UNITED STATES AIR FORCE
ABBREVIATED AIRCRAFT ACCIDENT INVESTIGATION BOARD REPORT

MQ-1B, T/N 05-03143

432D AIR EXPEDITIONARY WING
CREECH AFB, NV

LOCATION: UNITED STATES CENTRAL COMMAND AREA OF RESPONSIBILITY

DATE OF ACCIDENT: 4 SEPTEMBER 2017

BOARD PRESIDENT: LT COL ALFRED J. ROSALES

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

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DEC 20 2018

ACTION OF THE CONVENING AUTHORITY

The report of the Abbreviated Accident Investigation Board, conducted under the provisions of AFI 51-503, that investigated the 4 September 2017 mishap in the United States Central Command Area of Responsibility involving an MQ-1B, T/N 05-03143, assigned to the 432d Wing, Creech Air Force Base, Nevada, and operated by the 432d Air Expeditionary Wing, Creech Air Force Base, Nevada, complies with applicable regulatory and statutory guidance, and on that basis it is approved.

Lieutenant General, USAF
Deputy Commander

EXECUTIVE SUMMARY
ABBREVIATED AIRCRAFT ACCIDENT INVESTIGATION

MQ-1B, T/N 05-03143
US CENTCOM AOR
4 September 2017

On 4 September 2017, at 1701 Zulu (Z), the mishap aircraft (MA), an MQ-1B aircraft, tail number (T/N) 05-03143, from the 432d Wing, Creech Air Force Base (AFB), Nevada (NV), was lost in the United States Central Command Area of Responsibility (US CENTCOM AOR) while forward deployed and participating in a combat support mission. At the time of the mishap, the MA was being operated by a mission control element (MCE) from the 432d Air Expeditionary Wing, Creech AFB, NV. The MCE permanently lost the ability to monitor and control the MA while flying medium altitude approximately 16 hours into the mission. The location of the aircraft is unknown. The estimated cost of the missing aircraft is $4.09 Million. There were no known injuries and there was no known damage to other Government or private property.

After normal crew changeover briefs, the mishap crew lost complete video and command link ("lost link") within one minute of sitting in the cockpit, resulting in an inability to monitor and control the aircraft. At the moment of the lost link event, the aircraft was operating normally at an altitude of 13,000 feet. Radar controllers and one fighter aircraft in the area did not detect with certainty the MQ-1B in the area of the lost link event or in the vicinity of the emergency mission profile. Additionally, the mishap crew initiated the Emergency Checklist for aircraft that have lost link, but this did not resolve the lost link event. Weather was not a factor. The cockpit equipment and the maintenance of the cockpit was not a factor. The training and medical review of the mishap crew did not highlight any notable factors. The aircraft wreckage was not found from the time of the incident to the completion of this investigation.

The Abbreviated Accident Investigation Board (AAIB) President determined, by a preponderance of the evidence, the cause of the mishap was a lost link event followed by an inability to reestablish link for unknown reasons, and there was insufficient evidence of any substantially contributing factors.

SUMMARY OF FACTS AND STATEMENT OF OPINION
MQ-1B, T/N 05-03143
4 SEPTEMBER 2017

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ACRONYMS AND ABBREVIATIONS

12 AF	12th Air Force
432 WG	432d Wing
ACC	Air Combat Command
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFSOUTH	Air Forces Southern
AFTO	Air Force Technical Order
AFLCMC/WIIQL	Air Force Life Cycle Management Center/ MQ-1 System Program Office Logistics Section
AGL	Above Ground Level
AAIB	Abbreviated Accident Investigation Board
AIB	Accident Investigation Board
AOR	Area of Responsibility
ATO	Air Tasking Order
CC	Commander
CS	Chief of Safety
CTR	Contractor
DoD	Department of Defense
GA-ASI	General Atomics Aeronautical Systems Incorporation
GCS	Ground Control Station or Cockpit
GP	Ground Pilot
GSO	Ground Sensor Operator
HFACS	Human Factors Analysis and Classification System
IAW	In Accordance With
MA	Mishap Aircraft
MAJCOM	Major Command
MCE	Mission Control Element
MP	Mishap Pilot
MSO	Mishap Sensor Operator
MSL	Mean Sea Level
MTS	Multi-Spectral Targeting System
	Notices to Airmen
ORM	Operational Risk Management
RPA	Remotely Piloted Aircraft
SIB	Safety Investigation Board
T/N	Tail Number
TO	Technical Order
USAF	United States Air Force
US CENTCOM	United States Central Command
V	Volume
Z	Zulu Time

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 24 July 2018, Major General Patrick M. Wade, Deputy Commander, Air Combat Command (ACC), appointed Lieutenant Colonel Alfred J. Rosales as the Abbreviated Accident Investigation Board (AAIB) President to investigate the 4 September 2017 accident involving a MQ-1B aircraft, tail number (T/N) 05-03143 (Tab Y-2 and Y-3). An AAIB was conducted at Nellis Air Force Base (AFB), Nevada (NV), from 7 August 2018 to 29 August 2018, in accordance with (IAW) the provisions of Air Force Instruction (AFI) 51-503, *Aerospace and Ground Accident Investigations*, Chapter 11 (Tab Y-2 and Y-3). A legal advisor (Captain) and a recorder (Staff Sergeant) were also appointed to the AAIB (Tab Y-2).

b. Purpose

IAW AFI 51-503, this AAIB conducted a legal investigation to inquire into all the facts and circumstances surrounding this Air Force aerospace 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 4 September 2017, at approximately 1701 Zulu (Z) time, the mishap aircraft (MA), an MQ-1B with tail number (T/N) 05-03143, operated by the 432d Air Expeditionary Wing (432 AEW), Creech AFB, NV, was lost during a combat support mission (Tabs R-16, R-21, V-6.1, AA-4, and DD-2). The MA did not return to base and was not detected along the emergency mission route by radar or other means (Tab R-83). The MA's wreckage was not located, preventing hardware from being provided for testing and analysis (Tabs Q-2, R-19, and R-22). The estimated cost of the missing MA is $4.09 Million (Tab P-4).

3. BACKGROUND

The MA belonged to the 432d Wing (432 WG), Twelfth Air Force (12 AF), ACC, based at Creech AFB, NV, but was operated by the 432 AEW during the mishap (Tabs K-3, V-6.1, and AA-4, CC-10).

a. Air Combat Command

ACC is the major command of the United States Air Force (USAF) and the primary force provider of combat airpower to America's warfighting commands, established to support global implementation of national security strategy (Tab CC-2). ACC operates fighter, bomber, reconnaissance, battle-management and electronic-combat aircraft (Tab CC-2). It also provides command, control, communications and intelligence missions, and conducts global information operations (Tab CC-2). 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-2). ACC numbered air forces provide the air component to United States Central, Southern and Northern Commands, with Headquarters ACC serving as the air component to Joint Forces Commands (Tab CC-2). ACC also augments forces to United States European, Pacific, Africa-based and Strategic Commands (Tab CC-2).

b. Twelfth Air Force

12 AF, or Air Forces Southern (AFSOUTH), enables combat ready forces for rapid global employment; and receives and employs joint air component assets to meet US strategic objectives in the United States Southern Command Area of Responsibility (Tab CC-5). 12 AF is responsible for United States air and space operations in Central America, South American and the Caribbean and its subordinate commands operate more than 360 aircraft with more than 20,300 uniformed and civilian Airmen (Tab CC-5).

c. 432d Wing, 432d Air Expeditionary Wing

The 432 WG consists of combat-ready Airmen who fly and maintain the MQ-1 Predator and MQ-9 Reaper remotely piloted aircraft (RPA) in direct support of the United States total force components and combatant commanders (Tabs CC-9 and CC-10). The 432 WG also trains aircrew, intelligence, weather, and maintenance personnel for RPA operations (Tabs CC-9 and CC-10). The RPA systems provide real-time intelligence, surveillance and reconnaissance (ISR), as well as precision attack against fixed and time-critical targets (Tabs CC-9 and CC-10). The veteran combat unit returned to active service on May 1, 2007, at Creech AFB, NV, as the 432 WG, and formed the USAF's first unmanned (later, remotely piloted) aircraft systems wing (Tab CC-15). In doing so, the 432 WG took charge of existing and rapidly expanding unmanned precision attack and intelligence, surveillance, and reconnaissance combat missions there in support of overseas contingency operations (Tab CC-15). On May 15, 2008, the provisional 432 AEW activated at Creech AFB to offer the fullest possible spectrum of leadership to these fights, while complementing the operate, train and equip efforts of the 432 WG (Tab CC-15).

d. 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-11). Given its significant loiter time, wide-range sensors, multi-mode communications suite, and precision weapons, it provides a unique capability to perform strike, coordination and reconnaissance against high-value, fleeting, and time-sensitive targets (Tab CC-11). Predators can also perform the following missions and tasks: intelligence, surveillance and reconnaissance, close air support, combat search and rescue, precision strike, buddy-lase, convoy/raid overwatch, route clearance, target development, and terminal air guidance (Tab CC-11). The MQ-1B's capabilities make it uniquely qualified to conduct irregular warfare operations in support of combatant commander objectives (Tab CC-11). The Predator carries the Multi-spectral Targeting Systems (MTS), which integrates an infrared sensor, color/monochrome daylight TV camera, image-intensified TV camera, laser designator and laser illuminator (Tab CC-11). The full-motion video from each of the imaging sensors can be viewed as separate video streams or fused (Tab CC-11). The aircraft can employ two laser-guided Hellfire missiles that possess high accuracy, low-collateral damage anti-armor/anti-personnel engagement capabilities (Tab CC-11).

The aircraft is employed from a ground control station (GCS), commonly known as a cockpit via a line-of-sight datalink or a satellite datalink for beyond line-of-sight operations (Tabs CC-11 and C-12). 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 sensors and weapons inside the cockpit (Tab CC-11).

4. SEQUENCE OF EVENTS

a. Mission

On 4 September 2017, the mishap Mission Control Element (MCE) crew accomplished a changeover brief to continue an assigned 432 AEW ATO authorized mission in the United States Central Command Area of Responsibility (US CENTCOM AOR) (Tabs R-17, R-21, V-1.1, V-2.1, and V-6.1). The mishap crew consisted of the Mishap Pilot (MP) and Mishap Sensor Operator (MSO) (Tabs R-17, R-21, V-1.1, and AA-6).

b. Planning

The mishap crew's mission planning was complete and flight authorization and certification paperwork was completed (Tabs G-21, G-29, K-2, R-17, V-1.1, and AA-4). The risk management assessment was low and there was no adverse weather (Tabs F-1 to F-22, and AA-3).

c. Preflight

No discrepancies were noted in the maintenance records for the MA, and neither the mishap crew nor maintenance personnel recall any issues with the MA or cockpit (Tabs R-17, R-18, R-21, R-68, R-70, V-1.1, and V-2.1). At the time of the mishap, the MA had accumulated 25,002 total flight hours and was not overdue for any inspections (Tab D-2 and D-10).

d. Summary of Accident

At approximately 1701Z, the MA was lost in the US CENTCOM AOR while participating in a combat support mission and flying at a medium altitude of approximately 13,000 feet Mean Sea Level (MSL) (Tabs K-2, R-35, R-83, V-3.1, V-4.1, V-6.1, and DD-2). Approximately one minute after the crew changeover in the same cockpit, the mishap crew communicated to the controlling agencies their aircraft was lost link (Tabs R-4, R-17 to R-18, and V-1.1). The mishap crew began running through the applicable technical order checklists to attempt to regain control of the MA (Tabs R-18, R-21, V-1.1, and V-2.1). During the troubleshooting effort with maintenance personnel, the mishap crew and the operations supervisor contacted radar facilities and a nearby fighter aircraft to locate the MA in the vicinity of the last known position and along the emergency mission route of flight with no success (Tabs R-18 to R-19, R-83 to R-84, V-1.1, and V-3.1).

A lost link event occurs when the mishap crew loses satellite link with the aircraft (Tab V-6.1). The aircraft has an emergency mission logic that it executes when a lost link event occurs (Tab V-6.1). The emergency mission logic is input by the mission pilot (Tab V-6.1). In this case, when the aircraft lost link it should have flown that preset mission (Tab V-6.1).

e. Impact

The MA impact location within the US CENTCOM AOR was unknown (Tabs R-19, R-22, and S-2).

f. Egress and Aircrew Flight Equipment

Not applicable.

g. Search and Rescue (SAR)

Not applicable.

h. Recovery of Remains

Not Applicable.

5. MAINTENANCE

a. Forms Documentation

A review of the maintenance records for the MA leading up to the mishap day revealed no relevant discrepancies or issues, and showed no overdue Time Compliance Technical Orders, time change items, or special inspections (Tab D-2 to D-76). Prior to launch, there was no evidence of procedural violations on the MA's flight and post- and pre-flight inspections (Tab D-3 to D-43).

b. Inspections

There was no evidence of non-current or non-compliant maintenance inspection discrepancies by relevant authorities (Tabs D-2 and D-3). Air Force Technical Order (AFTO) Form 781H indicated the MA was inspected prior to its last flight (Tab D-3).

c. Maintenance Procedures

There was no evidence to suggest that maintenance procedures were not conducted IAW applicable TOs and guidance (Tab D-2 to D-76).

d. Maintenance Personnel and Supervision

There was no evidence of discrepancies in preflight servicing and maintenance documentation executed by military and civilian maintenance personnel (Tab D-2 to D-76). No evidence suggested that the training, qualifications, and supervision of the maintenance personnel were a factor in this mishap (Tab D-2 to D-76).

e. Fuel, Hydraulic, and Oil Inspection Analyses

No evidence existed in the MA's AFTO 781A forms regarding inspection of fluid levels prior to the mishap mission (Tab D-4). Due to the unknown location of the MA, post-mishap fluid analysis was not conducted (Tabs J2, R-19, R-22, and S-2).

f. Unscheduled Maintenance

Maintenance documentation revealed no unscheduled maintenance prior to the mishap (Tab D-2 to D-76).

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

Maintenance personnel inspected the mishap cockpit following the incident and did not note any issues (Tab R-18).

b. Evaluation and Analysis

Following the lost link event, the MCE data logs were sent to the Air Force Life Cycle Management Center – MQ-1 Predator System Program Office Logistics Section (AFLCMC/WIIQL) (Tab DD-2). AFLCMC/WIIQL conducted an analyses of the cockpit data logs and noted no aircraft systems mission malfunctions (Tab DD-2). Their technical review of the mishap data logs found no definitive answers to the exact reason for the lost link event (Tab DD-2).

7. WEATHER

a. Forecast Weather

The weather information briefed prior to the mishap flight indicated that the forecast for the flight operation was for clear skies and unlimited visibility (Tabs F-5 and F-12). Winds were forecasted to be out of the west at 28 knots at 15,000 MSL and southwest at 24 knots at 10,000 MSL (Tab F-18).

b. Observed Weather

No significant weather was reported or observed at the time of the mishap (Tabs F-19, R-35, and V-4.1).

c. Space Environment

Not Applicable.

d. Operations

No evidence suggests that the MA was operated outside of prescribed operational weather limits (Tabs F-5 and F-12 to F-13).

8. CREW QUALIFICATIONS

a. Mishap Pilot (MP)

The MP was current and qualified to conduct MCE operations in the MQ-1B at the time of the mishap (Tab G-21). The MP had 2065 hours of MQ-1B flight time around the time of the mishap (Tab G-22). Recent flight hours were as follows (Tab G-23):

	Flight Hours	Flight Sorties
Last 30 Days	14.0	5
Last 60 Days	34.7	12
Last 90 Days	42.4	17

b. Mishap Sensor Operator (MSO)

The MSO was current and qualified to conduct MCE operations in the MQ-1B at the time of the mishap (Tab G-29). The MSO had 1933 hours of MQ-1B flight time (Tab G-30). Recent MQ-1B flight hours were as follows (Tab G-31):

	Flight Hours	Flight Sorties
Last 30 Days	52.2	14
Last 60 Days	98.2	22
Last 90 Days	124.9	29

9. MEDICAL

a. Qualifications

No evidence exists to suggest crews were not qualified for flight duty (Tab AA-4).

b. Health

No evidence exists to suggest the health of the mishap crews contributed to the mishap (Tabs R-7 to R-15 and R-24 to R-33).

c. Pathology/Toxicology

Toxicology was not a factor in the mishap (Tab EE-2 to EE-10).

d. Lifestyle

No evidence suggests crew member lifestyles were a factor in the mishap (Tabs R-7 to R-15 and R-24 to R-33).

e. Crew Rest and Crew Duty Time

Aircrew members must have proper rest, as defined in AFI 11-202, Volume (V) 3, *General Flight Rules*, ACC Supplement, dated 28 November 2012, prior to performing in-flight duties (Tab BB-5). AFI 11-202 V3 defines normal crew rest as a minimum of a 12-hour non-duty period before the designated flight duty period begins (Tab BB-6). Crew rest is defined as free time and includes time for meals, transportation and the opportunity to sleep (Tab BB-6).

The mishap crew verified they had received the proper crew rest by initialing the pre-flight authorization (Tab AA-4).

10. OPERATIONS AND SUPERVISION

a. Operations

There is no evidence to suggest operations tempo contributed to the mishap (Tabs V-6.1 and AA-3).

b. Supervision

The Operations Supervisor identified no significant issues with the mishap crew prior to the mishap (Tabs R-82, R-83, and V-3.1).

11. HUMAN FACTORS ANALYSIS

The AAIB considered all human factors as prescribed in the Department of Defense (DoD) Human Factors Analysis and Classification System (HFACS), Version 7.0, to determine those human

factors that directly related to the mishap (Tab BB-2). Based on the evidence, human factors did not play a factor in this mishap.

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publicly-Available Directives and Publications Relevant to the Mishap

(1) AFI 51-503, *Aerospace and Ground Accident Investigations,* 14 April 2015, Incorporating AFGM2018-01, 12 March 2018
(2) AFI 51-503, *Aerospace Accident Investigations*, ACC 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,* ACC Supplement, 28 November 2012
(6) AFI 91-204, *Safety Investigations and Reports*, 27 April 2018

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) DOD HFACS, Version 7.0

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.

17 December 2018

ALFRED J. ROSALES, Lt Col, USAF
President, Abbreviated Accident Investigation Board

STATEMENT OF OPINION

MQ-1B, T/N 05-03143
US CENTCOM AOR
4 SEPTEMBER 2017

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

At approximately 1701 Zulu time on 4 September 2017, the mishap aircraft (MA), an MQ-1B, tail number (T/N) 05-03143, from the 432d Wing, Creech Air Force Base (AFB), Nevada (NV), was lost in the United States Central Command (US CENTCOM) Area of Responsibility (AOR) while participating in a combat support mission and flying at an altitude of approximately 13,000 feet Mean Sea Level. At the time of the mishap, the MA was being operated by a mission control element crew from the 432d Air Expeditionary Wing, Creech AFB, NV. Approximately one minute after the crew changeover in the same cockpit, the mishap crew communicated to the controlling agencies their aircraft had lost link. The mishap crew began running through the applicable technical order checklists to attempt to regain control of the aircraft. During the troubleshooting effort with maintenance personnel, the mishap crew contacted radar facilities and a nearby fighter aircraft in an attempt to locate the MA in the vicinity of the last known position and along the emergency mission route of flight with no success. The MA crash site and wreckage was never located.

2. CAUSE

I find by a preponderance of the evidence the cause of the mishap was a lost link event followed by an inability to reestablish link for unknown reasons. Since post mishap analysis of the data loggers did not reveal any issues with the cockpit or the MA immediately prior to the lost link and the aircraft was never found, there is insufficient evidence to determine the chain of events beyond the lost link.

3. SUBSTANTIALLY CONTRIBUTING FACTORS

I find there was insufficient evidence indicating any substantially contributing factors.

4. CONCLUSION

I find by a preponderance of the evidence the cause of the mishap was a lost link event followed by an inability to reestablish link for unknown reasons, and there was insufficient evidence of any substantially contributing factors.

17 December 2018

ALFRED J. ROSALES, Lt Col, USAF
President, Abbreviated Accident Investigation Board

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