UNITED STATES AIR FORCE
ABBREVIATED AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT

MQ-9A, T/N 15-4295

108th ATTACK SQUADRON
174th ATTACK WING
HANCOCK FIELD AIR NATIONAL GUARD BASE, NEW YORK

LOCATION: HANCOCK FIELD AIR NATIONAL GUARD BASE, NEW YORK

DATE OF ACCIDENT: 25 JUNE 2020

BOARD PRESIDENT: LIEUTENANT COLONEL BRIAN E. PRICHARD

Abbreviated Accident Investigation, conducted pursuant to Chapter 12 of Air Force Instruction 51-307

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

01 APR 2021

ACTION OF THE CONVENING AUTHORITY

The report of the abbreviated accident investigation board conducted under the provisions of Air Force Instruction 51-307, *Aerospace and Ground Accident Investigations*, that investigated the 25 June 2020 mishap involving an MQ-9A, T/N 15-4295, operated by the 108th Attack Squadron, complies with applicable regulatory and statutory guidance, and on that basis it is approved.

CHRISTOPHER P. WEGGEMAN
Lieutenant General, USAF
Deputy Commander

EXECUTIVE SUMMARY
UNITED STATES AIR FORCE
ABBREVIATED AIRCRAFT ACCIDENT INVESTIGATION

MQ-9A, T/N 15-4295
HANCOCK FIELD AIR NATIONAL GUARD BASE, NEW YORK
25 JUNE 2020

On 25 June 2020, at about 13:24 Zulu time (Z), the mishap aircraft (MA), an unmanned MQ-9A, tail number (T/N) 15-4295, lost engine power shortly after takeoff and impacted the ground. The MA came to rest approximately 600 feet from the departure end of runway 33 of Syracuse Hancock International Airport. The MA was assigned to the 174th Attack Wing and operated by the 108th Attack Squadron's Launch and Recovery Element located at Hancock Field Air National Guard Base (ANGB), Syracuse, New York. The MA was significantly damaged on impact resulting in a loss of Government Property valued at $6,085,179.00. Damage to civilian property was minimal and localized to Syracuse Hancock International Airport. There were no injuries or fatalities reported.

At 13:23:41Z, the Mishap Pilot (MP) applied takeoff power to the MA and began the takeoff down runway 33 Syracuse Hancock International Airport. At 13:24:14Z the MA lifted off the runway and began to climb out for departure. Approximately seven seconds after becoming airborne and about 150 feet above ground level (AGL) the MA experienced a complete loss of engine power. Loss of engine power was due to the MP misidentifying the Flap Lever. Instead of pushing the Flap Lever forward to reduce the flaps, the MP pulled the Condition Lever backwards which resulted in the fuel supply to the engine being cutoff stopping the engine. Upon realization that the engine had lost power, in accordance with emergency procedures checklist, the mishap crew (MC) consisting of the MP and mishap sensor operator (MSO), began running the Critical Action Procedures (CAPs) for an engine failure. The MP continued to misidentify the appropriate lever and pulled the Flap Lever to full aft or back. The MA impacted the ground 21 seconds after loss of engine power. Upon impact the MA struck a portion of airport runway lights, spun 180 degrees, and came to a rest approximately 600 feet off the departure end of runway 33.

The Abbreviated Accident Investigation Board (AAIB) President found, by a preponderance of the evidence, the cause of the mishap was the MP misidentifying the Flap Lever and pulling aft or back on the Condition Lever instead of pushing forward on the Flap Lever which cut the fuel supply to the engine, causing the engine to stop and the MA to impact the ground. Further, the AAIB President found, by a preponderance of the evidence that the following factor substantially contributed to the mishap: The design of the pilot Ground Control Station (GCS) Control Console Throttle Quadrant including the proximity of the Condition Lever and the Flap Lever, lack of markings, color differentiation, or a safety guard.

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 by the United States or by any person referred to in those conclusions or statements."

SUMMARY OF FACTS AND STATEMENT OF OPINION
MQ-9A, T/N 15-4295
HANCOCK FIELD AIR NATIONAL GUARD BASE, NEW YORK
25 JUNE 2020

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ACRONYMS AND ABBREVIATIONS

108 ATKS	108th Attack Squadron
174 ATKW	174th Attack Wing
AAIB	Abbreviated Accident Investigation Board
ACC	Air Combat Command
AFB	Air Force Base
AFE	Aircrew Flight Equipment
AFI	Air Force Instruction
AFTTP	Air Force Tactics, Techniques, and Procedures
AGL	Above Ground Level
AGR	Active Guard and Reserve
ALS	Approach Lighting System
ANGB	Air National Guard Base
ATCAA	Air Traffic Control Assigned Airspace
CAPs	Critical Action Procedures
CCDAR	Crash, Damaged, or Disabled, Aircraft, Recovery
Col	Colonel
DoD	Department of Defense
FL	Flight Level
FPM	Feet Per Minute
FPS	Fire Protection System
FRC	Fault Reporting Codes
FTU	Formal Training Unit
ft	Feet
g	Gravitational Force
GCS	Ground Control Station
HFACS	Human Factors Analysis and Classification System
HDD	Heads Down Display
HUD	Heads-Up Display
IAW	In Accordance With
IP	Instructor Pilot
ISR	Intelligence, Surveillance, and Reconnaissance
K	Thousand
KCAS	Knots Calibrated Airspeed
KTAS	Knots True Airspeed
kts	Knots
L	Local Time
LR	Launch and Recovery
LRE	Launch and Recovery Element
Lt Col	Lieutenant Colonel
M	Mach
MA	Mishap Aircraft
Maj	Major
MAJCOM	Major Command
MC	Mishap Crew
MFL	Mishap Flight Lead
MGCS	Mishap Ground Control Station
MOA	Military Operating Area
MP	Mishap Pilot
MSO	Mishap Sensor Operator
MSL	Mean Sea Level
ND	Nose Down
NM	Nautical Miles
NOTAMs	Notices to Airmen
OG	Operations Group
OPR	Officer Performance Report
PA	Public Affairs
P&W	Pratt and Whitney
PACAF	Pacific Air Forces
PHA	Physical Health Assessment
PMP	Packaged Maintenance Plan
PR	Pre Flight
PSI	Pounds Per Square Inch
QA	Quality Assurance
RPA	Remotely Piloted Aircraft
RPM	Revolutions Per Minute
RTB	Return-To-Base
RWD	Right Wing Down
SAR	Search and Rescue
SUA	Special Use Airspace
SII	Special Interest Item
SME	Subject Matter Expert
SOF	Supervisor of Flying
SSgt	Staff Sergeant
SQ/CC	Squadron Commander
TCTO	Time Compliance Technical Order
T/N	Tail Number
TO	Technical Order
TOD	Technical Order Data
USAF	United States Air Force
Z	Zulu

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 22 December 2020, the Deputy Commander, Lieutenant General Christopher Weggeman, Air Combat Command (ACC), appointed Lieutenant Colonel Brian E. Prichard as the Abbreviated Aircraft Investigation Board (AAIB) President to investigate a mishap that occurred on 25 June 2020 involving an MQ-9A Aircraft at Hancock Field Air National Guard Base (ANGB), New York (Tab Y-3 to Y-4). The AAIB was conducted in accordance with Air Force Instruction (AFI) 51-307, *Aerospace and Ground Accident Investigations,* Chapter 12, via virtual means due to COVID-19 restrictions, from 5 January 2021 to 14 March 2021 (Tab Y-3 to Y-4). Additional board members included a Major (Maj) Legal Advisor and a Staff Sergeant (SSgt) Recorder (Tab Y-3 to Y-4). On 25 January 2021, a Maj Subject Matter Expert (SME) on Launch and Recovery (LR) procedures was detailed to advise the board (Tab Y-5).

b. Purpose

In accordance with AFI 51-307, *Aerospace and Ground Accident Investigations*, 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 (Tab Y-3 to Y-4). This investigation was an abbreviated accident investigation, conducted pursuant to Chapter 12 of AFI 51-307 (Tab Y-3 to Y-4).

2. ACCIDENT SUMMARY

On 25 June 2020, at approximately 13:24 Zulu time (Z), the mishap aircraft (MA), an unmanned MQ-9A, tail number (T/N) 15-4295, lost engine power shortly after takeoff and impacted the ground, coming to rest approximately 600 feet from the departure end of runway 33 Syracuse Hancock International Airport (Tabs K-3, Q-3, Q-5, and EE-4, EE-8 to EE-9). The MA was assigned to the 174th Attack Wing (174 ATKW) and operated by the 108th Attack Squadron (108 ATKS) Formal Training Unit (FTU) which operates the Launch and Recovery Element (LRE)both located at Hancock Field ANGB, New York (Tabs Q-5 and AA-4). The Mishap Crew (MC) consisted of a Mishap Pilot (MP) and Mishap Sensor Operator (MSO) that were both assigned to the 108 ATKS (Tabs K-4, Q-5 to Q-6, V-11.1 and V-12.3). Upon impacting the ground, the MA struck a portion of the airfield's runway lighting system causing minor damage to public property (Tabs K-3, Q-5 and Q-10). The MA was significantly damaged on impact resulting in a damage of government property valued at $6,085,179.00 (Tabs Q-6 and EE-10 to EE-11).

3. BACKGROUND

a. Air Combat Command (ACC)

ACC is a 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-3 to CC-7). ACC operates fighter, bomber, reconnaissance, battle management and electronic aircraft (Tab CC-3 to CC-7). It also provides command, control, communications and intelligence systems, and conducts global information operations (Tab CC-3 to CC-7). 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 to CC-7). 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-3 to CC-7). ACC also augments forces to United States, European, Pacific, Africa-based, and Strategic Commands (Tab CC-3 to CC-7).

b. Air National Guard (ANG)

The Air National Guard is a separate reserve component of the United States Air Force, which has both a federal and state mission (Tab CC-8 to CC-11). The federal mission is to maintain well-trained units available for prompt mobilization during war and provide assistance during national emergencies (such as natural disasters or civil disturbances) (Tab CC-8 to CC-11). When ANG units are not mobilized or under federal control, they report to the governor of their respective state, territory, or the commanding general of the District of Columbia National Guard (Tab CC-8 to CC-11). The Air National Guard has more than 106,000 officers and enlisted people who serve 89 flying units and 579 mission support units (Tab CC-8 to CC-11).

c. 174th Attack Wing (174 ATKW)

The 174 ATKW is a unit of the New York ANG located in Syracuse, New York, located adjacent to Syracause Hancock International Airport (Tab CC-13 to CC-14). The 174 ATKW has both a federal and state mission (Tab CC-13 to CC-14). The federal mission is to provide qualified Airmen and weapon systems engaging in global air, space and cyberspace operations, as well as support homeland defense and joint operations (Tab CC-13 to CC-14). The state mission is to support civil authorites at the direction of the governor in times of crisis (Tab CC-13 to CC-14). The 174 ATKW flies, launches, and recovers the state-of-the-art MQ-9A Reaper Remotely Piloted Aircraft (RPA) out of Syracuse Hancock International Airport (Tab CC-13 to CC-14).

d. 108th Attack Squadron (108 ATKS)

The 108 ATKS is a Formal Training Unit (FTU) for the 174 ATKW, NYANG, located at Hancock Field ANGB, Syracuse, New York (Tab CC-15). The unit operates MQ-9A RPAs out of Hancock International Airport, Syracuse, New York (Tab CC-15). The unit produces newly qualified aircrew, launch and recovery qualified aircrew, and instructor qualified aircrew for the Air National Guard and active duty Air Force (Tab CC-15). Additionally, the 108 ATKS provides access to Continuation Training (CT) and Exercise Support by launching and recovering MQ-9As that can be controlled from any other MQ-9A unit (Tab CC-15). Finally, the 108 ATKS can be tasked to launch Domestic Operations Missions in support of the Governor of New York or national missions if federally activated (Tab CC-15).

e. MQ-9A Reaper

The MQ-9A Reaper is an armed, multi-mission, medium altitude, long-endurance RPA employed secondarily as an intelligence collection asset and primarily against dynamic target execution (Tab CC-16 to CC-18). The MQ-9A's capabilities, including its significant loiter time, wide-range sensors, multi-mode communications suite, and precision weapons, make it uniquely qualified to conduct irregular, time-sensitive warfare operations in support of combatant commander objectives (Tab CC-16 to CC-18). Reapers can perform the following missions and tasks: Intelligence, Surveillance, and Reconnaissance (ISR), close air support, combat search and rescue, precision strike, buddy-lase, convoy/raid overwatch, route clearance, target development, and terminal air guidance (Tab CC-16 to CC-18).

4. SEQUENCE OF EVENTS

a. Mission

On 25 June 2020, the MC was assigned to the 108 ATKS FTU and scheduled as the LRE crew for the planned flight (Tabs K-4, V-11.1, and V-12.4 to V-12.5). The mission was scheduled under the authority of the 108 ATKS Squadron Commander (SQ/CC) (Tabs K-4, AA-3, and AA-5 to AA-6). The MP was in an Active Guard Reserve (AGR) status while the MSO was in a Technician status for the mission (Tabs K-4, EE-19 to EE-21, and EE-23).

The planned mission was to takeoff from Syracuse Hancock International Airport and climb to the Grimm Air Traffic Control Assigned Airspace (ATCAA), see figure 1 (Tabs K-19 and EE-12). The Grimm ATCAA is a Special Use Airspace (SUA) above Flight Level (FL) 18,000 (180) (Tab DD-4). ATCAAs are airspace with limits designed to separate military aircraft manned and/or unmanned from civilian air traffic (Tab DD-4). Upon reaching the designated ATCAA the MC planned to do a crew swap with student trainees and instructors (Tabs K-4, V-11.1, and V-12.5 to V-12.6). A crew swap is performed by a new crew entering the Ground Control Station (GCS) and swapping out with the current pilot and sensor operator (Tab DD-4). The new crew is briefed

on the status of the aircraft and the mission and then one at a time the incoming and outgoing sensor operators and pilots swap positions (Tab DD-4). At the time of the mishap the incoming instructors and students were scheduled to accomplish training events after the crew swap (Tabs K-4, V-11.1, and V-12.5).

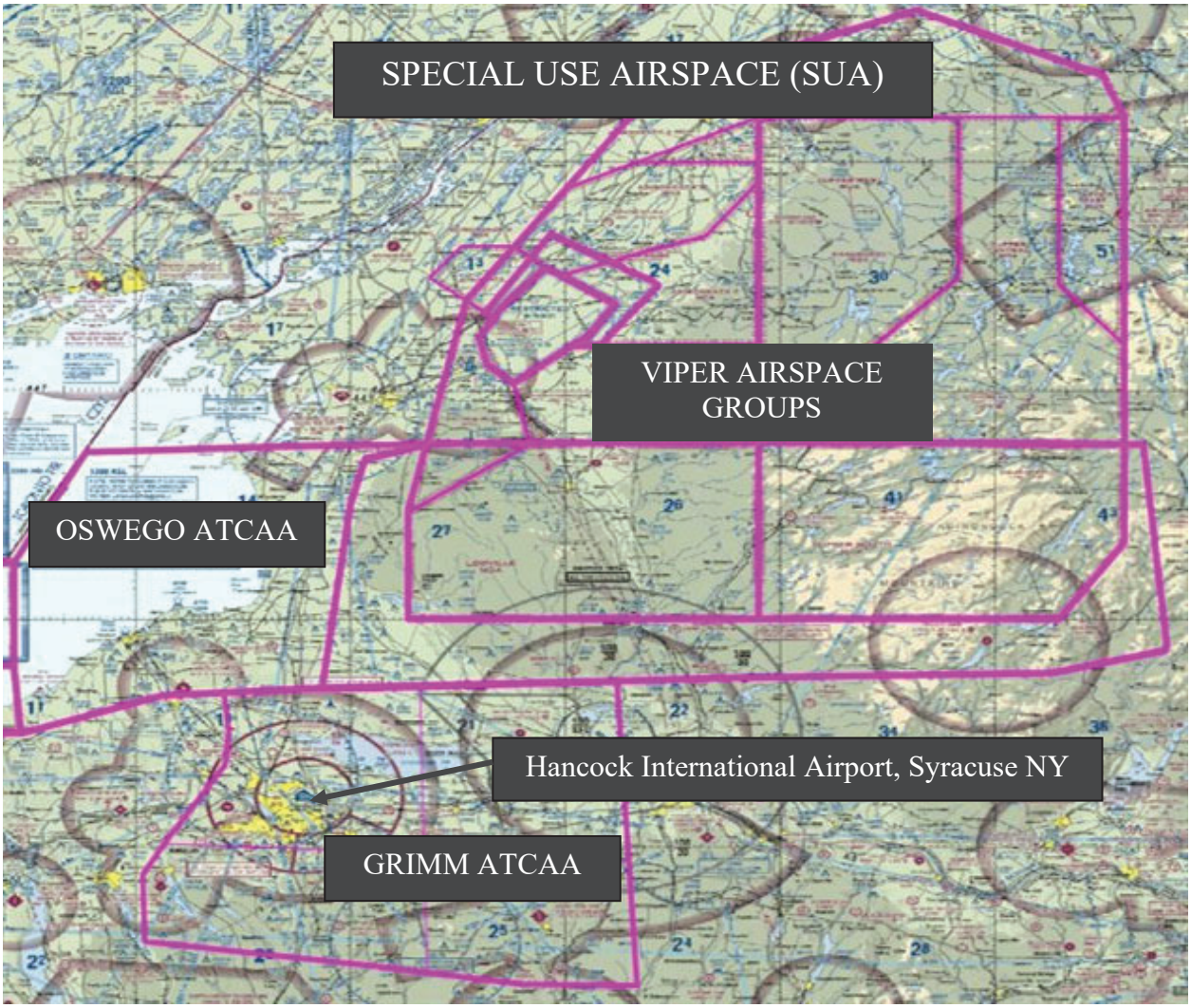

Figure 1. Special Use Airspace (Tab K-19)

b. Planning

The MC verified that the flight authorizations and paperwork for the MA and Mishap Ground Control Station (MGCS) were in order (Tabs V-11.1 and V-12.5). They received all weather, checked Notices to Airmen (NOTAMS), and operations briefs during the squadron's morning mass brief from the Supervisor of Flying (SOF) prior to launch (Tabs R-41 and V-11.1).

c. Preflight

The MA and MGCS preflight checks and taxi checks were conducted without incident (Tabs V-11.1 and EE-3)

d. Summary of Accident

On 25 June 2020, the MC consisting of the MP and MSO were scheduled to be part of the LRE crew that would launch an unmanned MQ-9A, T/N 15-4295 from Syracuse Hancock International Airport runway 33 and fly it to the Grimm ATCAA were they would transfer control to the FTU for student training, see figure 2 (Tabs K-4, Q-3, Q-5, V-11.1, EE-4, and EE12).

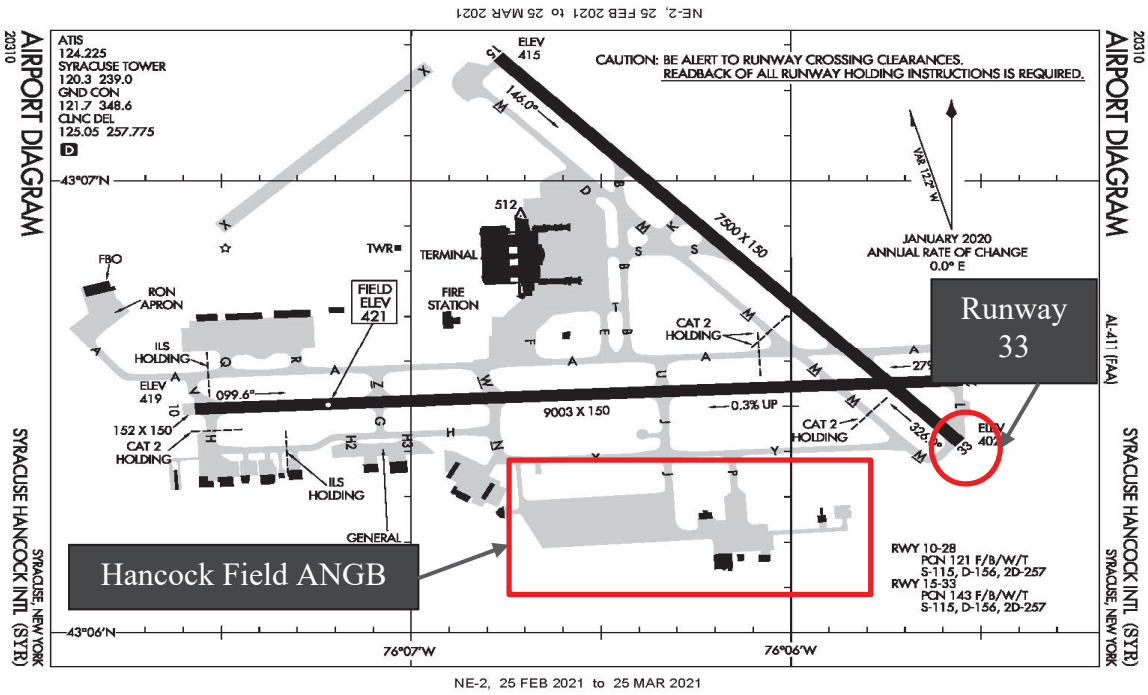

Figure 2. Syracuse Hancock International Airport Diagram (Tab EE-14)

At 13:05:04Z the MP started the MA engine (Tab K-3). The MC completed the MA engine start, preflight checklist procedures, and preflight checks without incident (Tabs V-11.1 and V-12.5). After engine start the Condition Lever should be in the full forward position and the Flap Lever in the neutral position, see figure 3 (Tab DD-3). The MP moved the Flap and Condition Levers into the correct positions for after engine start (Tab EE-8 to EE-9).

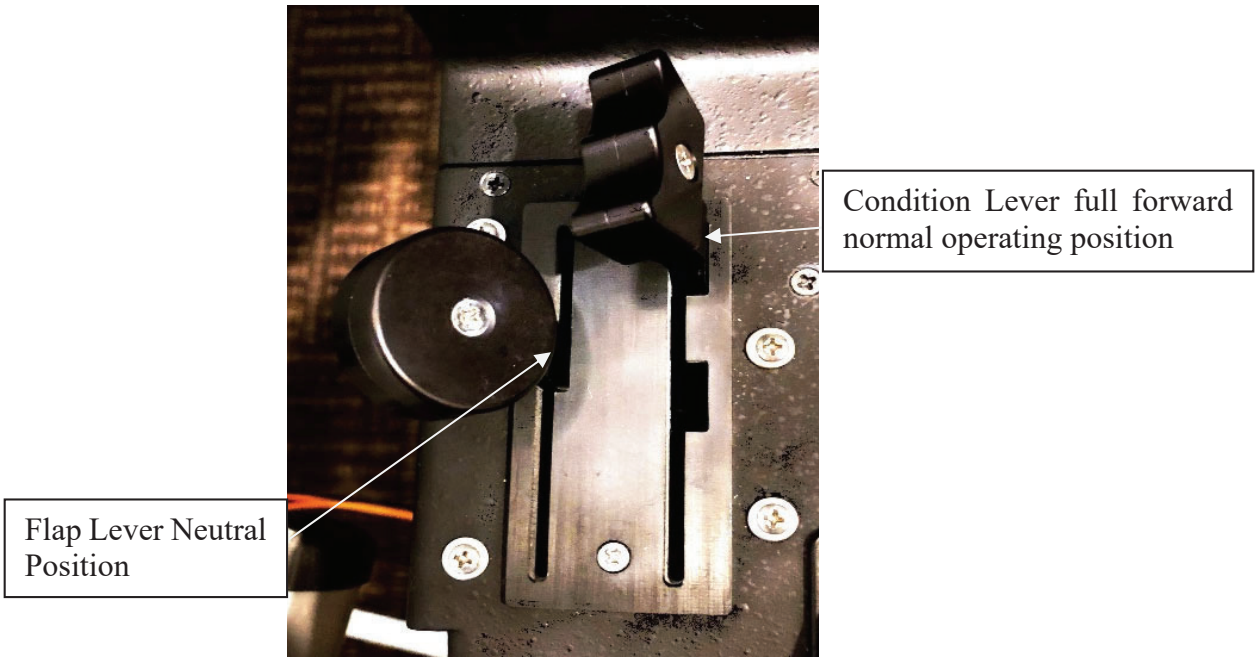

Figure 3. Flaps Neutral Position and Condition Lever Full Forward Example (Tab DD - 7)

At 13:16:57Z the MC taxied the MA from the parking ramp to runway 33 for departure (Tab K-3). The weather was clear and not a factor in the incident (Tabs V-11.1, V-12.5, and EE-4). The MC ran the checklists and briefed what they would do if they experienced an engine failure after takeoff at low altitude (Tab EE-3).

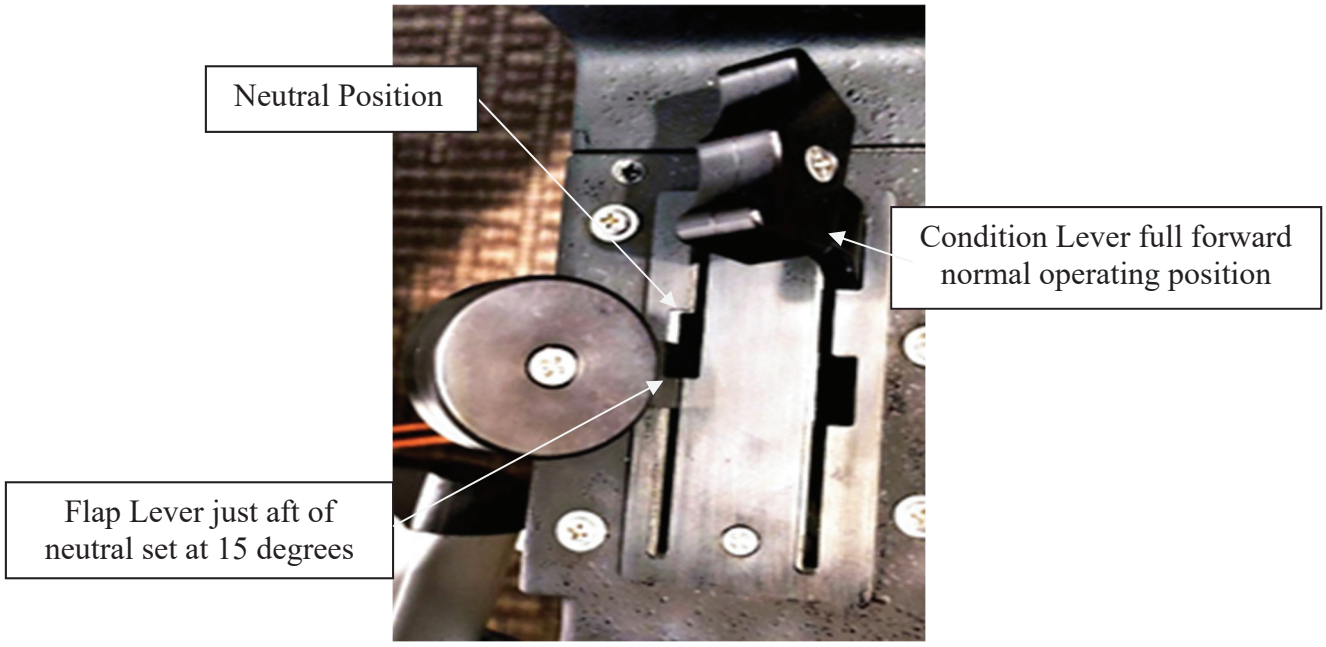

Figure 4. Flap Lever Aft of Neutral/15 Degrees & Condition Lever Full Forward Example (Tab DD - 9)

The proper positions during takeoff of the Condition Lever is full forward and Flap Lever is just aft or back of the neutral position in order to configure the flaps to 15 degrees, see figure 4 (Tab DD-3). The MP moved the Flap and Condition Levers into the correct positions for takeoff (Tab EE-8 to EE-9).

At 13:23:41Z the MP applied takeoff power and began to roll down runway 33 (Tabs K-3, EE-4 to EE-5, and EE-8 to EE-9). The MA accelerated and no issues were detected or noted with the takeoff (Tabs K-3, V-12.6, and EE-5 to EE-9).

At 13:24:13Z the MP rotated the nose of the MA to put it into a climb attitude and began climbing out for departure (Tabs K-3, V-14.6, EE-5, and EE-8 to EE-9). The takeoff proceeded as normal up to about 150 feet AGL (Tabs K-3, V-12.1, V-14.5, EE-5, and EE-8 to EE-9). At about 150 feet Above Ground Level (AGL) the MC began running the after takeoff checklists (Tabs K-3, V-11.1, DD-3 to DD-4, EE-5, and EE-8 to EE-9). One of the after takeoff checklist steps calls for retraction of flaps from 15 degrees to 0 degrees by moving the Flap Lever forward to the middle neutral position, see figure 3 above (Tab DD-4). The MP pulled the Condition Lever aft or back to the middle detent position instead of moving the required Flap Lever forward to the neutral position (Tabs V-12.5and EE-8 to EE-9). The MP's action resulted in the Condition Lever being in the middle detent position (fuel cutoff) and Flap Lever just aft or back of the neutral position leaving the Flaps at 15 degrees instead of the required 0 degrees, see figure 5 (Tabs V-12.5 DD-3 to DD-4, and EE-8 to EE-9).

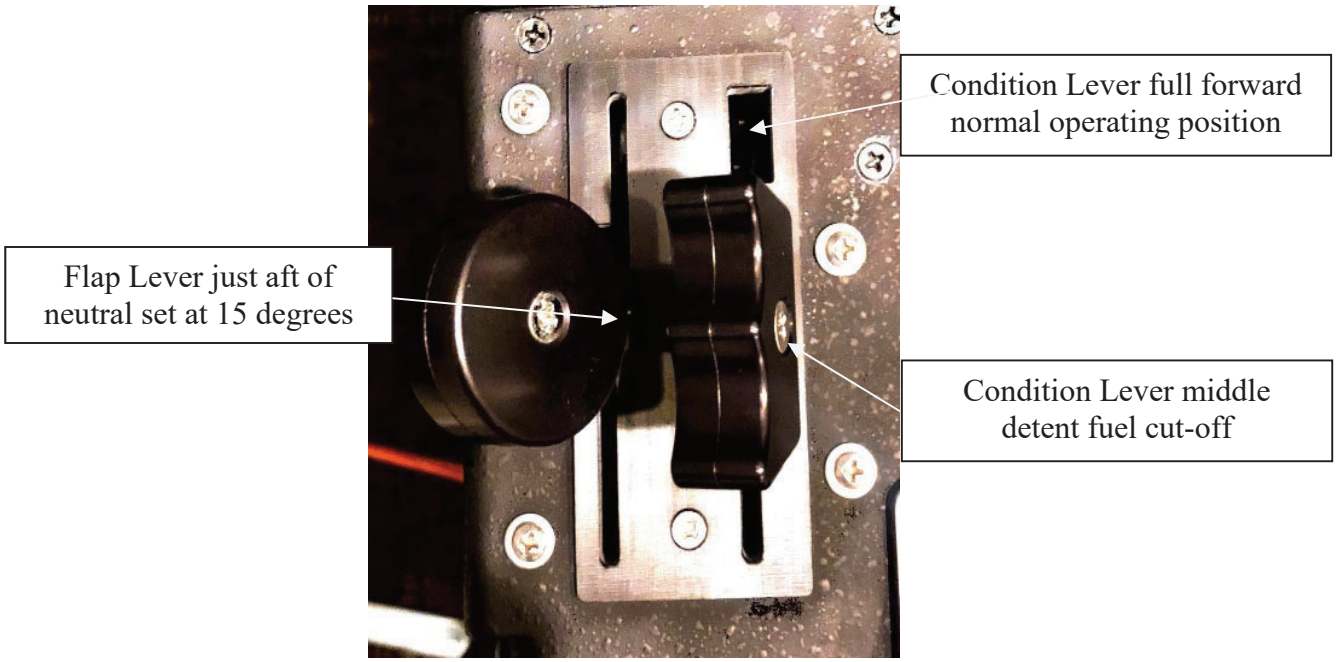

Figure 5. Flaps 15 and Condition Lever middle detent fuel cut off Example (Tab DD -10)

At 13:24:21Z the "Check Condition Lever" warning message was displayed on the HUD when the MP pulled the Condition Lever aft or back to the middle detent position (Tabs K-3 and V-12.6). The "Check Condition Lever" warning message is designed to alert a crew if the Condition Lever

is not fully forward (Tab DD-4). The "Check Condition Lever" message on the HUD was not observed by either the MP or MSO (Tab V-11.1 and V-12.6). The recorded data also shows the Engine Revolutions Per Minute (RPM) rolling back at the same moment that the Condition Lever was pulled to the middle detent position (Tabs DD-3 and EE-8 to EE-9). Approximately 44 seconds after takeoff, the engine completely lost power as a result of the MP pulling the condition leaver aft or back to the middle detent position, see figure 5 (Tabs K-3 and EE-8 to EE-9).

At 13:24:25Z an "Engine Out Detected" warning message was displayed in addition to an audible warning (Tabs K-3 and V-12.6). The first indication to the MC that the engine was no longer running was a drop in airspeed which engine status was confirmed by the "Engine Out Detected" warning and alarm (Tabs V-11.1, V-12.6 and EE-6). In response the MSO stated "Engine Out Detected, Engine Out Detected" (Tabs V-12.6 and EE-6). At that point the MC began running the Critical Action Procedures (CAPs) for an engine failure (Tabs V-11.1, V-12.7, and EE-6). As part of the CAPs, the MP established a glide configuration and began assessing the surroundings for an adequate place to land (Tab V-12.7). The CAPs also call for pulling the Condition Lever – aft or back, as required (Tab V-12.7). The MP continued to misidentify the appropriate lever and pulled the Flap Lever to full aft or back, see figure 6, which extended the Flaps to a mechanical stop of 45 degrees creating more drag (Tabs V-12.7, DD-3, EE-8 and EE-9). The Condition Lever was left in the middle detent position and was not brought to full aft or back in accordance with the CAPs (Tabs V-12.7, DD-3, EE-8 and EE-9). Figure 6 below shows what the controls looked like at that time. (Tab DD-6)

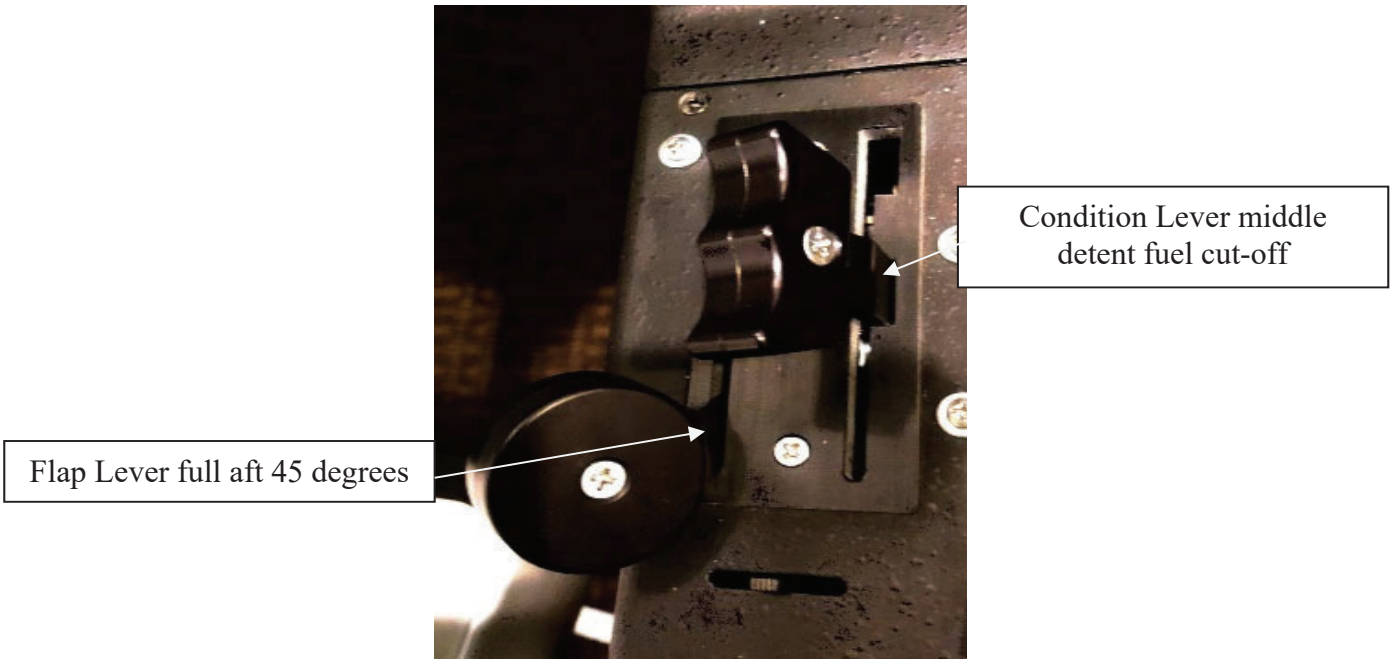

Figure 6. Flaps 45 degrees and Condition Lever middle detent fuel cut off Example (Tab DD -6)

At 13:24:46Z the MA impacted the ground (Tab K-3): After ground contact the MA struck an airport runway light, spun 180 degrees, and came to a rest at 13:24:52Z (Tabs K-3, Q-5, Q-10, and S-10). The impact was 21 seconds after the loss of engine power resulting in the MA

coming to rest approximately 600 feet off the departure end of runway 33 (Tabs K-3, Q-5, and S-10). The total time elapsed from takeoff until the MA came to a stop was one minute and eleven seconds, see figure 7 (Tab K-3).

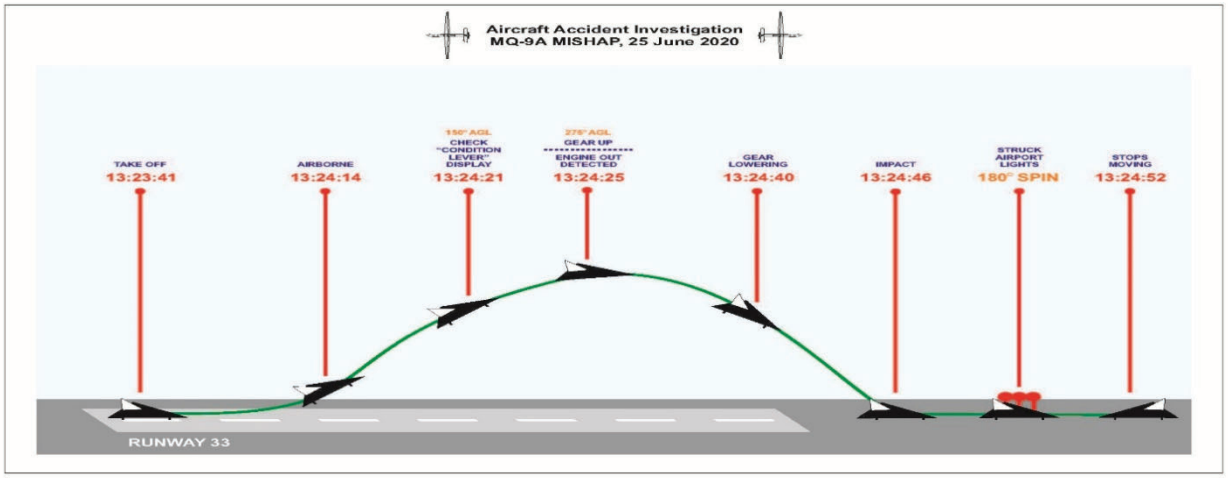

Figure 7. Accident Timeline Graphic (Tab DD-12)

e. Impact

Upon impact the MA struck an airport runway light causing it to spin 180 degrees and come to a rest approximately 600 feet from the departure end of runway 33 of Syracuse Hancock International Airport, see figure 8 (Tabs Q-5, Q-10, and S-10). The MA was significantly damaged on impact resulting in a damage of government property valued at $6,085,179.00 (Tabs Q-6 and EE-10 to EE-11).

Figure 8. Syracuse Hancock International Airport Departure End of Runway 33 (Tab S –10)

f. Egress and Aircrew Flight Equipment (AFE)

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 and MGCS leading up to the mishap day revealed no relevant discrepancies or issues, and showed no overdue Time Compliance Technical Orders (TCTO) (Tab D-249 to D-256). All preflight inspections and release procedures were followed (Tab V-1.1 to V-9.1).

b. Inspections

All MA and MGCS maintenance inspections were current and complied with all relevant authorities (Tab D-3 to D-256). No evidence indicated the MA and MGCS maintenance inspections were a factor in this mishap (Tabs D-3 to D-256 and V-1.1 to V-11.1 and V-12.4).

c. Maintenance Procedures

Maintenance personnel conducted all maintenance procedures in accordance with applicable TOs and guidance (Tabs D-3 to D-256, R-17, R-22, V-2.1, and V-7.1). No evidence indicated the maintenance procedures were a factor in this mishap (Tabs D-3 to D-256 and V-1.1 to V-12.10).

d. Maintenance Personnel and Supervision

No evidence indicated the training, qualifications, and supervision of the maintenance personnel were a factor in this mishap (Tab V-1.1 to V-12.10).

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

No evidence indicated the fuel, hydraulic, oil and oxygen were a factor in this mishap (Tab J-3 to J-16).

f. Unscheduled Maintenance

Not applicable.

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

The MA and MGCS structure and systems were operating as intended (Tabs Q-10, V-1.1 to V-11.1 and V-12.4). Figure 9 below shows the layout of the GCS Control Console and Throttle Quadrant (Tab EE-15).

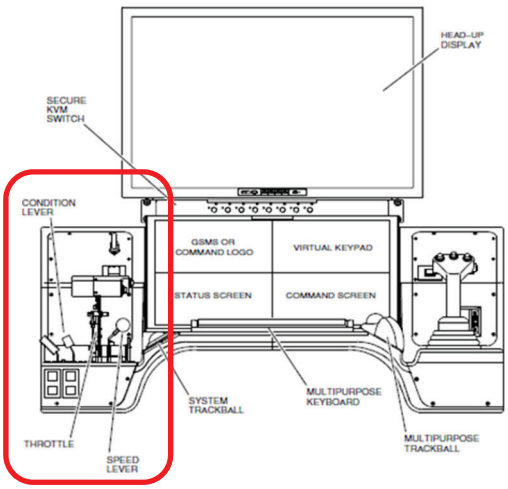

Figure 9. Engine Controls Diagram Example (Tab EE-15)

The design layout of the Control Console places the Flap Lever and the Condition Lever, forward and left of the Throttle Quadrant (Tab DD-11). The Flap Lever and Condition Lever are located approximately an inch apart, without labels, markings, and are the same color, see figure 10 (Tab DD-3 to DD-5).

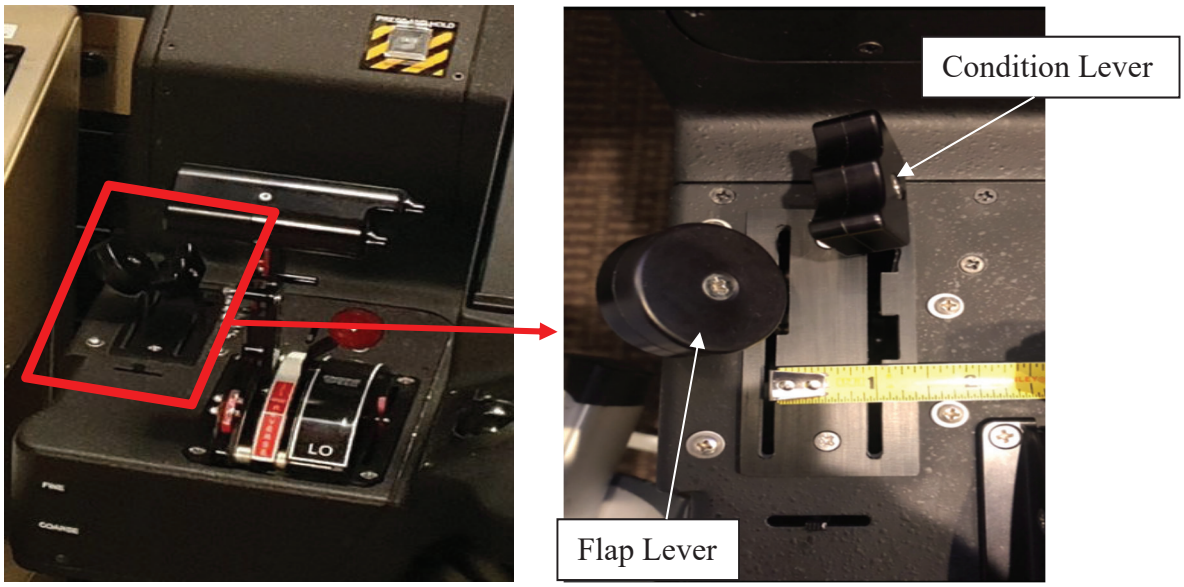

Figure 10. Throttle Quadrant and Condition Lever Example (Tab DD-5 and DD-11)

The Condition Lever is the second lever from the left on the GCS control console (Tab DD-3). The Condition Lever controls the stop/feather servo, which is mechanically linked to the feather valve and the fuel shutoff valve (Tab DD-3). The full forward position of the lever provides for normal engine running operation (Tab DD-3). The detent position closes the fuel shutoff valve and shuts down the engine (Tab DD-3). The full aft or back position mechanically feathers the propeller, closes the fuel shutoff valve, and shuts down the engine (Tab DD-3). The Flap Lever is the first lever from the left on the control console and commands the position of the flaps (Tab DD-3). It is normal to position the flaps to 15 degrees for takeoff (Tab DD-4). When the Flap Lever is placed to the middle, or null position, the flaps retract to 0 degrees, the neutral position (Tab DD-3). The neutral position is the normal position after takeoff (Tab DD-3 to DD-4). The Condition Lever and Flap Lever are not normally actuated in-flight unless accomplishing a takeoff, landing, or in an emergency situation (Tab DD-4).

b. Evaluation and Analysis

All equipment and components were functioning as intended requiring no evaluation or analysis (Tab V-1.1 to V-12.10).

7. WEATHER

a. Forecast Weather

The weather, briefed prior to the mishap flight, indicated the forecast weather for takeoff was to be clear skies, with greater than 6 statute miles visibility (Tab F-3 to F-18). Winds were forecast to be 230 degrees at 06 knots (Tab F-4). There was no other significant weather forecasted at the time of the mishap (Tab F-3 to F-18).

b. Observed Weather

No significant weather was reported or observed at the time of the mishap (Tab V-11.1). The morning SOF brief showed no significant weather issues (Tab V-11.1). The MP further stated the weather did not play a factor in the conduct of the mission (Tab V-12.5)

c. Space Environment

Not applicable.

d. Operations

Not applicable.

8. CREW QUALIFICATIONS

a. Mishap Pilot (MP)

The MP was current and qualified to accomplish the mission in the MQ-9A at the time of the mishap (Tab G-50). The MP was qualified as instructor pilot on the MQ-9A (Tab G-28, G-30,

and G-107). The MP performed well through all stages of LRE training (Tab G-51 to G-107). This was the MP's first flight since completion of the LRE training course (Tab G-39 to G-40 and G-50). The MP completed his LRE training with no major issues and above average grades (Tab G-51 to G-107). The MP had 705.1 hours of MQ-9A flight time and 145.5 hours of MQ-9A simulator time around the time of the mishap (Tab G-30). The MP also had logged 1,971.9 hours of MQ-1B (Predator) flight time from previous assignments (Tab G-30). Recent flight time is as follows (Tab G-30):

	Hours	Sorties
Last 30 Days	15.8	12
Last 60 Days	28.7	21
Last 90 Days	32.7	23

b. Mishap Sensor Operator (MSO)

The MSO was current and qualified to accomplish the mission in the MQ-9A at the time of the mishap (Tab G-108 to G-142). The MSO was qualified as instructor and evaluator MSO on MQ-9A (Tab G-141). The MSO had 1,689.6 hours of MQ-9A flight time and 558.2 hours of MQ-9A simulator time around the time of the mishap (Tab G-108). Recent flight time is as follows (Tab G-108):

	Hours	Sorties
Last 30 Days	5.8	7
Last 60 Days	19.1	19
Last 90 Days	23.8	26

9. MEDICAL

a. Qualifications

The aircrew and maintenance personnel were physically and medically qualified for the mission (Tab O-3 to O-406).

b. Health

No evidence was found to suggest the health of the aircrew or maintenance personnel was a factor in this mishap (Tab O-3 to O-406).

c. Pathology

The medical clinic collected blood and urine samples from the MC after the mishap (Tab O-401 to O-406). Pathology and Toxicology were not factors in the mishap (Tab O-401 to O-406).

d. Lifestyle

There is no evidence to suggest lifestyle was a factor in the mishap (Tab V-1.1 to V-12.10).

e. Crew Rest and Crew Duty Time

Prior to performing in-flight duties, aircrew members must have proper rest, as defined in the ACC Supplement to AFI 11-202, Volume (V) 3, *General Flight Rules* (BB-28). AFI 11-202 V3 defines normal crew rest as a minimum of 12-hour non-duty period before the designated flight duty period begins (Tab BB-27 to BB-30). Crew rest is defined as free time, and includes time for meals, transportation, and the opportunity for at least 8 hours of uninterrupted sleep (Tab BB-28).

The MC verified they had received the proper crew rest by signing the FTU Risk Management sheet (Tab K-5).

10. OPERATIONS AND SUPERVISION

a. Operations

This investigation found no evidence to suggest operations tempo contributed to the mishap (Tab V-1.1 to V-12.10).

b. Supervision

This investigation found no evidence to suggest the Operations Supervision contributed to the mishap (Tab V-1.1 to V-12.10).

11. HUMAN FACTORS

a. Introduction

The Department of Defense Human Factors Analysis and Classification System 7.0 (DoD HFACS 7.0) lists potential human factors that can play a role in aircraft mishaps and identifies potential areas of assessment during an accident investigation (Tab BB-3 to BB-25). Three human factors were identified as relevant to the mishap:

b. AE101 Unintended Operation of Equipment

HFACS AE101 Unintended Operation of Equipment: is a factor when an individual's movements inadvertently activate or deactivate equipment, controls or switches when there is no intent to operate the control or device. This action may be noticed or unnoticed by the individual (Tab BB-8). The MP pulled the Condition Lever aft or back to the middle detent position instead of moving the required Flap Lever forward to the neutral position (Tabs V-12.5, and EE-8 to EE-9). The MP continued to misidentify the appropriate lever during the CAPs and pulled the Flap Lever to full aft, see figure 6, which extended the Flaps to a mechanical stop of 45 degrees (Tabs V-12.5, DD-6, EE-6, and EE-8 to EE-9). The Condition Lever was left in the middle detent position and was not brought to full aft or back in accordance with the CAPs (Tabs V-12.5, EE-6 and EE-8 to EE-9).

c. PC102 Fixation

HFACS PC102 Fixation: is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others (Tab BB-16). Witness testimony stated that due to fixation on the HUD and the takeoff profile the MP inadvertently pulled aft or back the Condition Lever instead of the Flap Lever (Tab V-12.8. The MP pulling the Condition Lever aft or back caused the fuel shutoff valve to close and the engine to stop, leading to the MA impacting the ground (Tabs DD-3 to DD-4 and EE-8 to EE-9).

d. PE204 Control and Switches are Inadequate

HFACS PE204 Controls and Switches are Inadequate: is a factor when the location, shape, size, design, reliability, lighting or other aspect of a control or switch are inadequate (Tab BB-12). The design of the pilot GCS Throttle Quadrant places the Condition Lever and the Flap lever in close proximity, with a lack of markings, and are the same color, see figure 11 (Tab DD-4).

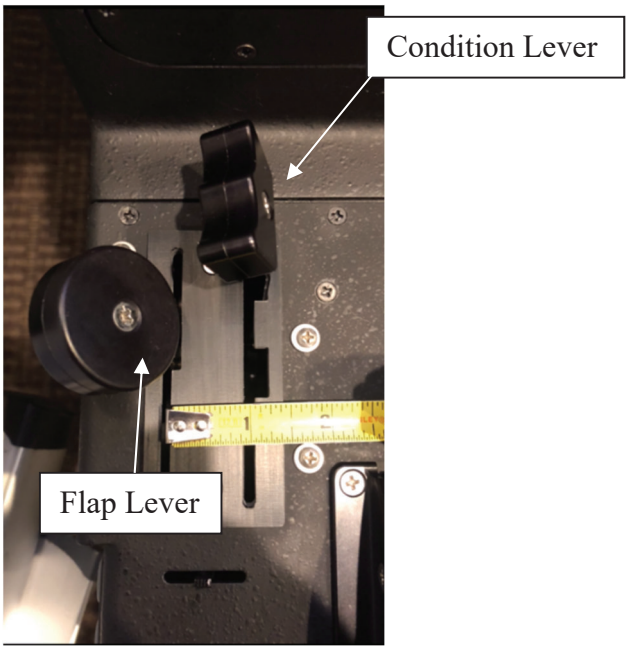

Figure 11. Flap Lever and Condition Lever Example (Tab DD-5)

The Condition Levers normal operating position is full forward and is without any safety guard (Tab DD-4). The next position that the Condition Lever is capable of being placed in is the middle (fuel cutoff) position (Tab DD-4).

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publically Available Directives and Publications Relevant to the Mishap

(1) AFI 51-307, *Aerospace and Ground Accident Investigations*, 18 March 2019

(2) AFI 51-307, Air Combat Command Supplement, *Aerospace and Ground Accident Investigations*, 3 December 2019

(3) AFI 91-204, *Safety Investigations and Reports*, 27 April 2018

(4) AFI 11-202, Volume 3, *General Flight Rules*, ACC Supplement, 10 August 2016, Change 2 – certified current 3 March 2020.

NOTICE: All directives and publications listed above are available digitally on the Air Force Departmental Publishing Office website at: https://www.e-publishing.af.mil. These publications were in effect at the time of the mishap and used to prepare this report.

b. Other Directives and Publications Relevant to the Mishap

(1) TO 1Q-9(M)A-1, *FLIGHT MANUAL, USAF SERIES 2400 SOFTWARE AND ABOVE*, *MQ-9A AIRCRAFT*, 14 November 2019, Change 1 – 1 April 2020

(2) TO 1Q-9(M)A-1-1, *FLIGHT MANUAL, APPENDIX A, PERFORMANCE DATA, USAF SERIES MQ-9A AIRCRAFT SERIAL NUMBERS 004, 006, 008, AND ABOVE*, 14 November 2019

(3) AFTTP 3-3.MQ-9, *COMBAT AIRCRAFT FUNDAMENTALS MQ-9,* 7 January 2019

(4) DOD HFACS, *DEPARTMENT OF DEFFENSE HUMAN FACTORS ANALYSIS AND CLASSIFICATION SYSTEM*, Version 7.0

c. Known or Suspected Deviations from Directives or Publications

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

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14 March 2021

BRIAN E. PRICHARD, Lieutenant Colonel, USAF
President, Abbreviated Accident Investigation Board

STATEMENT OF OPINION

MQ-9A, T/N 15-4295
HANCOCK FIELD AIR NATIONAL GUARD BASE, NEW YORK
25 JUNE 2020

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 25 June 2020, at about 13:24 Zulu time (Z), the mishap aircraft (MA), an unmanned MQ-9A, tail number (T/N) 15-4295, lost engine power shortly after takeoff and impacted the ground, coming to a rest approximately 600 feet from the departure end of runway 33 of Syracuse Hancock International Airport. The MA was assigned to the 174th Attack Wing and operated by the 108th Attack Squadron's Launch and Recovery Element located at Hancock Field Air National Guard Base (ANGB), Syracuse, New York. The MA was significantly damaged on impact resulting in a loss of Government Property valued at $6,085,179.00. Damage to civilian property was minimal and localized to Syracuse Hancock International Airport. There were no injuries or fatalities reported.

At 13:23:41Z, the Mishap Pilot (MP) applied takeoff power to the MA and began the takeoff down runway 33 Syracuse Hancock International Airport. At 13:24:14Z the aircraft lifted off the runway and began to climb out for departure. Approximately seven seconds after becoming airborne and about 150 feet above ground level (AGL) the aircraft experienced a complete loss of engine power. Loss of engine power was due to the MP misidentifying the Flap Lever. Instead of pushing the Flap Lever forward to reduce the flaps, the MP pulled the Condition Lever backwards which resulted in the fuel supply to the engine being cutoff stopping the engine. Upon realization that the engine had lost power, in accordance with emergency procedures checklist, the mishap crew (MC) consisting of the MP and mishap sensor operator (MSO), began running the Critical Action Procedures (CAPs) for an engine failure. The MP continued to misidentify the appropriate lever and pulled the Flap Lever to full aft or back, instead of pulling the Condition Lever aft or back. The MP accomplished the steps while the MSO read the steps aloud. The MA impacted the ground 21 seconds after loss of engine power. Upon impact the MA struck a portion of airport runway lights, spun 180 degrees, and came to a rest approximately 600 feet off the departure end of runway 33.

I find by a preponderance of the evidence, the cause of the mishap was the MP misidentifying the Flap Lever and pulling aft or back on the Condition Lever which cut the fuel supply to the engine, causing the engine to stop and the MA to impact the ground. Further, I find by a preponderance of the evidence that the following factor substantially contributed to the mishap: The design of the pilot Ground Control Station (GCS) Control Console Throttle Quadrant including the

proximity of the Condition Lever and the Flap lever, lack of markings, color differentiation, or a safety guard.

2. CAUSE

I find by a preponderance of the evidence, the cause of the mishap was the MP misidentifying the Flap Lever and pulling aft or back on the Condition Lever which cut the fuel supply to the engine, causing the engine to stop and the MA to impact the ground.

Inadvertent Activation of the Condition Lever

The specific cause of the mishap was the inadvertent activation of the Condition Lever by the MP shortly after takeoff. The Condition Lever is the second lever from the left on the GCS control console. The lever controls the stop/feather servo, which is mechanically linked to the feather valve and the fuel shutoff valve. The full forward position of the lever provides for normal engine running operation. The detent position closes the fuel shutoff valve and shuts down the engine. The full aft or back position mechanically feathers the propeller, closes the fuel shutoff valve, and shuts down the engine. The Flap Lever is the first lever from the left on the control console and commands the position of the flaps. It is normal to position the flaps to 15 degrees for takeoff. When the Flap Lever is placed to the middle or null position, the flaps retract to 0 degrees, the neutral position. The neutral position is the normal position after takeoff.

Review of the MA data files and audio recordings from the mishap show, by a preponderance of evidence, that at the point in time after takeoff that flaps should have been retracted to neutral, the Condition Lever was pulled aft or back. At 13:24:21Z the Heads-Up Display (HUD) displayed a "Check Condition Lever" warning, this indication means that the Condition Lever is not fully forward. The action of moving the Condition Lever aft or back caused the fuel shutoff valve to close and subsequent engine fuel starvation. At 13:24:25Z an "Engine Out Detected" warning was presented, and verbalized by the MSO. The MC started running their CAPs for Engine Failure. The MP continued to misidentify the appropriate lever and pulled the Flap Lever to full aft or back. The aircraft impacted the ground at 13:40:46Z, causing significant damage to the aircraft and causing minor damage to the airport runway lights. The witness testimony also confirmed that due to fixation on the HUD and the takeoff profile the MP inadvertently activated the Condition Lever instead of the Flap Lever. The Condition Lever activation caused the fuel shutoff valve to close and the engine to stop, leading to the MA impacting the ground.

3. SUBSTANTIALLY CONTRIBUTING FACTOR

Further, I find by preponderance of the evidence that the following factor substantially contributed to the mishap: The design of the pilot GCS Control Console Throttle Quadrant including the proximity of the Condition Lever and the Flap Lever, lack of markings, color differentiation, or a safety guard.

GCS Control Console Throttle Quadrant Design

The design layout of the Control Console places the Flap Lever and the Condition Lever in close proximity, within an inch, with very different functions without labels, markings, color differentiation, or a safety guard. The Condition Lever is without any safety guard at its forward (normal operation) position. The next position that the Condition Lever is capable of being placed in is the middle (fuel cutoff) position. These levers could easily be mistaken by an inexperienced, fatigued, or confused crewmember.

The MP on takeoff became fixated with the HUD on climb out and misidentified the Flap Lever and pulled aft or back on the Condition Lever instead of pushing forward on the Flap Lever which cut the fuel supply to the engine, causing the engine to stop in flight. The Flap Lever is normally actuated shortly after takeoff to bring the flaps from a takeoff position to the neutral position by pushing the lever forward. The Condition Lever is set forward during initial preflight checklists and not normally moved again unless in an emergency.

4. CONCLUSION

Aircraft Data Loggers and witness testimony prove, by a preponderance of the evidence, the cause of the mishap was the MP misidentifying the Flap Lever and pulling aft or back on the Condition Lever instead of pushing forward on the Flap Lever which cut the fuel supply to the engine, causing the engine to stop and the MA to impact the ground. Further, I find by a preponderance of the evidence that the following factor substantially contributed to the mishap; the design of the pilot GCS Control Console Throttle Quadrant including the proximity of the Condition Lever and the Flap Lever, lack of markings, color differentiation, or a safety guard.

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14 March 2021

BRIAN E. PRICHARD, Lieutenant Colonel, USAF
President, Abbreviated Accident Investigation Board

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