# UNITED STATES AIR FORCE
# ABBREVIATED AIRCRAFT
# ACCIDENT INVESTIGATION
# BOARD REPORT

**MQ-1B Predator, T/N 98-3040**

**46TH EXPEDITIONARY RECONNAISSANCE SQUADRON**
**432D WING**
**CREECH AIR FORCE BASE, NEVADA**

**LOCATION: USCENTCOM AOR**

**DATE OF ACCIDENT: 8 November 2015**

**BOARD PRESIDENT: LT COL RICHARD C. ORZECHOWSKI**

**Abbreviated Accident Investigation, conducted pursuant to Chapter 11 of Air Force Instruction 51-503**

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
JOINT BASE LANGLEY-EUSTIS VA

OFFICE OF THE DEPUTY COMMANDER
205 DODD BOULEVARD SUITE 203
JOINT BASE LANGLEY-EUSTIS VA 23665-2788

16 NOV 2017

# ACTION OF THE CONVENING AUTHORITY

**The Report of the Abbreviated Accident Investigation Board, conducted under the provisions of AFI 51-503, that investigated the 8 November 2015 mishap involving an MQ-1B, T/N 98-3040, 46th Expeditionary Reconnaissance Squadron, 432d Wing, Creech Air Force Base, Nevada, complies with applicable regulatory and statutory guidance; on that basis it is approved.**

\\Signed\\

**JOHN K. MCMULLEN**
**Major General, USAF**
**Deputy Commander**

**EXECUTIVE SUMMARY**
**UNITED STATES AIR FORCE**
**ABBREVIATED AIRCRAFT ACCIDENT INVESTIGATION**

**MQ-1B Predator, T/N 98-3040**
**USCENTCOM AOR**
**8 November 2015**

On 8 November 2015, at approximately 1653 Zulu time (Z), the mishap remotely piloted aircraft (MRPA), an MQ-1B Predator, tail number (T/N) 98-3040, forward deployed from the 432d Wing, Creech Air Force Base (AFB), Nevada, conducted a combat support mission in the United States Central Command (USCENTCOM) area of responsibility (AOR). At the time of the mishap, the mishap launch and recovery element (MLRE) from the 46th Expeditionary Reconnaissance Squadron operated the MRPA from a deployed location in the USCENTCOM AOR. The MRPA experienced a left tail control surface failure, departed controlled flight, and crashed en route to the intended base of landing. The estimated cost of aircraft and munitions is $5.3 million. There were no reported injuries, deaths, or personal property damages.

At approximately 1638Z, the MLRE took handover of the MRPA from the mission control element. The aircraft was returning early due to an Outside Air Temperature sensor failure. The handover was uneventful. Over the next 15 minutes, the MLRE began a descent for landing and started working through appropriate checklist procedures for descent and arrival.

Evidence showed that the left tail and tail insert fell off the MRPA. Consequently, the MRPA became uncontrollable. The aircraft entered an unrecoverable spin and the impact destroyed the aircraft. All indications are that the maintenance personnel correctly complied with all maintenance actions and were not a factor to this mishap.

The Abbreviated Accident Investigation Board (AAIB) President found by a preponderance of the evidence that the cause of the mishap was the failure of the left tail clamp and/or left tail clamp bolts. The failure resulted in the airborne loss of the left tail insert and attached left tail. The loss of the left tail insert and the attached left tail surface resulted in an unrecoverable departure from controlled flight.

# SUMMARY OF FACTS AND STATEMENT OF OPINION
# MQ-1B PREDATOR, T/N 98-3040
# 8 NOVEMBER 2015

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 12 AF | 12th Air Force |
| 414 ERS | 414th Expeditionary Reconnaissance Squadron |
| 432 WG | 432d Wing |
| 489 ATKS | 489th Attack Squadron |
| A/C | Aircraft |
| AAIB | Abbreviated Accident Investigation Board |
| ACC | Air Combat Command |
| AF | Air Force |
| AFB | Air Force Base |
| AFE | Air Flight Equipment |
| AFI | Air Force Instruction |
| AFTO | Air Force Technical Order |
| AGL | Above Ground Level |
| AIB | Abbreviated Accident Investigation Board |
| AIB | Accident Investigation Board |
| ANG | Air National Guard |
| AOR | Area of Responsibility |
| ATO | Air Tasking Order |
| CAP | Critical Action Procedure |
| DoD | Department of Defense |
| E-Mission | Emergency Mission |
| EP | Emergency Procedures |
| FMC | Fully Mission Capable |
| GA-ASI | General Atomics Aeronautical Systems, Inc. |
| GCS | Ground Control Station |
| HUD | Heads-Up Display |
| IAW | In Accordance With |
| ISR | Intelligence, Surveillance, and Reconnaissance |
| LR | Launch and Recovery |
| LRE | Launch and Recovery Element |
| Lt Col | Lieutenant Colonel |
| MAJCOM | Major Command |
| MCE | Mission Control Element |
| MLRE | Mishap Launch and Recovery Element |
| MP | Mishap Pilot |
| MRPA | Mishap Remotely Piloted Aircraft |
| MSO | Mishap Sensor Operator |
| MSL | Mean Sea Level |
| MTS | Multi-Spectral Targeting System |
| NOTAMs | Notices to Airmen |
| OAT | Outside Air Temperature |
| ORM | Operational Risk Management |
| RPA | Remotely Piloted Aircraft |
| SAR | Search and Rescue |
| SAS | Stability Augmentation System |
| SIB | Safety Investigation Board |
| T/N | Tail Number |
| TO | Technical Order |
| UAV | Unmanned Aerial Vehicle |
| U.S.C. | United States Code |
| USCENTCOM | United States Central Command |
| VVI | Vertical Velocity Indication |
| Z | Zulu |

The above list was compiled from the Summary of Facts, the Statement of Opinion, the Index of Tabs, and Witness Testimony (Tab V).

# SUMMARY OF FACTS

## 1. AUTHORITY AND PURPOSE

### a. Authority

On 1 August 2017, Major General John K. McMullen, Vice Commander, Air Combat Command, appointed Lieutenant Colonel Richard C. Orzechowski as the Abbreviated Accident Investigation Board (AAIB) President to investigate the 8 November 2015 accident involving an MQ-1B Predator aircraft (A/C), tail number (T/N) 98-3040 (Tab Y-3 to Y-4). An AAIB was conducted at Creech Air Force Base (AFB), Nevada, from 11 August 2017 to 18 August 2017, in accordance with the provisions of the Air Force Instruction (AFI) 51-503, *Aerospace Accident Investigations*, Chapter 11. A legal advisor and a recorder were also appointed to the AAIB (Tab Y-3).

### b. Purpose

In accordance with AFI 51-503, *Aerospace and Ground Accident Investigations*, this accident investigation board conducted a legal investigation to inquire into all the facts and circumstances surrounding this Air Force ground accident, prepare a publicly releasable report, and obtain and preserve all available evidence for use in litigation, claims, disciplinary action, and adverse administrative action.

## 2. ACCIDENT SUMMARY

On 8 November 2015, at approximately 1653 Zulu time (Z), the mishap remotely piloted aircraft (MRPA), an MQ-1B Predator, tail number (T/N) 98-3040, forward deployed from the 432d Wing, Creech AFB, Nevada, conducted a combat support mission in the United States Central Command (USCENTCOM) area of responsibility (AOR) (Tabs K-2, AA-4 to AA-5, and EE-4). At the time of the mishap, the mishap launch and recovery element (MLRE) from the 46th Expeditionary Reconnaissance Squadron (46 ERS) operated the MRPA from a deployed location in the USCENTCOM AOR (Tabs K-2, V-3.1 to 3.2, AA-4 to AA-5, and EE-4). The MRPA experienced a left tail control surface failure, departed controlled flight, and crashed en route to the intended base of landing (Tabs S-8, V-3.1, EE-4 to EE-6, and EE-11). The estimated cost of aircraft and munitions is $5.3 million (Tab P-4). There were no reported injuries, deaths, or personal property damages (Tab P-3).

## 3. BACKGROUND

### a. Air Combat Command (ACC)


To support global implementation of national security strategy, ACC operates fighter, bomber, reconnaissance, battle-management and electronic aircraft (Tab CC-3). It also provides command, control, communications and intelligence systems, and conducts global information operations (Tab CC-3). As a force provider and Combat Air Forces lead agent, ACC organizes, trains, equips and maintains combat-ready forces for rapid deployment and employment while ensuring strategic air defense forces are ready to meet the challenges of peacetime air sovereignty and wartime air defense (Tab CC-3). Additionally, ACC develops strategy, doctrine, concepts, tactics, and procedures for air and space-power employment (Tab CC-3). The command provides conventional and informational warfare forces to all unified commands to ensure air, space, and information superiority for warfighters and national decision-makers (Tab CC-3). The command can also be called upon to assist national agencies with intelligence, surveillance, and crisis response capabilities (Tab CC-3). ACC numbered air forces provide the air component to U.S. Central, Southern and Northern Commands, with Headquarters ACC serving as the air component to Joint Forces Commands (Tab CC-3). ACC also augments forces to United States European, Pacific, Africa-based and Strategic Commands (Tab CC-3).

### b. Twelfth Air Force (12 AF)


12 AF is responsible for the combat readiness of seven active-duty wings and one direct reporting unit (Tab CC-8). The subordinate commands operate more than 360 aircraft with more than 20,300 uniformed and civilian Airmen (Tab CC-8). The command is also responsible for the operational readiness of 17 AF-gained wings and other units of the Air Force Reserve and Air National Guard (ANG) (Tab CC-8).

### c. 432d Wing (432 WG)


The 432 WG "Hunters" consists of combat-ready Airmen who fly remotely piloted aircraft (RPA) in direct support of the joint warfighter (Tab CC-13). The Hunters conduct RPA training for aircrew, intelligence, weather, and maintenance personnel (Tab CC-13). The 432 WG flies and maintains the MQ-1B Predator and MQ-9 Reaper RPAs to support the joint forces warfighter. (Tab CC-13).

### d. 46th Expeditionary Reconnaissance Squadron (46 ERS)


The 46 ERS is responsible for launch and recovery operations of unmanned aerial vehicles (UAVs), to include the MQ-1B (Tab V-3.1).

### e. Battlespace Flight Services, LLC (BFS)

BFS provides operational maintenance support for MQ-1B aircraft and systems to sustain the combat and training at tasked locations worldwide (Tab CC-14). The objective of BFS is to provide qualified management and supervisory personnel at U.S. MQ-1B operating locations, and a level of support for their personnel that allow them to accomplish their objective (Tab CC-14). Support includes aircraft maintenance, supply support, command, control, communications, computer, intelligence, surveillance, and reconnaissance (ISR) (does this need to be listed in the table of acronyms and abbreviations?) systems, quality assurance, and an environmental, safety and health program (Tabs CC-14).

### f. MQ-1B Predator

The MQ-1B Predator is an armed, multi-mission, medium-altitude, long endurance RPA that is employed primarily as an intelligence-collection asset and secondarily against dynamic execution targets (Tab CC-16). Given its significant loiter time, wide-range sensors, multi-mode communications suite, and precision weapons, it provides a uniquely capability to perform strike, coordination and reconnaisance against high-value, fleeting, and time-sensitive targets (Tab CC-16). Predators can also perform the following missions and tasks: intelligence, surveillance and reconnaissance, close air support, combat search and rescuse, precision strike, buddy-lase, convoy/raid overwatch, route clearance, target development, and terminal air guidance (Tab CC-16). The MQ-1B's capabilities make it uniquely qualified to conduct irregular warfare operations in support of combatant commander objectives (Tab CC-16).

The Predator carries the Multi-spectral Targeting System (MTS), which integrates an infrared sensor, color/monochrome daylight TV camera, image-intensified TV camera, laser designator and laser illuminator (Tab CC-16). The full-motion video from each of the imaging sensors can be viewed as separate video streams or fused (Tab CC-16). The aircraft can employ two laser-guided Hellfire missiles that possess high accuracy, low-collateral damage anti-armor/anti-personnel engagement capabilities (Tab CC-16).

The aircraft is employed from a ground control station (GCS) via a line-of-sight datalink or a satellite datalink for beyond line-of-sight operations (Tab CC-16). The basic crew for the Predator is a rated pilot to control the aircraft and command the mission and an enlisted aircrew member to operate senors and weapons inside the GCS (Tab CC-16).

# 4. SEQUENCE OF EVENTS

## a. Mission

On 8 November 2015, an Air Tasking Order (ATO) authorized the MRPA to conduct a combat support mission in the USCENTCOM AOR (Tab AA-4 to 5) .

## b. Planning

On 8 November 2015, at around 1230Z, the MLRE, consisting of the mishap pilot (MP) and the mishap sensor operator (MSO) conducted a crew brief within the 46 ERS (Tabs R-8, and V-3.1). The briefing was uneventful with no risk factors noted (Tab V-3.1). The weather briefing indicated no significant weather for the MLRE but there were some thunderstorms in the AOR that would be a factor to the MCE (Tabs V-3.1 to V-3.2, EE-5, and EE-8). The MP and MSO indicated an overall moderate risk level for Operational Risk Management (ORM) with the highest risk factor being the MSO's Launch and Recovery Element (LRE) experience and a moderate level of fatigue (Tab AA-3). The MP had a low ORM level (Tabs V-3.1, and Tab AA-3).

## c. Preflight

The MLRE did not observe any maintenance discrepancies for the GCS (Tabs V-3.1 to V-3.2 and EE-5). No pilots or maintainers reported any maintenance discrepancies for the MRPA (Tabs R-37, R-52, and V-3.2). The MLRE reviewed the Notices to Airmen (NOTAMs) and determined there were no factor NOTAMs to the mission (Tab V-3.2). The MLRE reviewed the GCS maintenance forms with no discrepancies noted (Tab V-3.2).

## d. Summary of Accident

The MP and the MSO proceeded to the GCS at a normal time for an aircraft recovery (Tabs R-8, R-27 and V-3.1). The MLRE was tasked with landing the MRPA that was returning with a possible Outside Air Temperature (OAT) sensor failure (Tabs R-8, V-3.1, and EE-4). The MCE performed a successful handover to the MLRE at 1638Z (Tabs J-3, V-3.2, AA-5, and EE-5). Following handover, the GCS and MRPA appeared to be operating normally (Tabs J-3 to J-4, and V-3.2). There were no reported warnings in the GCS (Tab J-3). The GCS operated normally and was Fully Mission Capable (FMC) (Tab J-3 to J-4).

For the next 15 minutes, in preparation for landing, the MLRE flew the aircraft toward the intended landing field and conducted the normal *Descent* and *Arrival* checklists (Tabs J-3, R-4, R-18, R-22, and V-3.2 to V-3.3). At approximately 165311Z, the MLRE commanded the landing gear down (Tabs N-2, EE-6). The MLRE commanded Landing Configuration as part of the arrival checklist, which disables the autopilot functions (Tabs N-2, V-3.2 to V-3.3, and Tab EE-6). The MRPA continued a gradual descent, slightly nose low, wings level, and tails matching in the commanded position (Tab EE-6).

Descending through 4,000 feet mean sea level (MSL), the MP alternated left and right rudder inputs as part of the second to last step of the *Arrival* checklist (Tabs N-2, R-4, R-18 to R-19,

R-22, V-3.2 to V-3.3, and EE-6). The aircraft immediately lost control, pitch angle rapidly decreased, uncommanded, to 50 degrees nose low (Tabs J-4, R-4, R-18 to R-19, V-3.3, EE-6). The yaw rate increased to a maximum reportable 30 degrees per second to the right (Tab J-4, EE-6). For the next 27 seconds, the aircraft tumbled uncontrollably to the ground (Tabs J-4, R-4, R-18 to R-20, R-22, V-3.3, EE-6). The MP attempted to recover the aircraft to controlled flight by executing the *Spin Recovery* checklist (Tabs R-19, V-3.3, and BB-5). The MRPA was unresponsive and unrecoverable (Tab V-3.3). The MRPA impacted the ground 27 seconds after it had departed controlled flight (Tabs J-4, N-2 to N-3, V-3.3, and Tab EE-7).

### e. Impact

At approximately 165424Z, the MRPA impacted the ground 27 seconds after it began its departure from controlled flight (Tabs N-3, S-2, EE-4). The aircraft was inverted at the time of impact (Tabs S-4, and Tab EE-11). The impact and subsequent fire destroyed the MRPA but the parts remained close together (Tab S-2 to S-4). There was no indication of skidding or sliding through the field (Tab S-2 to S-4).

### f. Egress and Aircrew Flight Equipment (AFE)

Not Applicable.

### g. Search and Rescue (SAR)

The recovery personnel collected and loaded the burned wreckage in an aircraft container (Tab EE-9). The recovery crew searched the area surrounding the crash site for several miles, but no additional pieces were recovered (Tabs S-9, and EE-9). In particular, they never found the left tail and left tail insert, nor did they find the left tail clamp or clamp bolts (Tabs S-5, EE-9, and EE-11).

### h. Recovery of Remains

Not Applicable.

## 5. MAINTENANCE

### a. Forms Documentation

A review of the MRPA's maintenance documentation recorded in the Air Force Technical Order (AFTO) 781 series, revealed no relevant discrepancies (Tab D). AFTO Form 781H, dated 4 November 2015, revealed total MRPA airframe time of 19,469 hours (Tab D-3 to D-4). General Atomics Aeronautical Systems, Inc.'s (GA-ASI) review of the aircraft maintenance records indicated probable data entry errors related to the total flight time for the installed aircraft tails (Tab EE-8). GA-ASI indicated that the MRPA's left and right tails likely only had 4,861.8 and 3,126.8 flight hours respectively, and not the hours specified on the AFTO Form 781H (Tab EE-8).

### b. Inspections

All maintenance inspections were current and complied with (Tabs D, R-37, and R-54).

### c. Maintenance Procedures

Maintenance personnel accomplished all preflight inspections, servicing operations, and launch procedures without incident (Tabs D, R-37, R-54, and V-3.1 to V-3.2). On 13 October 2015, maintenance personnel removed and reinstalled the aircraft tails as part of an engine overhaul (Tabs D-2, and EE-8). The MRPA's tails experienced 131 flight hours since last installed prior to this mishap (Tabs D-2, and EE-5). Maintenance personnel correctly followed all technical order (TO) procedures (Tab R-37, R-54, R-87 to R-88, and R-93 to R-94

### d. Maintenance Personnel and Supervision

Military and civilian maintenance personnel were properly trained, qualified, and supervised (Tabs G, and V-3.1). Military and civilian maintenance personnel correctly documented all preflight servicing and maintenance (Tab D).

### e. Fuel, Hydraulic, and Oil Inspection Analyses

Maintenance documentation showed proper servicing and correct levels of fluids in the aircraft at takeoff (Tab D). Post-accident fuel sample analysis did not find any problems (Tab EE-32).

### f. Unscheduled Maintenance

Maintenance documentation revealed no unscheduled maintenance (Tab D-8 to D-9).

## 6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

### a. Structures and Systems

The MRPA container arrived at Creech AFB in February 2016 (Tab EE-9). GA-ASI inspected the wreckage (Tab EE-4). GA-ASI focused the inspection to search the burnt wreckage for the left tail servo, tail insert, and tail clamp (Tab EE-9). The inspectors found two tail servos, the right tail, right tail insert, and the right tail clamp but they did not find the left tail, left tail insert, and left tail clamp (Tab EE-9 and EE-11). In addition, GA-ASI's review of the aircraft maintenance records indicated data entry errors related to the total flight time for the installed aircraft tails (Tab EE-8). GA-ASI indicated that the aircraft left and right tails likely had 4,861.8 and 3,126.8 flight hours, respectively (Tab EE-8).

### b. Evaluation and Analysis

According to the GA-ASI report neither left tail composite structure nor the left metal tail insert could be identified in the wreckage or wreckage photographs (Tab EE-11). The rapid loss of control began at the conclusion of alternating left and right rudder inputs (Tab EE-11). This is a normal procedure that puts additional loads on the tail clamping mechanism and associated hardware (Tab EE-11). Data logs indicated that both the left and right tails followed commanded

positions (Tab EE-11). The right tail servo electrical current increased to values typically seen during large tail movements (Tab EE-11 to EE-12). The left tail servo current was at or near zero amps (Tab EE-12). This is consistent with the left tail servo continuing to move the servo shaft to the commanded position but the motor having no tail loads or associated aerodynamic loads (Tab EE-12).

## 7. WEATHER

### a. Forecast Weather

The MLRE briefed the weather, which indicated nothing that would influence the mission (Tabs V-3.1, and AA-3). For the remainder of the mission, there is no evidence that suggests weather played a significant role in this mishap (Tab V-3.1 to V-3.3).

### b. Observed Weather

The MCE experienced thunderstorms in their working area of the AOR (Tab V-3.1 to V-3.2). After gaining the MRPA, the MLRE noted no significant weather that would influence the mission to safely recover the aircraft (Tab V-3.2).

### c. Operations

No evidence suggests that the MRPA was operated outside of prescribed operational weather limits (Tab V-3.1 to V-3.2, and AA-3).

## 8. CREW QUALIFICATIONS

### a. Mishap Pilot

The MP was current and had been qualified in the MQ-1B since 31 March 2014 (Tab G-12). At the time of the mishap, the MP had a total flight time of 940.5 hours in the MQ-1B (Tab G-3). The MP's flight time during the 90 days before the mishap was as follows (Tab G-4):

| | Hours | Sorties |
|---|---|---|
| 30 | 12.7 | 17 |
| 60 | 35.9 | 47 |
| 90 | 62 | 75 |

### b. Mishap Sensor Operator

The MSO was current and had been qualified in the MQ-1B since 25 February 2014 (Tab G-25). At the time of the mishap, the MSO had a total flight time of 990.9 hours in the MQ-1B (Tab G-8). The MSO's flight time during the 90 days before the mishap was as follows (Tab G-9):

| | Hours | Sorties |
|---|---|---|
| 30 | 16.8 | 17 |
| 60 | 41.3 | 46 |
| 90 | 65.2 | 75 |

## 9. MEDICAL

### a. Qualifications

At the time of the mishap, MLRE crewmembers were fully medically qualified for flight duty. (Tab DD-3 to DD-4).

### b. Health

There is no evidence to suggest the health of the MLRE crewmembers contributed to the mishap.

### c. Pathology

A medical group in the USCENTCOM AOR collected blood and urine samples from the MLRE and the mishap maintenance personnel following the mishap (Tab DD-5 to DD-9). All toxicology reports resulted in negative findings (Tab DD-5 to DD-9).

### d. Lifestyle

There is no evidence to suggest lifestyle factors were a factor in the mishap.

### e. Crew Rest and Crew Duty Time

Aircrew members are required to have proper crew rest prior to performing in-flight duties, defined as a minimum of 12-hours non-duty time before the designated flight duty period begins (Tab BB-4). The MLRE met crew rest requirements (Tabs R-8 to R-9, R-26 to R-27, and AA-3). There is no evidence to suggest crew rest and crew duty time were factors in the mishap (Tab AA-3).

## 10. OPERATIONS AND SUPERVISION

### a. Operations

There is no evidence to suggest operations tempo contributed to the mishap (Tabs V-3.1, and AA-3).

### b. Supervision

On the day of the mishap, the MLRE received their daily briefing as they came on shift around 1200Z (Tab R-8 to R-9, and R-27). Shortly after, the MLRE conducted their crew mission briefing (Tab R-8 to R-9, and R-27). The MLRE was current on their go/no-go requirements and their operational risk management (ORM) was signed off and approved prior to proceeding to the GCS (Tabs V-3.1, and AA-3).

## 11. HUMAN FACTORS ANALYSIS

There were no human factors applicable to this mishap.

## 12. GOVERNING DIRECTIVES AND PUBLICATIONS

### a. Publically Available Directives and Publications Relevant to the Mishap

(1) AFI 51-503, *Aerospace Accident Investigations,* 14 April 2015
(2) AFI 51-503, Aerospace Accident Investigations, Air Combat Command *Supplement*, 28 January 2016
(3) AFI 11-2MQ-1&9, Volume 1, *MQ-1&9, Aircrew Training,* 23 April 2015
(4) AFI 11-2MQ-1&9, Volume 3, *MQ-1 AND MQ-9*, *Operations Procedures*, 28 August 2015
(5) AFI 11-202, Volume 3, *General Flight Rules,* 7 November 2014
(6) AFI 91-204, Safety Investigations and Reports, 12 February 2014, Corrective Actions Applied 10 April 2014, Attachment 6, *DoD Human Factors Analysis and Classification System*

**NOTICE:** All directives and publications listed above are available digitally on the Air Force Departmental Publishing Office website at: http://www.e-publishing.af.mil.

### b. Other Directives and Publications Relevant to the Mishap

(1) AFTO 1Q-1(M)B-1, Aircrew Flight Manual – USAF Series MQ-1B System, 20 March 2015
(2) AFTO 1Q-1(M)(B)-1-1, Flight Manual Appendix A Performance Data – USAF Series MQ-1B System, 10 December 2012
(3) AFTO 1Q-1(M)B-1CL-1, Flight Crew Checklist – USAF Series MQ-1B System, 20 March 2015

**c. Known or Suspected Deviations from Directives or Publications**

There is no evidence to suggest that any directive or publication deviations occurred during this mishap.

\\Signed\\

27 October 2017

RICHARD C. ORZECHOWSKI, Lt Col, USAF
President, Accident Investigation Board

# STATEMENT OF OPINION

**MQ-1B PREDATOR, T/N 98-3040**
**USCENTCOM**
**8 NOVEMBER 2015**

*Under 10 U.S.C. § 2254(d) the opinion of the accident investigator as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report, if any, may not be considered as evidence in any civil or criminal proceeding arising from the accident, nor may such information be considered an admission of liability of the United States or by any person referred to in those conclusions or statements.*

## 1. OPINION SUMMARY

On 8 November 2015, at approximately 1654 Zulu time (Z), the mishap remotely piloted aircraft (MRPA), an MQ-1B Predator, tail number (T/N) 98-3040, forward deployed from the 432d Wing, Creech Air Force Base (AFB), Nevada, conducted a combat support mission in the United States Central Command (USCENTCOM) area of responsibility (AOR). At the time of the mishap, the mishap launch and recovery element (MLRE) from the 46th Expeditionary Reconnaissance Squadron (46 ERS) operated the MRPA from a deployed location in the USCENTCOM AOR. The MRPA experienced a left tail control surface failure, unexpectedly departed controlled flight, and crashed en route to the intended base of landing. The estimated cost of aircraft and munitions is $5.3 million. There were no reported injuries, deaths, or personal property damages.

I find by a preponderance of the evidence the cause of the mishap was the failure of the left tail clamp and/or tail clamp bolts. The failure resulted in the airborne loss of the left tail insert and attached left tail. The loss of the left tail insert and the attached left tail surface resulted in an unrecoverable departure from controlled flight.

I developed my opinion by analyzing factual data from historical records, flight data logs, manufacturer reports, maintenance records, witness testimony, Air Force directives and guidance, and Air Force Technical Orders (AFTO).

## 2. CAUSE

I find by a preponderance of the evidence the cause of the mishap was the failure of the left tail clamp and/or tail clamp bolts. The failure resulted in the airborne loss of the left tail insert and attached left tail. The loss of the left tail insert and the attached left tail surface resulted in an unrecoverable departure from controlled flight.

The mishap pilot (MP) was flying the aircraft, conducting the *Arrival* checklist. When the MP alternated left and right rudder inputs, additional mechanical and aerodynamic loads broke a weakened or failing left tail clamp or tail clamp bolt. When the clamp or clamp bolt failed, the left tail liberated from the aircraft. Both of the tail servos continued to operate despite having

lost mechanical or aerodynamic load to the left tail servo. Without both tail control surfaces, the aircraft was uncontrollable and departed controlled flight.

The MP recognized the out of control situation and attempted to recover the aircraft for the remaining 27 seconds before impact. Without both tail surfaces, any recovery was impossible. The aircraft came to rest in an inverted position and subsequently burned in a post-impact fire.

Based on my review of the evidence, I believe the maintenance personnel correctly complied with all maintenance actions and were not a factor to this mishap.

## 3. CONCLUSION

I find by a preponderance of the evidence the cause of the mishap was the failure of the left tail clamp and/or tail clamp bolts. The failure resulted in the airborne loss of the left tail insert and attached left tail. The loss of the control surface resulted in an unrecoverable departure from controlled flight.

\\Signed\\

27 October 2017

RICHARD C. ORZECHOWSKI, Lt Col, USAF
President, Accident Investigation Board

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