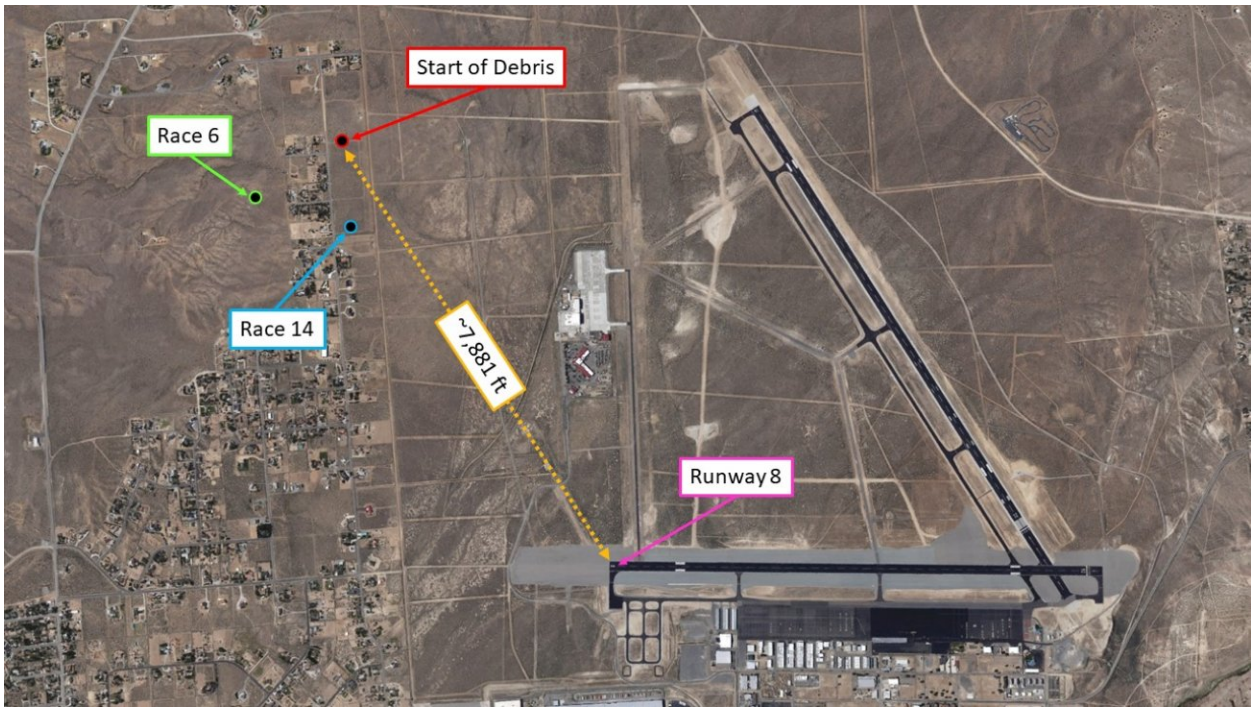

Figure 2: Wreckage location diagram.

Medical and Pathological Information

An autopsy of the pilot of Race 6 was performed by the Washoe County Medical Examiner's office.. According to the autopsy report, the cause of death was multiple blunt force injuries, and the manner of death was accident.

Toxicology testing for the pilot of Race 6 was performed at the FAA Forensic Sciences Laboratory found no drugs of abuse.

An autopsy of the pilot of Race 14 was performed by the Washoe County Medical Examiner's office. According to the autopsy report, the cause of death was multiple blunt force injuries, and the manner of death was accident.

Toxicology testing for the pilot of Race 14 was performed at the FAA Forensic Sciences Laboratory found no drugs of abuse.

Reno Air Race Association

The Flight Operations Team 2023 Standard Operating Procedures outlined definitions for various positions that included the Air Boss, Controller in Charge, and Race Control. The definition for the Air Boss position stated in part…" Individual with overall authority and responsibility for all aircraft operations and management of all Flight Operations under the Race Waiver, Air Show Waiver, and Contract Tower Operations." The Controller in Charge (CIC) is defined as "a Race Controller appointed by Tower Chief to assume certain duties of the Tower Chief during his absence or when operational requirements require the Tower Chief to be engaged with other duties and responsibilities." The Race Control position was defined as "Front-line controllers ("Race Controllers") who manage all traffic movements during a RARA Event and report directly to the Tower Chief."

Additionally, the standard operating procedures outlined procedures for exiting the [race]course, pattern, and landing procedures. They stated, in part, "exiting cool down is an informational call made by the racers and does not require acknowledgement from Race Control." "All aircraft will call downwind abeam (meaning the aircraft is abeam the Tower on downwind); EXCEPT FOR IF1 and BIPLANE, Race Control will provide each aircraft with its interval to landing by issuing, Race XX, number two following traffic Same procedure for next traffic entering Downwind Abeam….If an aircraft fails to make the downwind abeam call, Race Control will proactively provide that aircraft with their interval. After an aircraft calls base with gear just issue landing clearance i.e., race cleared to land."

The person who occupied the Air Boss position at the time of the accident stated that, from a spotter standpoint, the spotters report and advise where airplanes are to Race Control and that Race Control is the only position that talks to airborne race aircraft. He added that they do not provide traffic separation and that there was no written guidance regarding traffic separation. However, they provide an advisory service only, which includes providing a sequence number for landing to the race aircraft and that they do not report positions of other aircraft unless requested by the pilot of a race aircraft. When asked about relaying potential conflicts of a collision, the Air Boss stated that "historically, Race Control has proactively made calls to avoid a possible conflict."

Pylon Racing Seminar (PRS) – T6 Class

PRS training material that was provided to the T6 Class included information on landing procedures and race control communications. The material indicated that a pattern altitude of 6,500 ft mean sea level should be used for all runways. The radio transmissions expected by the racers should include "Race #, Abeam Runway" and to not expect a reply from race control, and "Race Control, Race #, Base with gear" and to expect a landing clearance.

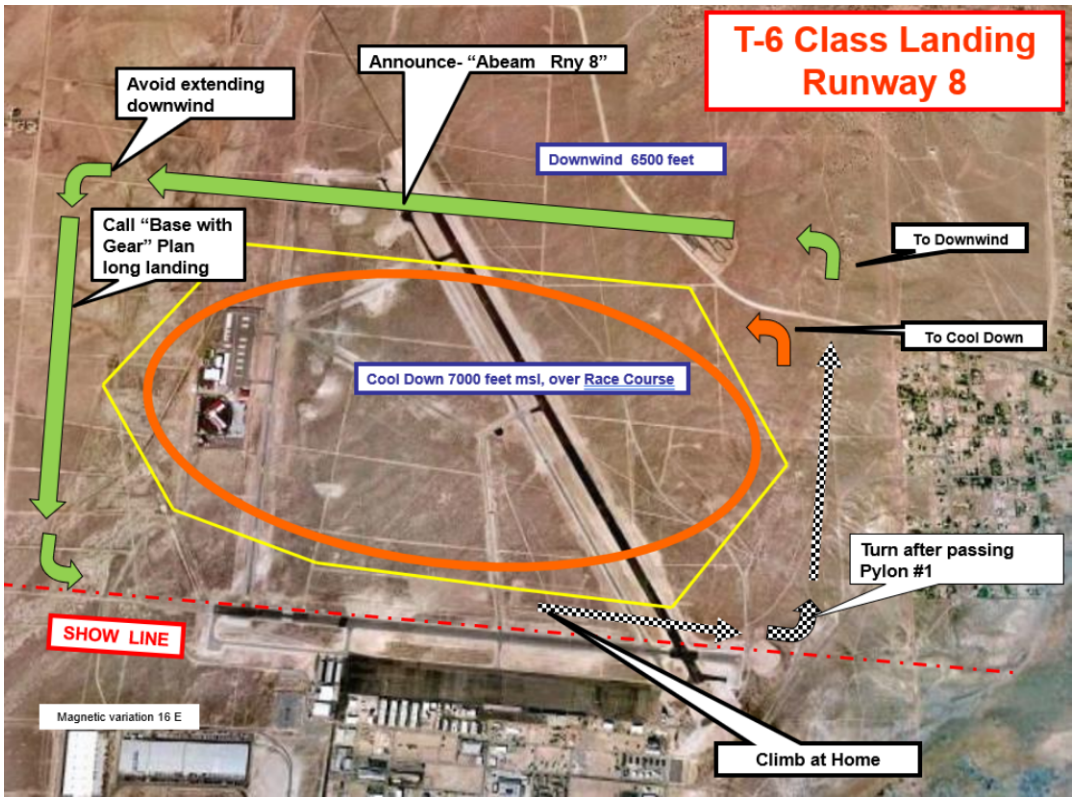

Figure 3: T6 Class PRS Training Slide, with pattern locations annotated. Courtesy of the T6 Class.

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Paul Adams; FAA Reno FSDO; Reno, NV Terrance Matter; Reno Air Race Association; Reno, NV
Original Publish Date:	September 3, 2025
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=193074

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