# Aviation Investigation Final Report

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| **Location:** | Oxnard, California | **Accident Number:** | WPR15GA030 |
| **Date & Time:** | October 29, 2014, 17:11 Local | **Registration:** | N332AX |
| **Aircraft:** | HAWKER AIRCRAFT LTD HAWKER HUNTER MK.58 | **Aircraft Damage:** | Destroyed |
| **Defining Event:** | Aerodynamic stall/spin | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Public aircraft | | |

## Analysis

The airline transport pilot was flying the single-seat turbojet airplane, which was owned and operated by a private company under contract to the United States Navy. The accident airplane was one of a flight of two airplanes that were returning to the airport to land at the conclusion of a training exercise. The accident airplane was to follow the lead airplane in an "overhead break" maneuver, which included overflying the runway, entering a descending, 270-degree turn to enter the downwind leg of the traffic pattern, then subsequently entering a descending, 180-degree turn to final approach. The recommended final approach airspeed was 150 knots (kts).

Witnesses observed both airplanes during the approach, and noted that the accident airplane's approach appeared lower and slower than that of the lead airplane. They stated that they observed the accident airplane in a left-wing-low bank, the wings rocked from side to side, then the airplane entered a rapid roll to the right and pitched down until it impacted the ground.

Recorded data recovered from the airplane's primary flight display unit revealed that the airplane crossed the runway's extended centerline about 5,900 ft from the runway threshold in a 30-degree bank at an airspeed about 126 kts. At this time, the airplane was on a magnetic heading about 25 degrees from runway alignment, at an altitude of about 328 ft; field elevation was 13 ft. Although the airspeed was well below the target airspeed, the airplane was on a heading, and in a geographic location, that permitted capture of the final approach path with bank corrections. Stall onset occurred several seconds later when the airplane was at a bank angle of 45 degrees, an airspeed of 114 kts, and an altitude of 276 ft. Data indicated that the pilot did not increase thrust significantly in the approach until at, or possibly about 1 second before, stall onset.

The stall was the result of the combination of an airspeed that was 46 knots below the minimum target value, and a bank angle that was significantly more than that required to capture the final approach path.

Examination of the engine and flight controls did not reveal any mechanical deficiencies that would have adversely affected the performance or controllability of the airplane before impact.

The on-scene investigation revealed that the pilot did not attempt to eject from the airplane. Naval Air Systems Command simulations determined that a successful ejection could have been accomplished as late as 2 seconds before the end of the data (the data ended several seconds before impact).

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The pilot's failure to maintain adequate airspeed during the approach for landing, which resulted in the airplane exceeding its critical angle of attack and experiencing an aerodynamic stall/spin at an altitude too low for recovery.

### Findings

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| **Personnel issues** | Aircraft control - Pilot |
| **Aircraft** | Airspeed - Not attained/maintained |
| **Aircraft** | Angle of attack - Not attained/maintained |

# Factual Information

## History of Flight

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| **Approach-VFR pattern final** | Aerodynamic stall/spin (Defining event) |
| **Approach-VFR pattern final** | Loss of control in flight |
| **Uncontrolled descent** | Collision with terr/obj (non-CFIT) |

On October 29, 2014, at 1711 Pacific daylight time, a Hawker Hunter Mk 58, single-seat turbojet fighter aircraft, N332AX, crashed while on approach to Naval Air Station (NAS) Point Mugu, California (NTD). The airline transport pilot was killed, and the airplane was destroyed by impact forces and postimpact fire. The airplane was registered to Airborne Tactical Advantage Company (ATAC) and the non-military public flight was operated under contract to Naval Air Systems Command (NAVAIR) in accordance with the provisions of 49 United States Code (USC) Sections 40102 and 40125. Visual meteorological conditions existed at the accident site and the flight was operated on a visual flight rules flight plan.

The purpose of the flight was to support adversary and electronic warfare training with Carrier Strike Group 15 (CSG15). The accident airplane departed NTD at 1500 as the wingman in a flight of two Hunters, intending to participate in an adversarial support air defense training exercise offshore in warning area W291. The flight's radio call sign was "ATAC 11," and the accident airplane was "ATAC 12."

The accident occurred during the "overhead break" arrival to land on runway 21. The procedures were to fly as a flight of two with ATAC 12 making a left break 4 seconds after the lead airplane, ATAC 11. ATAC 12 was to follow the lead in a descending, 270-degree turn to enter the downwind leg for runway 21. At the initiation of the base leg, the pilot was to make a continuous, descending, 180-degree turn, and roll out on final approach to land on runway 21. The normal final approach is flown at a recommended airspeed at or above 150 knots.

Witnesses reported watching both airplanes make the approach and noted that ATAC 12's approach appeared lower and slower than the lead airplane. ATAC 12 was observed in a left-wing-low bank, followed by the wings rocking from side to side, then a quick roll to the right, after which the airplane nosed down and impacted the ground.

A video recording of the accident sequence was recovered from a fixed location near the accident sight. The recording was consistent with witness observations.

## Pilot Information

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| **Certificate:** | Airline transport | **Age:** | 45 |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Single |
| **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 1 With waivers/limitations | **Last FAA Medical Exam:** | May 21, 2014 |
| **Occupational Pilot:** | Yes | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 3727.1 hours (Total, all aircraft), 15.1 hours (Total, this make and model), 2896.1 hours (Pilot In Command, all aircraft) | | |

The operator reported that the 45-year-old pilot held an airline transport pilot certificate with ratings for airplane multiengine land and commercial pilot privileges for airplane single-engine land and instrument airplane. The operator reported that the pilot had a total flight time of 3,727.1 hours, with an estimated 15.1 hours in the accident airplane make and model. The pilot was recently retired from the United States Air Force after serving 21 years. He had most recently been assigned as a pilot in the Air Force, and was current in the F-16. The pilot was hired by ATAC on September 22, 2014, started his initial training on September 23, 2014, and completed it on October 7, 2014. The pilot then reported to ATAC at Point Mugu to begin his operational training.

The accident flight was the pilot's 5th flight with ATAC since reporting from his initial training. The pilot flew one mission on October 28 totaling 1.8 hours. On October 26, the pilot flew two missions totaling 3.7 hours. On October 23, the pilot flew one mission totaling 1.8 hours. The pilot had previously flown one overhead break approach prior to the accident flight.

The pilot held a Federal Aviation Administration (FAA) first-class medical certificate, issued on May 21, 2014, with a limitation that the pilot must wear corrective lenses.

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | HAWKER AIRCRAFT LTD | **Registration:** | N332AX |
| **Model/Series:** | HAWKER HUNTER MK.58 NO SERIES | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 1959 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Experimental (Special) | **Serial Number:** | 41H-697448 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 1 |
| **Date/Type of Last Inspection:** | September 5, 2014 AAIP | **Certified Max Gross Wt.:** | 25000 lbs |
| **Time Since Last Inspection:** | | **Engines:** | 1 Turbo jet |
| **Airframe Total Time:** | 3690.9 Hrs as of last inspection | **Engine Manufacturer:** | Avon |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | 203/7 |
| **Registered Owner:** | HUNTER AVIATION INTERNATIONAL INC | **Rated Power:** | 10150 Lbs thrust |
| **Operator:** | ATAC | **Operating Certificate(s) Held:** | None |

The Hawker Hunter Mk-58 is a single-seat, single-engine, multi-role combat airplane, first introduced into service in 1956; it was originally manufactured by Hawker-Siddley Corporation of the United Kingdom. The airplane has tricycle, retractable landing gear and a hydraulically-boosted flight control system. The airplane was powered by an Avon 203/7 turbojet engine rated at 10,150 lbs of thrust. The airplane was maintained in accordance with an approved aircraft inspection program. Its most recent inspection was completed on September 5, 2014, at a total aircraft time of 3,690.9 hours.

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | KNTD,12 ft msl | **Distance from Accident Site:** | 2 Nautical Miles |
| **Observation Time:** | 17:19 Local | **Direction from Accident Site:** | 270° |
| **Lowest Cloud Condition:** | Few / 28000 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | None | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 29.96 inches Hg | **Temperature/Dew Point:** | 22°C / 16°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Oxnard, CA (NTD ) | **Type of Flight Plan Filed:** | Military VFR |
| **Destination:** | Oxnard, CA (NTD ) | **Type of Clearance:** | VFR |
| **Departure Time:** | 15:00 Local | **Type of Airspace:** | Class D |

## Airport Information

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| **Airport:** | POINT MUGU NAS NTD | **Runway Surface Type:** | Asphalt |
| **Airport Elevation:** | 13 ft msl | **Runway Surface Condition:** | Unknown |
| **Runway Used:** | 21 | **IFR Approach:** | None |
| **Runway Length/Width:** | 11102 ft / 200 ft | **VFR Approach/Landing:** | Traffic pattern |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Destroyed |
| **Passenger Injuries:** | | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | On-ground |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 34.116943,-119.082496 |

The accident site was located in a strawberry field east of Highway 1 and north of the final approach path to runway 21.

Investigators examined the wreckage at the accident scene. The first identified point of contact (FIPC) was a ground scar with components of the right wing located in the ground scar. The debris path extended about 325 feet on a magnetic heading of 290 degrees. The FIPC was 0.7 NM from the

approach end of runway 21, on a heading of 035 degrees.

Examination of the engine, which was still contained in the fuselage, exhibited signatures consistent with the engine operating at a high power setting at impact. The airframe flight control components were examined on scene with no abnormalities noted.

## Medical and Pathological Information

The Ventura County Coroner completed an autopsy on October 31, 2014. The cause of death was blunt force injuries. The FAA Civil Aerospace Medical Institute (CAMI), Oklahoma City, Oklahoma, performed toxicological testing on specimens of the pilot. Analysis of the specimens contained no findings for carbon monoxide, cyanide, volatiles, and tested drugs.

## Tests and Research

NAVAIR Flight Animation

The airplane was equipped with a single Garmin G3X panel-mounted display, which had a primary flight display with attitude/directional guidance, electronic engine monitoring, and moving map capabilities. The installed configuration recorded 57 parameters at 1 second intervals. The data card for the Garmin G3X was recovered at the accident site. Recovered data from the unit captured the accident flight, as well as the previous flights made by the accident pilot.

The NAVAIR Aeromechanics Safety Investigation Support Team (ASIST) used the G3X data to analyze the flight, and published its "Engineering Analysis and Supporting Data Quick Report" that concluded that the data was "of good quality and ... valid for the purposes of this investigation." Angle of attack (AOA or alpha) was not directly sensed on the airplane, and was not derived or recorded by the G3X, but the ASIST analysis used two different methods to calculate AOA. The accident flight data ended a few seconds short of impact, which the ASIST report attributed to G3X internal buffering activity. The ASIST report concluded that the airplane experienced an aerodynamic stall near the end of its turn from the downwind leg of the traffic pattern to final approach for landing.

The data from the Garmin G3X was submitted to the US Navy Safety Center, and a visual representation was produced of both the accident flight and the previous flight completed by the accident pilot. The visual representations are included in the public docket for this accident.

NTSB Airplane Performance Report

An NTSB review of the ASIST report did not reveal any data or conclusions that warranted re-

evaluation or independent verification. However, in an effort to gain additional insight into the accident, the NTSB analyzed data from the accident flight and two other flights, ATAC 11, and the pilot's previous flight on October 26, 2014.

The recorded data did not include any direct measures of throttle position or engine thrust but did include engine exhaust gas temperature (EGT). That parameter was used as an approximation of thrust setting. During the approach maneuver, the EGT remained at a level consistent with a relatively low thrust level, possibly flight idle. The EGT began an increase to near-takeoff value concurrent with the aerodynamic stall.

Depending on flap setting in the approach, the 180-degree turn should have been flown between 160 and 180 kts; recorded data showed that the airplane slowed through 160 kts shortly after the 180-degree turn began.

The target minimum speed until the wings-level rollout from the 180-degree turn onto final was 160 kts; however, the recorded speed was 126 kts when the airplane reached the extended runway centerline.

In both the 270- and 180-degree turns, the pilot lost significantly more speed than ATAC 11 did. In the 270-degree turn on both his previous flight and the accident flight, the pilot decreased his speed by about 110 knots, which was 35 knots more than the speed decrease by ATAC 11. In the 180-degree turn during the accident flight, the pilot decreased his speed by about 55 knots, compared to 38 knots by ATAC 11.

Airplane separation/spacing distances between ATAC 11 and ATAC 12 met the applicable criteria, and did not substantiate any need for the observed speed decreases of ATAC 12.

Following the aerodynamic stall, the airplane rolled from 45 degrees left-wing-low to 71 degrees right-wing-low in about 7 seconds, while descending to 92 feet, at which time the data ended.

Ejection Seat

The on-scene investigation revealed that the pilot did not attempt to eject from the airplane; the ejection seat was activated upon impact. Navair-conducted simulations determined that a successful ejection could have been accomplished as late as 2 seconds before the end of the recorded data.

## Administrative Information

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| **Investigator In Charge (IIC):** | Jones, Patrick |
| **Additional Participating Persons:** | William Barnes; Federal Aviation Administration; Van Nuys, CA<br>Ross Gregory; Federal Aviation Administration; Van Nuys, CA<br>Scott Stacy; ATAC; Newport News, VA |
| **Original Publish Date:** | April 4, 2017 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | The NTSB traveled to the scene of this accident. |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=90331 |