



Aviation Investigation Final Report

Location:	Point Mugu, California	Accident Number:	DCA12FA076
Date & Time:	May 18, 2012, 12:12 Local	Registration:	N329AX
Aircraft:	HAWKER AIRCRAFT LTD HAWKER HUNTER MK.58A	Aircraft Damage:	Destroyed
Defining Event:	Fuel related	Injuries:	1 Fatal
Flight Conducted Under:	Public aircraft		

Analysis

The pilot was appropriately rated to act as pilot in command of the airplane for the intended mission. There was no weather, air traffic control, powerplants, or airplane airworthiness factors in the accident. The accident pilot initiated an ejection at some point after the airplane departed controlled flight, however, the airplane's attitude and altitude were outside the envelope for a successful ejection.

While troubleshooting the lateral imbalance condition that was encountered immediately after takeoff, the accident pilot was aware of the maintenance involving the left fuel transfer valve motor two days prior to the accident flight and quickly concluded that he had a fuel imbalance. He also indicated in communications with the flight lead that he was not certain if he had verified the fuel load during the pre-flight inspection. The airplane was controllable at this point; however, he elected to continue the flight even after the flight lead recommended that he return to base. As the flight progressed, the accident pilot also indicated that he believed he had a transfer problem from the left side tanks, resulting in fuel burning from the right side and no fuel burning from the left wing tanks, thereby exacerbating the lateral imbalance as the flight continued. Although the pilot likely did not verbalize every switch change that he performed in the cockpit, some of the information that was relayed was inconsistent with the design of the fuel system, possibly indicating that the pilot's understanding of the fuel system was limited. The pilot's initial training on the Hunter at ATAC was reduced in time, potentially causing some lack of full understanding of systems. Therefore, the accident pilot elected to continue to the mission area, about 140 miles from the departure airport, with a known fuel imbalance condition, contrary to the airplane flight manual and the flight lead's recommendation.

After the pilot did decide to return to base, he made no more statements about the stick position or controllability of the airplane nor did the pilot declare an emergency which would have been appropriate given his urgent situation. Although there was insufficient data to conclusively determine the reason for the departure from controlled flight, it is likely that the pilot continued to counter the "heavy" wing with opposite aileron until full authority was attained and he was unable to further arrest the roll. At this

point in the flight, the fuel unbalance was significantly greater than the maximum unbalance limitation in the Hunter manual and so controllability, especially at slower speeds, would have been questionable. Additionally, it is possible that the pilot may have elected to extend the flaps early during the approach, which would have aggravated the roll tendency as also stated in the Hunter manual. This scenario could not be confirmed because there was no radio communications from the pilot during this time, nor could the flap position be conclusively determined in the wreckage.

ATAC did not have a crew resource management or aeronautical decision making training program in effect. If such a program had been in effect, it may have led the accident pilot to follow the flight lead's recommendation and return or divert rather than continue the flight and troubleshoot.

Two days prior to the accident, ATAC maintenance replaced left fuel transfer valve assembly. The mechanic that conducted the work had never performed this task and expressed difficulty and confusion with completing it and had to request assistance from other personnel. No type-specific maintenance training exists for the Hunter and all maintenance training is conducted on-the-job. Although ATAC did have the appropriate manuals on hand to guide the replacement, the maintenance personnel were not aware that they had the British manuals, and only referenced the Swiss French-language manuals, which they could not translate. No task cards, detailed step-by-step instructions for maintenance tasks, existed for the Hunter due to the legacy nature of the aircraft.

Examination and testing of the left fuel transfer valve assembly found there was no evidence of pre-impact failure of the motor even though the valve ball was found about 80 degrees outside of the normal range. This information, along with the information relayed by the accident pilot to the flight lead regarding his fuel indications, led the investigation to consider the possibility that the motor/valve combination was mated with the valve shaft rotated out of alignment. The design of the assembly is such that the motor and valve cases can only be mounted to the airplane in correct alignment when connected to the electrical cannon plug. However, the investigation found that the valve shaft could be rotated a full 360 degrees, and the motor drive key could be set in one of two positions and still allow the cases to mate. Although the mechanic stated that while he had some difficulty mating the motor and valve, he only needed to rotate the valve shaft a small amount during the mating procedure. The mechanic did not view the face of the valve to inspect the alignment markings with an inspection mirror, nor was there any specific task in the maintenance procedure to confirm the shaft alignment prior to attaching the motor. Examination of exemplar valves and motors found that there were combinations of valve shaft rotations that could result in the valve being driven to positions similar to that found in the wreckage and that would be consistent with the effects reported by the pilot. Therefore, it is likely that the valve motor did not fail during the accident flight, but was installed incorrectly on the valve assembly with the shaft out of alignment by 90 degrees or more, preventing normal fuel transfer.

An additional fuel system anomaly was also reported by the accident pilot. During the flight he informed the flight lead that the left inboard external tank quantity indications had reduced, consistent with obtaining some fuel transfer from the left side. However, the design of the fuel transfer system, using bleed air pressure to the outboard external tank first is such that there is no way for the outboard tank to be bypassed and not feed fuel, while still allowing the inboard tank to feed fuel. ATAC representatives stated that they had seen this occur before, but neither ATAC nor Lortie could explain the mechanism.

The pilot initially detected a fuel imbalance condition immediately after takeoff, however, this would likely be too early for any imbalance caused by the improper motor/valve installation to have affected the fuel balance. The flight two days prior to the accident likely emptied the right outboard tank, and a large amount of the right inboard, without depleting the left wing internal or external tanks. The lack of accurate quantity indications on the wing tanks, and the potentially confusing indications of the fuel loading panel, likely led to the incomplete refueling of the right outboard external tank prior to the accident flight. Adding the estimated fuel remaining from the previous flight with that uploaded by the fuel truck, results in an approximate 50 gallon (340 pounds) shortage in the outboard tank. The mechanic noted that the lights on the fuel loading panel were extinguished; however, the timer switch does extinguish the lights prior to the timer completing its cycle. The mechanic also stated that he tapped the tanks to confirm the quantity but this method is subject to significant error. In addition, the pilot noted during the accident flight that he was not certain of the fuel quantity prior to takeoff and so likely did not check the quantity of the external tanks during preflight. Therefore, the initial fuel imbalance was likely the result of an incomplete and improper fuel loading due to limitations of the fuel system design of the airplane and an incomplete preflight by the pilot.

The pilot's decision to continue the flight with a known fuel imbalance is a possible indicator of company culture of pressing to complete the assigned mission. On March 6, 2012 another ATAC fighter crashed, fatally injuring the pilot. In that accident the pilot was also likely pressing to complete the mission, leading eventually to the accident. ATAC did not have a crew resource management or safety-risk management program in place for its pilots at the time of these accidents; therefore, it is likely that the company culture did not support good aeronautical decision-making and risk management concepts. Following a recommendation in a Navy audit in June 2012, CRM training was established. Also, ATAC established an operational risk management (ORM) program in August 2012.

Additionally, since the flight was operating under Public Aircraft Operations the Navy was responsible for oversight of the company. The Navy contract, while setting some requirements for FAA certifications, did not specify to what standards the airplane, pilots, or maintenance program were required to conform. Thus, the oversight environment did not support a safety culture or standards that would be expected in other U.S. commercial aviation operations.

Probable Cause and Findings

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

the pilot's decision to continue the flight with a known fuel imbalance condition that resulted in a loss of lateral control when the imbalance exceeded the known capabilities of the airplane. The fuel imbalance was due to incomplete refueling and an ineffective preflight inspection by the pilot. The imbalance was further complicated by an incorrectly assembled fuel transfer valve and motor combination.

Contributing to the severity of the accident was the pilot's delayed decision to eject prior to exceeding the ejection seat envelope. Also contributing to the accident was (1) the Navy's oversight environment, which did not require airman, aircraft, and risk management controls or standards expected of a commercial civil aviation operation, and (2) ATAC's organizational environment, which did not include

CRM training to promote good aeronautical decision-making and ORM guidance to mitigate hazards. Also contributing to the accident were the design features of the airplane, which were typical of its generation, including the lack of accurate fuel quantity indications, the design of the fuel transfer valve; and the maintenance program's lack of clearly documented procedures and type-specific training for the Hunter.

Findings

Personnel issues	Decision making/judgment - Pilot
Aircraft	Lateral/bank control - Attain/maintain not possible
Aircraft	Fuel - Fluid management
Personnel issues	Incomplete action - Ground crew
Personnel issues	Preflight inspection - Pilot
Personnel issues	Repair - Maintenance personnel
Personnel issues	Identification/recognition - Pilot
Aircraft	Emergency equipment - Not used/operated
Organizational issues	Oversight of operation - FAA/Regulator
Organizational issues	Standard operating practices - Operator
Aircraft	(general) - Design

Factual Information

History of Flight

Prior to flight	Aircraft maintenance event
Prior to flight	Preflight or dispatch event
Approach	Fuel related (Defining event)
Approach-VFR pattern downwind	Loss of control in flight

HISTORY OF FLIGHT

On May 18, 2012, at 1212 Pacific standard time, a Hawker Hunter Mk 58, single-seat turbojet fighter aircraft, N329AX, operated by ATAC (Airborne Tactical Advantage Company) under contract to Naval Air Systems Command (NAVAIR) crashed while on approach to Naval Air Station Point Mugu, California (NTD). The sole pilot aboard was killed, and the airplane was destroyed by impact forces. The flight was conducted under the provisions of a contract between ATAC and the U.S. Navy to provide ATAC owned and operated aircraft to support adversary and electronic warfare training with VMFAT-101 (Marine Fighter Attack Training Squadron 101). The airplane was operating as a non-military public aircraft under the provisions of Title 49 of the United States Code Sections 40102 and 40125.

The airplane departed NTD at 1113 as the wingman in a flight of two Hunters, intending to participate in a fleet training exercise in off shore warning area W291. The flight's radio call sign was "COUGR21."

As the accident airplane was not equipped with any recording devices, and all radio communications with the accident pilot were via air-to-air with the flight lead, the sequence of events is based upon the flight lead's interview with investigators and information he separately provided to ATAC personnel following the accident.

According to the flight lead, shortly after takeoff, the accident pilot advised him, on an air-to-air frequency, that his lateral stick trim was almost all the way to the right in order to maintain wings level flight. The pilots discussed a maintenance issue involving a fuel transfer valve two days before the accident flight and concluded that an under-fueled right outboard tank was the likely cause.. The flight lead asked the accident pilot if he had checked the tank during preflight and if there was fuel in it and the accident pilot replied "I don't know." The flight lead said he recommended that the accident pilot return to the airport, "because we knew we had an issue right off the bat." The accident pilot elected to continue the flight and shortly afterward reported that the right outboard tank was indicating empty, much earlier than normally expected.

As the pilots continued to discuss the problem, the accident pilot also related that he believed that the airplane was also not drawing fuel from the left wing and external tanks. The accident pilot reported that

he turned off the right boost pump, in an attempt to balance fuel, by configuring the fuel system so that the engine would draw fuel only from the left side.

After arrival in the training area, the flight lead indicated that he repeated his suggestion to return, but the accident pilot said he would give it more time to see if he could get fuel to transfer from the left side. Fuel transfer from the left outboard tank could only be confirmed once it empties (the magnetic indicator would change from black to white indicating empty). The accident pilot also reported that he saw the fuel quantity indicator on the left inboard tank began to show a reducing quantity in that tank, indicating 1300 pounds, and he thought he was getting a slow transfer from that tank.

Additionally, the low fuel light for the left feed tank illuminated, indicating that the tank was not full although there was still fuel in other tanks that should have transferred into the feed tank to keep it full. When this light illuminated, the accident pilot, at the flight lead's suggestion, cycled the left fuel transfer switch multiple times to read the front tank contents, as the gauge would indicate only the front tank quantity while the valve was in transit. At this point, after further discussions with the flight lead, the accident pilot decided to return to base because there were indications that fuel was not correctly transferring.

The flight lead elected to accompany him, and the pilots switched positions, with the accident pilot taking lead and flight lead flying echelon left (slightly above and behind to the left). During the return flight, the pilots continued to discuss the airplane systems and what indications the accident pilot should look for. The flight lead noted that the information relayed did not make sense regarding the fuel system compared to the cockpit indications. The accident pilot repeated that he thought he was getting a slow transfer from the left side fuel system, but could not determine the actual quantity of fuel in the left outboard tank (which would be the first to be depleted if fuel was transferring). He did not indicate the stick position or asymmetry. The pilots estimated how long it would normally take for the left outboard tank to reach empty, however, it was still indicating it contained fuel. About 10 to 15 minutes from the airport, the accident pilot related that he saw 1000 pounds remaining in the left inboard tank.

ATC restricted the flight to 15,000 feet until nearing the airport, and then cleared the flight for descent. Neither the pilots nor ATC declared an emergency or urgency situation. The flight lead stated that the accident pilot did not appear to have conducted a controllability check. The aircraft crossed the shoreline at about 6,000 to 7,000 feet on a left downwind leg for runway 21. They planned to extend the downwind leg to lose altitude and turn in for a long straight-in final approach. The flight lead reported that at a point approximately abeam the approach end of the runway at about 5,000 feet and an indicated airspeed of about 270 to 280 knots, the accident airplane began "a nice gentle left hand turn" which he said "didn't make sense." The flight lead said he was about 100 feet above and behind the accident airplane when it began to turn across his path, and it continued to turn and roll until it "turned into a barrel roll" on a course of about 030 degrees. He stated that it was a slow roll but it "was evident it was out of control." When the loss of control occurred, the flight had been airborne about 60 minutes.

The flight lead said that the accident airplane did not appear to slow down but he reactively maneuvered as needed to stay in position, although he noted that the airplane generally does not slow down noticeably in a descent if the throttle was already set at 6,000 rpm or less. They had not yet begun configuring for landing. The flight lead leveled off but banked left to observe the accident airplane pass below, which he said seemed to be briefly in level flight, and then "saw it snap over" and enter a steep nose down, left rolling maneuver. The flight lead reported he saw "lots of fuel coming out of the

[external] tanks." He saw two objects come out as he was yelling "eject" on the radio, and initially thought they may have been the canopy and the ejection seat. He later concluded the objects were the left side external tanks separating from the wing. The airplane impacted less than three seconds later. He saw the two objects impact about 100 yards from the airplane (consistent with the ground position of the left external tanks). The airplane impacted at a steep angle and a small fireball was visible. The flight lead did not see a chute, and then he called the tower to launch the search and rescue effort.

Previous Flight of N329AX

On May 16, 2012, the airplane was flown by a different pilot on a similar mission, and experienced a fuel transfer incident. The accident pilot was the wingman on this flight. The aircraft fuel tanks had been filled and he also had an electronic warfare pod on the right wing station.

The preflight, start-up, and taxi out were uneventful. On initial climb-out, he started noticing an asymmetry developing so he checked the fuel system. He said the left transfer system indicator was showing no fuel was coming from the left internal or external tanks to the feeder tank. He cycled the selector switch between Auto, Rear, and Wing, six to eight times without any changes. During this time he kept adding right stick and right trim as no fuel was burning from the left wing tanks. At this point he was about 4 to 5 minutes into the flight when the left low fuel light came on indicating fuel was being drawn from the feeder tank. He elected to turn off the left fuel boost pump to preserve fuel in the left feeder tank.

The incident pilot said his wingman (the accident pilot) stated that nothing appeared unusual from the exterior and no fuel appeared to be venting. He applied a positive and negative G which did not have any affect. He then decided to return to land and his wingman continued the mission. During the return to the airport, he conducted a controllability check where he found that the left wing was heavier than the right wing. About that time he saw that the right wing outboard tank magnetic indicator turned white, indicating that tank was empty. He landed on runway 3 with no difficulty, and estimated the total flight time as about 17 to 18 minutes.

Troubleshooting and Maintenance

After landing, and before the incident pilot shut down the engine, maintenance personnel checked the fuel transfer valve and motor while he cycled the left wing switch to rear but the transfer valve was not working. The attempt to troubleshoot took about 15 minutes. (Tests at Lortie Aviation indicated the engine ground idle fuel burn was about 145 pounds per hour.) He believed that after shutdown, the left side exterior tanks were still full, the right outboard was empty, and the right inboard had burned some fuel but was not yet empty. Investigators estimated that the fuel burn during the incident flight would have left the airplane with a shutdown fuel load of approximately 6000 pounds. The incident pilot conducted a post-flight debrief with the wingman (accident pilot) after his return.

The ATAC Point Mugu Maintenance Manager (MM) took part in the troubleshooting. He said the procedure they followed was to first open the access panel on the left underside of the fuselage, near the gear well, to access the valve. They then manually selected the fuel transfer switch from wing to rear (which should have activated a motor that moves a ball valve), and heard no left motor sound, and saw no movement of the valve or indicator. They performed the same task to the right side, and all indications sounded and looked normal. They then disconnected the cannon plug from the motor to

check the wiring. No power was measured at the motor, and the associated 5 amp fuse was found to be blown. The shop did not have any spare 5 amp fuses, so installed a 7.5 amp fuse to test, and reconnected the cannon plug and the fuse blew right away, with no noise from motor. Actuating the switch with the motor cannon plug disconnected did not cause a blown fuse. The MM reported the problem to Lortie Aviation via a web based system for requesting spare parts and other maintenance information. Lortie overnight-shipped a replacement motor to ATAC.

The following day, the replacement part arrived about 1000. The ATAC mechanic assigned to the job was working the afternoon shift and began preparing for the replacement upon arrival. Neither he nor other ATAC personnel at the Point Mugu base, had ever done this particular task before. The mechanic had participated in the troubleshooting the day prior. He stated that the job took "all day" because the location of the motor and valve was very difficult to access. He first removed the motor and gave it to the MM for bench testing while he began to install the replacement motor. The MM applied power on a test bench, with the same result as on-wing. The valve shaft could not be accessed by hand with the motor and lines installed, during the time that the motor was removed, none of the maintenance personnel tested for motion of the ball valve.

The mechanic said that due to the difficult access he had to use a crows foot and extensions on his wrench to attach the motor to the valve. The mechanic described that the motor attached to the valve case by two threaded studs that protrude from the motor fastened with nuts. The studs and the electrical cannon plug are aligned so that the motor body can only be installed one way. He described that the valve shaft protrudes and has a slot in the end of the shaft, which fit into a receptacle on the motor which contained a cross-pin that fit into the slot. He reported that when he first tried to slide the motor over the shaft, it would not fit, because the shaft was not aligned. He removed the motor and turned the shaft "not as much as a quarter turn, maybe a sixteenth." He said that he used a standard screwdriver to turn the valve shaft, but it was not difficult to turn. He reported that he could not see the face of the valve housing or any markings thereon.

He replaced the cannon plug and they performed a check of the system. The fuse was replaced and the MM cycled the transfer switch. The mechanic could hear the movement at the valve, and feel vibration by hand. The indicator on the motor casing was not visible with all lines installed. The MM observed normal indications in the cockpit during the check. It was not possible to test the AUTO function without getting into the aft fuselage tanks. The mechanic then replaced the duct work that had been removed for access and secured the area. Another mechanic looked over the area for general appearance and absence of debris. They left the access hatches open so the inspector could sign off on the repair the next morning.

ATAC Hunter maintenance training was primarily conducted using on the job training methods. There was no formal school or training location for the airplane, although the maintainer who replaced the motor was an FAA A&P certified mechanic. Maintenance tasks were referenced to the British airplane manual, and ATAC had access to Lortie technical representatives by phone to give guidance and answer questions about specific tasks.

When the mechanic came in the next day, Friday May 18, the pilots were already there. He assisted with the daily checks of other airplanes, and the two pilots departed with other airplanes for the first sortie. The inspector signed off on the motor replacement, but the hatch would not close properly, the mechanic

repositioned the duct and closed up the hatches, then took the airplane out of the hangar to the ramp for refueling.

The mechanic that performed the motor replacement also did the refueling. He described to investigators that he cycled the fuel tank indicator selector through the positions to determine which tanks needed fueling (see Aircraft Information for a description of the refueling panel operation). He described fueling the aft fuselage tanks first, then noted the inboard external tanks indicated full, he switched the indicator selector again for the outboard external tanks and described that he "went to tap on the tanks and see how much is in there, if I can hear it." After going to the right outboard, then left outboard, he returned to the refueling panel to reset the battery timer rotary switch ("egg timer") and said he saw all the lights were extinguished indicating the tanks were full, so he stopped fueling. The mechanic described that on a recent occasion, a tank overflowed and he did not want to risk that. He estimated a total of 275 or 277 gallons was added, on top of the remainder from the early return flight. He assisted the accident pilot with the preflight inspection, but could not recall if he or the pilot tapped the external tanks.

INJURIES TO PERSONS

The pilot was fatally injured.

DAMAGE TO AIRPLANE

The airplane was destroyed by impact forces. The airplane was highly fragmented and mostly contained in an impact crater. See wreckage and impact information.

PERSONNEL INFORMATION

The pilot, age 57, had worked for ATAC since February of 2011. He was a former U.S. Navy bombardier-navigator in the A-6 Intruder before transitioning to pilot and flying EA-6 Prowlers and F/A-18 Hornets. He served as a Carrier Air Wing Commander, and Executive Officer on the USS Kitty Hawk CVN-63. He reported 8,325 hours total flight time, and held an FAA Airline Transport Pilot Certificate with type ratings in the Gulfstream IV and V, and worked as a corporate pilot on the Gulfstream for more than eight years. His flight experience with ATAC was all in the MK-58 Hunter, total time 186 hours with 106 landings logged. He held an FAA Class 2 Medical Certificate with a limitation to wear corrective lenses. The accident pilot was the ATAC Deputy Director of Operations for the West Coast and the Supervisor of Flying.

The accident pilot completed his ATAC Hunter ground training between 21 and 26 February, 2011. Two dual instruction flights and a solo flight were conducted on 24-26 February respectively. The Hunter initial transition training was conducted by Lortie Aviation's chief pilot. ATAC noted that their written training plan was normally 10 training days in order to provide time for ground and cockpit systems review. The accident pilot did not receive the ATAC academics and extra ground training due to the deployment of their instructor during the period the accident pilot began training.

AIRCRAFT INFORMATION

The Hunter is a subsonic single seat single engine multi-role combat aircraft, first introduced into service in 1956, originally manufactured by Hawker-Siddley Corporation of the U.K. The MK-58 variant was an export version of the British F.6, built by Hawker-Siddley for a Swiss Air Force order

beginning in 1958. The Swiss Air Force ceased operational use of the MK-58 in the mid-90's and its fleet of airplanes, support equipment, spares stores, and technical publications were sold to Lortie Aviation of Quebec City, Canada. It was powered by a Rolls-Royce Avon 207 engine, mounted in the mid to rear of the fuselage, with intakes at the wing roots and a single centerline tailpipe exhaust. Lortie provides all technical support on the airplane since Hawker and Rolls-Royce no longer provide technical support for the airplane and engine. The basic guidance for operations and maintenance was Hawker Aviation Publication 58, amended to June 8, 1967, and the Swiss Air Force developed publications 56.226f, amended to November 18, 1991. The Swiss publications are only available in French or German. ATAC additionally developed its own operational guidance and checklists. According to the operator, ATAC and Lortie Aviation maintained the Hunters in accordance with a FAA-approved Aircraft Inspection Program, derived from Swiss Air Force and Royal Air Force maintenance standards that included tracking and replacement of Life-Limited and Time-Between-Overhaul components. The fuel transfer valve motor was an 'on-condition' component.

The airframe has mid-fuselage mounted swept wings and conventional cruciform empennage. Controls are hydraulically boosted. The accident airplane was carrying an electronic warfare pod on the right wing, between the two external tanks.

The engine is fed from a pair of fuselage mounted feeder flexible bladder tanks of 120 US gallons each (1 U.S. gal equals about 7 pounds of Jet-A or JP8 fuel) which are replenished in sequence from other tanks. The first source used for taxi and takeoff is a pair of rear fuselage mounted bladder tanks, with a capacity of 31 U.S. gallons each. The fuel transfer system senses when the rear tanks empty and switches the rotary ball type fuel transfer valve to the wing tanks.

The valve is a mechanical ball valve design with passages for fuel configured in a T-shape in the ball. An actuating shaft connected to the ball protrudes from the valve face and has a slot to engage on a pin in the drive motor. The valve shaft and ball assembly is designed to turn 90 degrees between two positions. In the rear position fuel flows from one arm of the T through to the other arm of the T to the forward feed tank. The wing tank is isolated by the top part of the T and no fuel can flow from the wing tanks, the vertical leg of the T is adjacent to the blank face of the valve housing. When the valve is rotated to the "wing" position by the drive motor, one leg of the T connects to the wing tank feed line, and the vertical leg of the T connects to the forward feeder tank, blocking the rear tank line with the top of the T, and moving the other arm of the T to the blank housing face. Markings on the valve face where the shaft protruded were index lines 90 degrees apart, with inscribed "Open" corresponding to the "wing" setting, and "Shut" corresponding to the "rear" setting. Red paint in the slot on the valve shaft indicated which end of the slot was intended to be lined up with the index marks.

The drive motor attached to the valve case by two threaded studs that protrude from the motor fastened with lock nuts. The studs and the electrical cannon plug connection were aligned so that the motor body can only be installed one way. The slotted valve shaft fit into a receptacle on the motor which contained a cross-pin that fit into the slot. The motor runs 90 degrees clockwise or counter-clockwise depending on the electrical signal sent via the aircraft wiring and cannon plug. Motors are marked "L" or "R" for left and right, the only difference between the two is in the indicator window which shows the position of the motor drive. The motor and valve assembly is installed in the airplane in the lower fuselage area, adjacent to the main landing gear well. Electrical generators and duct work are adjacent to the motor and associated wiring. The valve and motor are oriented at an angle of about 30 degrees upward from the

valve to the motor. The valve shaft slot and valve face markings are not visible from below without the use of a mirror, or removing the duct work and physically observing from the opened area.

A cockpit switch, normally set to "AUTO" enables the tank changeover, or the pilot can manually select "REAR" or "WING" with the same switch. The internal wing tank assembly consists of two flexible bladders in each wing, with a capacity of 84 U.S. gallons per wing. The accident airplane was equipped with two pairs of externally mounted fuel tanks. The inboard tanks had a capacity of 276 U.S. gallons each, and the outboard tanks had a capacity of 120 U.S. gallons each. The external tanks were not jettisonable.

The ATAC Hunter Pocket Checklist (PCL) defines a fuel imbalance as "Left and right fuel quantities differ by more than 100lbs" and cautions to "Investigate the low-speed handling characteristics at a safe altitude." Fuel Imbalance actions are specified as "1. Boost pump (low side) — CYCLE AS REQUIRED ... IF UNSUCCESSFUL AND FUEL QUANTITY AND BALANCE PERMIT: RTB (Return to Base) OTHERWISE: LAND ASAP (As Soon As Possible)" Switching off the boost pump will prevent fuel feed from the low quantity side, leading to asymmetric feed from the heavy side and correcting the imbalance. According to ATAC, if pilots followed the PCL procedure for the 100 pound imbalance specified, it would result in frequent activation of the boost pumps and resultant engine RPM limitations.

Under the procedure for fuel transfer pressure anomalies (the airplane was equipped with a Transfer Pressure Indicator, a magnetic/mechanical cockpit display which showed transfer air pressure, not fuel flow), the PCL specifies "Rely only upon the fuel in the front tank on the affected side (maximum 770 lbs.); an increasing fuel imbalance is developing. Minimize the fuel imbalance by expediting recovery and obtaining priority. A delay causing significant unusable external fuel may require as much as 190 knots to maintain aircraft control, making landing very difficult if not impossible." No further details defining specific imbalance amounts and minimum control speeds appear in the checklist or other manuals.

The tanks were pressurized via engine bleed air to provide flow into the system. When external tanks were installed, bleed air enters the outboard tank, forcing fuel to flow to the inboard tank, thence to the internal wing tanks. No bleed air passed directly to the inboard external tank – if the outboard tank was not installed, a bypass plate was fitted to the tank pylon. The sequence of feed when in the "WING" position was to first feed from the outboard external tanks, then to the inboard external tanks, then to the internal wing tanks. Under normal "AUTO" operation, the rear fuselage tanks would deplete first (to aid in center of gravity), then the outboard external tanks would be the next to deplete, as described above, the forward fuselage feeder tanks being the last to be depleted. There was no capability to transfer fuel between the left and right sides of the aircraft.

There was no quantity indicator on the outboard external tanks, a magnetic indicator would switch to white color to indicate empty, and so any quantity of fuel in the outboard external tank would appear the same. The inboard external tanks had a quantity gauge mounted on the forward inner surface, that the pilot could read visually from the cockpit. The variant of the inboard 230 imperial gallon tank installed on the accident airplane had baffles which resulted in the indicator not moving off of the F (full) indication until less than 1300 pounds remained, vice the actual full amount of 1700 pounds.

Fuel gauges in the cockpit were intended to display the total quantity of fuel in the internal wing tanks, plus the feeder tanks (about 1300 pounds per side), but pilots reported that the system was not very accurate until fuel had depleted sufficiently to be draining the feeder tank and illuminating a "low fuel" light, which could be used to verify the feeder tank associated with the light had dropped to 650 pounds (approximately 90 U.S. gallons). There was no fuel flow gauge. *Before Entering the Cockpit states, "1. Fuel Load – VERIFIED"*. During refueling or preflight inspection, pilots and mechanics were trained to test that external tanks were full by tapping with open hands around the circumference and listening for solid sound. Some pilots reported tapping with their rings to ensure they did not hear a hollow sound.

ATAC developed a fuel loading form and spreadsheet in order to track fuel use and uploads. As the airplane fuel quantity indicators did not directly measure the amount in each tank, use of the fuel log to indicated the amount of fuel uploaded to refill the tanks after a sortie, cross-referenced with the spreadsheet, was used to track fuel loads. ATAC records indicated that an uncertainty of 50 gallons or more was not uncommon.

The airplane is refueled via a refueling panel located under the left wing root in the vicinity of the landing gear well. The panel includes a fuel coupling, control panel with selective refueling switch, rotary time switch ("egg timer") and tank indicator lights. As the time winds down counter-clockwise there is an audible clicking sound. The indicator lights illuminate when the tank to which they assigned by the selective switch is not completely filled. The position of the selective switch enables refueling of: internal wing and fuselage tanks (POS 2); internal wing and inboard external tanks (POS 3); or internal wing, inboard and outboard externals (POS 1). The rotary time switch operates for 8 minutes to energize the refueling system from battery power. The intent of the switch is to avoid inadvertent draining of the battery. In a typical fueling scenario, once operating in POS 1, observing all lights extinguished should mean all tanks are full. However, ATAC personnel demonstrated to investigators that the circuit was deenergized and the lights would extinguish prior to the rotary timer completing its cycle while it was still producing the audible "egg timer" clicking sounds. Resetting the timer switch (rotating clockwise) would reilluminate the lights if the associated tanks were not full.

N329AX was owned by Lortie Aviation, registered to Hunter Aviation International of Delaware (a wholly owned subsidiary of Lortie), and leased to ATAC. The airplane holds an FAA Special Airworthiness Certificate Experimental-Exhibition, issued on August 28, 2009 with no expiration date. The Operating Limitations attachment to the certificate states that "No person may operate this aircraft for other than the purpose of exhibition flight" and that "Any flight operations that are not considered...exhibition purposes must occur with the aircraft having been declared a public aircraft."

METEOROLOGICAL INFORMATION

Weather was daylight, visual meteorological conditions.

COMMUNICATIONS

There were no communications difficulties with ATC. The airplane was equipped with four radios (2 VHF, 2 UHF), of which one transmitter could be used at a time. The two pilots communicated with each other over a discrete VHF frequency, which was not recorded or monitored. Communications with the Air Traffic Control Tower were conducted on UHF.

AERODROME INFORMATION

The Point Mugu Naval Air Station (KNTD) was part of the Naval Base Ventura County (NBVC) that also included Point Hueneme and San Nicholas Island. The base was about 35 miles west of Los Angeles, California. Runway 03/21 was 11,102 feet long and 200 feet wide with an asphalt surface and a 900 foot paved overrun area.

FLIGHT RECORDERS

The airplane was not equipped with a CVR or FDR, nor was it required to be.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted in a nose down nearly vertical attitude in a plowed field approximately 2 miles northeast of the approach end of NTD runway 21. The main wreckage was contained within a crater approximately 20 feet in diameter and 30 feet deep. The two left wing external fuel tanks were located approximately 200 yards to the west of the crater, in shallow craters of their own. Both of the tanks were ruptured and visible fuel staining was observed in the surrounding area. Both tanks were still attached to the pylons. Two attach bolts were noted torn from the wing structure with a slight amount of bending. The two right wing external tanks were located on the perimeter of the crater and were accordion crushed and ruptured, with no evidence of fuel. The vertical stabilizer was found approximately 30 feet north of the crater exhibiting crush damage to the upper portion of the stabilizer leading edge where it was found in contact with the rear of the ejection seat. The left canopy rail was found to the north of the ejection seat and vertical stabilizer, the right canopy rail was located on the far side of the crater, approximately 50-75 yards to the west. Multiple fragments of Plexiglas canopy were located in the vicinity of the seat, and in and around the impact crater throughout the entire debris field.

The upper portion of the aft fuselage and horizontal stabilizer was adjacent to the crater, inverted. The outer portions of each wing were found adjacent to the aft fuselage portion also at the perimeter of the crater, inverted, in approximately the correct orientation to the other components. Inner portions of the wings and the lower aft fuselage were protruding from the crater in a narrow v-shaped orientation. The speed brake was open but actuator position during impact could not be determined due to damage sustained during the recovery process.

Further wreckage was deeply impacted into the ground, and earthen material collapsed the sides of the crater on top. Heavy equipment was used to extract the remainder of the wreckage, which was laid out and examined in the field.

Flight Controls

All four corners of the airplane were located in or around the crater, flight control continuity could not be established due to fragmentation. The outer portions of the wings were righted and inspection panels for the hydroboosters were removed for inspection. The left aileron could be moved by hand and the connecting rod and the hydrobooster pack assembly observed to move normally. The booster connector rod was bent consistent with the booster being engaged to the flight control, as in the normal hydraulic system operating condition. The right aileron was observed similarly except the connector rod was bent to about 45 degrees. The rudder and elevators were observed attached to the stabilizers normally.

Flaps could be freely moved, as the actuators were broken from the connecting rods.

Fuel System

The right fuel transfer valve and electrically driven motor were found attached. The valve ball was found in the "rear tank" position. The position indicator on the motor casing indicated "rear."

The left fuel transfer valve and motor were found separated. The valve ball was positioned about 80 degrees outside of the normal range between "rear" and "wing" position. A witness mark on the outer surface of the valve ball was visible and was consistent with the ball having been in a position not found in normal operation when the mark was made. The position indicator window on the motor was separated from the casing. A slap mark consistent with the width of the needle was observed on the inner surface of the window frame closer to the "ARR" ("rear" French abbreviation) position. Both valves and motors were retained for testing.

Left and right fuel boost pumps visually appeared crushed.

Forward fuselage tanks were found fragmented with a small amount of charring. Float valves were not located.

The left rear fuselage tank was opened and examined, evidence of fuel in the bladder was observed. The right rear fuselage tank was opened and examined; the inner surface of the bladder was found dry to the touch.

Cockpit and Engine

Fuel control panels were located, in a highly fragmented conditions, transfer valve switches were damaged and bent, and were retained for lab examination. The magnetic indicators were found crushed and bent under the panel. The right fuel gauge was found crimped, and retained for examination. The flap switch was not found.

The aileron two-position jack, which is located at the base of the control stick, was found extended approximately 25% of travel, consistent with normal hydraulic system operation.

The instrument panel was highly fragmented and unusable for further examination.

The throttle was found in the full forward position, consistent with the position of the engine fuel control unit. The engine was located at the deepest part of the impact crater and the turbine blades were mostly bent and broken from the turbine wheel opposite the direction of rotation, consistent with high rotation at impact.

MEDICAL AND PATHOLOGICAL INFORMATION

Post-mortem toxicology tests did not reveal any positive findings of toxicological significance. The pilot reported a history of high blood pressure and medications for cardiovascular conditions. No concerns or issues were identified in his last medical exam, nor identified by his spouse.

FIRE

A small amount of fire was evident on the wreckage in the impact crater.

SURVIVAL ASPECTS

The accident was not survivable.

The ejection seat was a Type 3H seat manufactured by Martin Baker Aircraft Co. The seat was heavily damaged due to impact with the ground and the vertical stabilizer, the pilot was still attached to the seat on impact.

The main cartridge and secondary cartridges had fired. The inner piston of the ejection gun had been ripped from the seat on impact and was found approximately 20 to 30 feet north of where the seat came to rest. The Secondary Firing Handle (lower ejection handle) that initiated the ejection sequence was found approximately 3 feet from the seat. The Face Screen Firing Handle had been dislodged from its mounting on impact.

The parachute and survival pack were still with the seat, however the leg restraint lines had operated and sheared their rivets. Only the barrel and part of the drogue gun breech were recovered by the explosive ordnance disposal team, the timing mechanism had separated from the barrel portion including the firing pin, the cartridge was not fired. The timing mechanism was not recovered. The drogue chute assembly that stabilizes the seat on ejection was found intact inside the seat box.

The Barometric Time Release Unit (BTRU) had been initiated but had not activated, consistent with the function of the G controlled mechanism, which operates to prevent the BTRU from activating until the G loads fall below 4G to prevent damage to the main parachute canopy during ejection. There was further evidence of impact damage on the BTRU. The canopy was jettisoned and highly fragmented, the rails were found outside the main wreckage crater.

Evidence was consistent with the initiation of the ejection seat sequence, and separation of the seat from the airplane, however outside the performance envelope for successful ejection.

TESTS AND RESEARCH

The left fuel transfer valve motor appeared to have external damage consistent with impact damage, and the connector portion of the motor was no longer present. The motor housing was marked with an "L" indicating that it was the left fuel transfer valve motor. Comparison of the indicator pointer and the stops controlling the position of the indicator pointer with those of an exemplar unit showed that the motor was in the "wing" position.

Examination of the motor revealed that there were no indications of electrical shorting, arcing, or other obvious electrical problems. There were wires found that were no longer connected, however, these points of disconnection were consistent with impact related damage.

When the motor was removed from the housing, the drive gear and the mating gear were both found to be present with all teeth present and in good condition. All additional gears within the gear train were observed through a hole in the side of the housing, and they also appeared to be in good condition.

The left fuel transfer valve forward, wing, and rear fuel connection openings were identified based on an exemplar unit provided by Lortie Aviation. The markings on the top face (open, shut), were in positions

consistent with the orientation shown on the exemplar valve. The red mark on the ball valve shaft was in a position approximately opposite the "open" marking on the top plate of the valve.

A curved witness mark was found on the ball face visible in the rear opening. The mark was adjacent to the left side of the opening (when viewed with the shaft up). When the top cover was removed, the ball appeared to be rotated towards the corner between the front and rear openings.

The fuel transfer switch panel showed significant damage consistent with impact damage. After examination and removal of portions of the panel, it was determined that the components for the fuel transfer switches were missing. Only the switch toggle and an insulator cap for the toggle remained.

The investigation evaluated a matrix of 20 combinations of possible motor/valve connections, with left and right motors, and the valve shaft in various 90 and 180 degree rotations. For ten of the combinations, the motor and valve could not be fully mated. Four combinations were found in which fuel would be supplied to the forward fuselage tank when the switch was in REAR position, but no fuel would be supplied to the forward tank when the switch was in WING position. All four conditions required the valve shaft to be turned 90 degrees or more away from the marked positions on the valve face.

According to Lortie, they have experienced four valve motor failures in the past three years, and no valve failures. ATAC reported no valve failures and a small number of motor failures.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

Company Description

ATAC started business as an independent company in 1996, and is based in Newport News Virginia, with facilities in Point Mugu, California; Kaneohe Bay, Hawaii; Atsugi, Japan, and Zweibrücken, Germany. ATAC provides civilian tactical airborne training to U.S. military customers. The primary service, as in the accident flight, is to provide aggressor or adversary aircraft capability for training and readiness missions, as well as electronic warfare, ship defense, research and development, target towing, and other capabilities. At the time of the accident, ATAC's fleet consisted of thirteen Hunters including the accident airplane, based in the U.S. and Japan. ATAC additionally had 5 IAI Kfir multi-role aircraft, one of which was based at Point Mugu (another one was destroyed in an accident on March 7, 2012 NTSB accident number DCA12PA049), and four based in Newport News; and four Czech L39 Albatross trainer/light attack airplanes based in the U.S. and Germany. ATAC had a pilot cadre of 30 former military tactical pilots, and all maintenance personnel were military trained on similar types of aircraft. ATAC does not hold an FAA 14 CFR Part 119 air carrier certificate, nor was it required to do so.

Certification and Contract

At the time of the accident, ATAC was operating under the terms of contract N00019-09-D-0021 dated March 19, 2009, which "provides contractor owned and operated aircraft to United States Navy (USN) Fleet customers for a wide variety of airborne threat simulation capabilities to train shipboard and aircraft squadron weapon systems operators and aircrew how to counter potential enemy Electronic Warfare (EW) and Electronic Attack (EA) operations in today's Electronic Combat (EC) environment." The contract specified details of the capabilities of the aircraft, and mission planning and operations.

The contract specified that all aircraft "shall carry a valid FAA airworthiness certificate for non-public use activities that are similar in nature to the missions required to be performed under this PWS for the duration of the contract. The aircraft shall be operated and maintained as civil aircraft. All pilots and crew shall be FAA certified." It further specified details of airplane equipment requirements. There is no FAA experimental category that directly relates to air combat training, nor is there an FAA type rating for the Hunter.

The contract required that the pilots "Must be FAA certified to fly in the required type aircraft, [hold a] Current FAA Class 2 Medical Rating, FAA Instrument Rating, FAA Commercial Pilot License [and have logged] 1200 tactical flight hours in a USN, USMC, or USAF air to air radar equipped tactical jet aircraft." It further detailed currency and other requirements.

The Navy (representatives from both NAVAIR and a representative from Commander - Naval Air Forces Atlantic (CNAL)), and ATAC agreed that the accident flight, as all other operations under the contract with event numbers and Navy tasking orders, were operating as Public Aircraft Operations as described in USC 40102 and 40125. An FAA notice released on March 23, 2011, stated that the contractor must have a declaration statement from the government agency, specifying that the aircraft was operating under Public Aircraft. ATAC did not have a letter from NAVAIR, according to NAVAIR representatives, although they acknowledged the PAO nature of the flights, they did not consider the regulations in force at the time of the accident required a declaration statement, nor did the FAA specify what such a declaration was to include. According to the FAA, operations under those statutes require that the sponsoring government agency (e.g. U.S. Navy) takes on responsibility for operational and airworthiness oversight of many portions of the flights.

NAVAIR Safety describes the contractor flight operations oversight on their web page http://www.navair.navy.mil/safety/flight_ops.cfm Navy representatives from NAVAIR and CNAF, described the process of oversight used for contractors such as ATAC. The Navy's baseline "first step" was the FAA airworthiness certification of the airplane, and airmen certification of the pilots. NAVAIR will audit maintenance practices to assure the asset is properly maintained, and audits the contractor for conformance with OEM, military, or equivalent procedures. Oversight and requirements are then built upon this starting point. The Navy representatives described that the Fleet squadrons that are supported by the contractor (e.g. CNAF, NSA WC, etc.) are the "consumer" of the service and define the requirements, and NAVAIR manages the contract, as well as providing for R&D, test and evaluation (T&E) etc. The two organizations develop the contract together, and provide oversight to the operator through the Navy DCMA 3710.1F/8210.1 instruction (portions of which will be reflected in the contract), and appendices as needed. The contractor (ATAC) will provide the operational and safety procedures, which Navy assesses via audits on a two-year cycle, with partial reviews every six months and then the fourth audit is more in-depth and completes a review by NAVAIR, the Government Flight Representatives (GFR), and the Fleet customer. NAVAIR representatives explained that the Navy does not "approve" or "certify" procedures, but reviews the contractor's procedures and controls are sufficient. The contractor may use Navy procedures, civilian industry practices, or unique procedures to satisfy the GFR. The audits are conducted by teams of subject matter experts, using the same standards used to evaluate acquisitions and production facilities for regular Navy aircraft.

FAA representatives explained that the civilian certification and operation of former military turbojet airplanes dates back almost as far as the use of turbojets. The first imports of ex-military airplanes were in 1957, as a slow trickle of first generation jets began to enter civilian hands. Use of such airplanes in

contract work began in the late 1960's and then greatly increased in the 1980's when former Eastern Bloc airplanes became common and affordable. The typical airworthiness certification is Experimental-Exhibition. Although operators may intend to use the airplane for other purposes than Exhibition (i.e. Public Aircraft), if the FAA is presented with a legitimate program letter, showing intent to operate in Exhibition, they cannot deny a certificate. Beginning in August of 2011, the FAA has begun a process to develop a more detailed set of criteria for each type of aircraft in this category. FAA aircraft certification representatives noted that although the DoD contracts require an airworthiness certificate, the Experimental category does not necessarily provide a baseline for oversight.

ADDITIONAL INFORMATION

Immediately following the accident, NAVAIR detasked ATAC for all contract activity, and required a return-to-flight plan. ATAC conducted an employee survey, using a contractor that provides the same service for units in the Navy. NAVAIR conducted specific location audits at Fallon and Point Mugu prior to reauthorizing contract activity. During the stand-down period, ATAC developed a specific Safety Officer position, and also requested safety assessments from FAA and the Navy Safety Center. The report of the location audits stated that the Navy Government Flight Representative (GFR) was "generally pleased with ATAC's adherence to their...procedures." Among other recommendations, the GFR recommended that ATAC add Crew Resource Management (CRM) training to their ground syllabus. The Fallon and Point Mugu operations were cleared to resume contract activities.

Lortie Aviation began a program of developing task cards for maintenance items, based on the British and Swiss manuals, and known service history of the airplanes.

On 8 July 2010, about 1340 Pacific daylight time, a Douglas A4L, N132AT, operated by ATAC, collided with terrain after the pilot ejected following a loss of engine power on takeoff from Fallon Naval Air Station. The airline transport pilot sustained minor injuries. The airplane sustained substantial damage by impact forces and postcrash fire. The NTSB determined the probable cause of this accident to be a loss of engine power during takeoff due to the failure of the engine's stator and turbine. Contributing to the accident was inadequate maintenance. (NTSB #WPR10LA339)

On 6 March 2012, an ATAC Kfir crashed while attempting an emergency landing at NAS Fallon, Nevada. The airplane was destroyed and the pilot fatally injured. (NTSB # DCA12FA049)

Pilot Information

Certificate:	Airline transport; Commercial; Military	Age:	57, Male
Airplane Rating(s):	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 2 With waivers/limitations	Last FAA Medical Exam:	August 31, 2011
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	8700 hours (Total, all aircraft), 186 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	HAWKER AIRCRAFT LTD	Registration:	N329AX
Model/Series:	HAWKER HUNTER MK.58A	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Experimental (Special)	Serial Number:	41H-003067
Landing Gear Type:	Tricycle	Seats:	1
Date/Type of Last Inspection:	August 2, 2011 Annual	Certified Max Gross Wt.:	24000 lbs
Time Since Last Inspection:		Engines:	1 Turbo jet
Airframe Total Time:	2377 Hrs at time of accident	Engine Manufacturer:	Rolls Royce
ELT:	Installed, not activated	Engine Model/Series:	Avon 207
Registered Owner:	Lortie Aviation	Rated Power:	10150
Operator:	ATAC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KNTD	Distance from Accident Site:	3 Nautical Miles
Observation Time:		Direction from Accident Site:	210°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/ None
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	
Precipitation and Obscuration:			
Departure Point:	Point Mugu, CA (KNTD)	Type of Flight Plan Filed:	IFR
Destination:	Point Mugu, CA (KNTD)	Type of Clearance:	IFR
Departure Time:	11:13 Local	Type of Airspace:	Class D

Airport Information

Airport:	Naval Air Station Point Mugu KNTD	Runway Surface Type:	
Airport Elevation:	13 ft msl	Runway Surface Condition:	
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	34.118888,-119.118888

Administrative Information

Investigator In Charge (IIC): English, William

Additional Participating Persons:

Original Publish Date: August 24, 2016

Last Revision Date:

Investigation Class: [Class](#)

Note: The NTSB traveled to the scene of this accident.

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=83685>

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

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