UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT

T-38C, T/N 68-8099

50TH FLYING TRAINING SQUADRON
14TH FLYING TRAINING WING
COLUMBUS AIR FORCE BASE

LOCATION: DANNELLY FIELD, MONTGOMERY, ALABAMA

DATE OF ACCIDENT: 19 FEBRUARY 2021

BOARD PRESIDENT: MAJOR GENERAL LAURA L. LENDERMAN

Conducted IAW Air Force Instruction 51-307

EXECUTIVE SUMMARY
UNITED STATES AIR FORCE
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T-38C, T/N 68-8099
DANNELLY FIELD, MONTGOMERY, ALABAMA
19 FEBRUARY 2021

At 2240 Zulu (Z) (4:40 p.m. Local Time) on 19 February 2021, a T-38C, T/N 68-8099, impacted the terrain short of Runway 28 while performing an instrument approach at Montgomery Regional Airport (Dannelly Field), Montgomery, Alabama (AL). The Mishap Instructor Pilot (MIP) was a First Assignment Instructor Pilot (FAIP), and the Mishap Student Pilot (MSP) was a Japanese student pilot. Both pilots were assigned to the 14th Flying Training Wing (14 FTW) and flew with the 50th Flying Training Squadron (50 FTS) at Columbus Air Force Base (AFB), Mississippi.

The Mishap Sortie (MS) was the first leg of an off-station student cross-country mission. Due to a recent winter storm, the MS was also the first sortie flown by the MIP and MSP in nine days.

The Mishap Crew (MC) planned to fly to Dannelly Field, execute a circling instrument approach, and then continue to Tallahassee International Airport, Tallahassee, Florida for a full stop landing. The MSP flew the downwind leg of the circling approach configured with landing gear down and locked, 60% flap setting, and displaced 1.9 NM from the runway. The MSP was 18 knots above final turn speed and 0.4 NM wide when he began the turn to final. Due to undershooting the final turn, the MIP directed the MSP to roll out on an approximately 40-degree intercept heading to final approach and directed the MSP to slow down. The MSP retracted the throttles to idle and started a 30-35 degree left bank turn to align with the runway. As the Mishap Aircraft (MA) decelerated through 164 KCAS (8 knots below final approach speed), the MIP took control of the aircraft, rolled wings level, pitched up, and then advanced the throttles to max afterburner. At this time, the throttles had been at idle for 18 seconds, and the MA had decelerated to 155 KCAS (17 knots below final approach speed), and was descending through 250 feet mean sea level at 1,100 feet per minute sink rate. The MA impacted the ground seconds later, approximately 1,800 feet from the approach end of runway 28. Both the MIP and MSP were fatally injured on impact.

I find by a preponderance of the evidence the cause of the mishap was the MIP's loss of situational awareness on final approach and failure to take timely and necessary actions as a dangerous situation developed. Further, I find by a preponderance of the evidence that the MSP substantially contributed to the mishap after becoming task saturated in the traffic pattern and placing and leaving the throttles in idle. As the circling approach progressed, the MIP failed to recognize the MA's deteriorating performance caused by the excessive length of time the throttles were in idle. This undetected and uncorrected action, coupled with the MSP's additional flight control inputs to align with the runway, resulted in insufficient airspeed and altitude and an increased angle of attack and sink rate, and placed the MA outside the parameters for safe flight.

SUMMARY OF FACTS AND STATEMENT OF OPINION
T-38C, T/N 68-8099
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ACRONYMS AND ABBREVIATIONS

’	Feet
”	Inches
°	Degrees
%	Percent
AF	Air Force
AB	Afterburner
ABU	Automatic Backup Unit
ADAF	Active Duty Air Force
ADI	Attitude Display Indicator
ADO	Assistant Director of Operations
AETC	Air Education and Training Command
AETCI	AETC Instruction
AETCMAN	AETC Manual
AF	Air Force
AFB	Air Force Base
AFE	Aircrew Flight Equipment
AFI	Air Force Instruction
AF IMT	Air Force Initial Military Training
AFMAN	Air Force Manual
AFMES	Armed Forces Medical Examiner System
AFPC	Air Force Personnel Center
AFSC	Air Force Specialty Code
AFSEC	Air Force Safety Center
AFTO	Air Force Technical Order
AGL	Above Ground Level
AGR	Air Guard Reservist
AIB	Accident Investigation Board
AIMWTS	Aeromedical Information Management Waiver Tracking System
AL	Alabama
AMP	Amplifier
ANG	Air National Guard
AOA	Angle of Attack
AOR	Area of Responsibility
ART	Active Reserve Technician
ASAP	As Soon As Possible
ATC	Air Traffic Control
AU	Air University
BIP	Buddy IP Program
Bldg	Building
B/T	Boat Tail
BTRU	Barostatic Time Release Unit
BWC	Birdwatch Condition
CAF	Combat Air Forces
CAFB	Columbus Air Force Base
CAP	Civil Air Patrol
CAP	Commander’s Awareness Program
Capt	Captain
CCIP	Commander’s Inspection Program
CFS	Call For Service
Co	Company
COA	Course of Action
Col	Colonel
CPD	Core Personnel Document
CRM	Crew Resource Management
CS	Communication Squadron
CSAF	Chief of Staff of the Air Force
CT	Continuation Training
CTS	Course Training Standard
CUI	Controlled Unclassified Information
DC	District of Columbia
DDU	Drogue Deployment Unit
DG	Distinguished Graduate
DLIELC	Defense Language Institute English Language Course
DNIFs	Duty Not To Include Flying
DO	Director of Operations
DOT	Department of Training
DoD	Department of Defense
DS	Director of Staff
DV	Distinguished Visitor
EADI	Electronic Attitude Display Indicator
EGT	Exhaust Gas Temperature
EHSI	Electronic Heading System Indicator
Eng	Engine
EP	Emergency Procedure
EOB	End of Block
EOD	Explosive Ordnance Disposal
EOR	End of Runway
EO System	Emergency Oxygen System
EPE	Emergency Procedures Evaluation
ER	Exceptional Release
ERRC	Engine Regional Repair Center
Exec	Executive

FAIP	First Assignment Instructor Pilot
FBO	Fixed Base Operator
FCIF	Flight Crew Information File
FCII	Flying Class II
FCP	Front Cockpit
FHR	Flight Hours Recorded
FINI	Final Flight
FLT/CC	Flight Commander
FLTS	Flying Training Squadron
FMC	Fully Mission Capable
FOD	Foreign Object Damage
FOQA	Flight Operations Quality Assurance
FTS	Flying Training Squadron
FTW	Flying Training Wing
FS	Fuselage Station
FW	Fighter Wing
GA	Georgia
GB Review	Gradebook Review
GK	General Knowledge
HAP	High Accident Potential
HATR	Hazardous Air Traffic Report
HBDU	Headbox Deployment Unit
HFACS	Human Factors Analysis and Classification System
HHQ	Higher Headquarters
Hi-TCN A	Hi Tacan Alpha
HPO	Hourly Post Flight Inspection
HQ	Headquarters
HUD	Heads-Up Display
HUREVAC	Hurricane Evacuation Plan
HWY	Highway
IAW	In Accordance With
IC	Incident Commander
IFE	In-Flight Emergencies
IFG	In-Flight Guide
IGEMS	Inspector General Evaluation System
IGV	Inlet Guide Vane
INC	Incomplete
IP	Instructor Pilot
IPR	Installation Personnel Readiness
I/Q	Instrument Qualification
ISS	Inter-Seat Sequencing System
ITS	Index of Thermal Stress
JA	Judge Advocate
JASDF	Japan Air Self Defense Force
JCN	Job Control Number
JMPS	Joint Mission Planning Software
JSUPT	Joint Specialized Undergraduate Pilot Training
KCAS	Knots Calibrated Air Speed
KTLH	Tallahassee International Airport
KVLD	Valdosta Regional Airport
L/E Tape	Leading Edge Tape
LL	Low-Levels
LOX	Liquid Oxygen
Lt	Lieutenant
Lt Col	Lieutenant Colonel
LT/RT STABS	Left/Right Stabilizer
MA	Mishap Aircraft
MAF	Mobility Air Forces
Maj	Major
MAJCOM	Major Command
MC	Medical Corps
MC	Mishap Crew
MDA	Minimum Descent Altitude
MDS	Mission Design Series
MEF	Military Execution Forecast
MFC	Main Fuel Control
MFD	Multi-Functional Display
MG	Maintenance Group
MICT	Management Internal Control Toolset
MIF	Maneuver Item File
MILPDS	Military Personnel Data System
MIP	Mishap Instructor Pilot
MLG	Main Landing Gear
MNCL	Mission Capable Maintenance
MOA	Military Operating Area
MOR	Manual Over-Ride
MP	Mishap Pilot
MPI	Multi-Purpose Initiator
MS	Mishap Sortie
MS (State)	Mississippi
MSD	Medical Standards Direction
MSL	Mean Sea Level
MSN	Mission
MSP	Mishap Student Pilot
MQT	Mission Qualification Training
MWS	Major Weapon System
NG	No Grade
NLG	Nose Landing Gear
NLT	No Later Than

NM	Nautical Mile
NMCM	Non-Mission Capable-Maintenance
NOTAM	Notice to Airman
OG	Operations Group
OPS	Operations
OPS SUP	Operations Supervisor
ORM	Operational Risk Management
OSS	Operations Support Squadron
PA'd	Proficiency Advanced
PAPI	Precision Approach Path Indicator
PC/EC	Progress Check / Elimination Check
PD	Police Department
PIRD	Powered Inertia Reel Device
Para	Paragraph
P.E. Inspection	Periodic Inspection
PHA	Public Health Assessment
PIF	Pilot Information File
PIT	Pilot Instructor Training
PLB	Personal Locator Beacon
P/N	Part Number
POC	Point of Contact
QC	Quality Control
QRC	Quick Reaction Checklist
RAP	Required Aircrew Program
RCP	Rear Cockpit
RD	Road
RFP	Rudder Force Producer
RPA	Remotely Piloted Aircraft
RPM	Revolutions Per Minute
RSU	Runway Supervisory Unit
RWY	Runway
SAPM	Self-Assessment Program Manager
SAR	Search and Rescue
SARM	Squadron Aviation Resource Management
SAS	Stability Augmentation System
SE	Safety
SEFE	Standards of Evaluation Flight Examiner
SER	Serial
SIB	Safety Investigating Board
SI	Seat Initiators
SII	Special Interest Item
SIMs	Simulations
SKED	Survival Kit Electronic Device
SOF	Special Operations Forces
SOF	Supervisor of Flying
SOP	Standard Operating Procedures
SP	Student Pilot
SPO	System Program Office
SQ	Squadron
SSK	Seat Survival Kit
SSRs	Special Syllabus Requirement
STAR	Standard Terminal Arrival
STUS	Student Squadron
SUPT	Specialized Undergraduate Pilot Training
SYM	Symbol
TCN	Tacan
TDU	Time Delay Unit
TDY	Temporary Duty
TED	Trailing Edge Down
TEU	Trailing Edge Up
TI	Theater Indoctrination
TIMS	Training Information Management
TLH	Tallahassee
TMT	Task Management Tool
T/N	Tail Number
T.O.	Technical Order
TREM	Threat Recognition and Error Management
UHF	Ultra High Frequency
UIPs	Upgrading Instructor Pilots
UNSAT	Unsatisfactory
UPT	Undergraduate Pilot Training
US	United States
USAF	United States Air Force
USN	United States Navy
USR	Under-Seat Rocket Motor
VEN	Variable Exhaust Nozzle
VFR	Visual Flight Rules
VHF	Very High Frequency
VR	Virtual Reality
VVI	Vertical Velocity Indicator
WUC	Work Unit Code
WX	Weather
XC	Cross Country
Z	ZULU

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 22 February 2021, Lieutenant General Marshall B. Webb, Commander, Air Education and Training Command (AETC), appointed Major General Laura L. Lenderman to conduct an Accident Investigation Board for a mishap that occurred on 19 February 2021 involving a T-38C aircraft, tail number (T/N) 68-8099, in the vicinity of Dannelly Field, Montgomery, Alabama (AL) (Tabs DD-1 and NN-1 to NN-2). The aircraft accident investigation was conducted in accordance with (IAW) Air Force Instruction (AFI) 51-307, *Aerospace and Ground Accident Investigations*, at Columbus Air Force Base (AFB), Mississippi (MS), from 5 April 2021 to 5 May 2021. The board members included a Medical Member (Lieutenant Colonel), a Legal Advisor (Major), a Pilot Member (Captain), a Recorder (Staff Sergeant), and a Maintenance Member (Work Leader-10) (Tab DD-3 to DD-5). Additional non-board members included a USAF Interpreter (Lieutenant Colonel) and two Japan Air Self Defense Force Observers (Lieutenant Colonels) (Tab DD-6 to DD-7).

b. Purpose

In accordance with AFI 51-307, *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 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

At 2240 Zulu (Z) (4:40 p.m. Local Time) on 19 February 2021, a T-38C, T/N 68-8099, impacted the terrain short of Runway (RWY) 28 while performing an instrument approach at Montgomery Regional Airport (Dannelly Field), Montgomery, AL (Tab II-4). The Mishap Aircraft (MA) was destroyed, and both the Mishap Instructor Pilot (MIP) and Mishap Student Pilot (MSP) suffered fatal injuries (Tabs O-6 to O-9 and KK-2). The MA and Mishap Crew (MC) were assigned to the 14th Flying Training Wing (14 FTW) at Columbus AFB, MS (Tabs I-1 and II-1).

3. BACKGROUND

a. Air Education and Training Command (AETC)

AETC was established and activated in January 1942, making it the second oldest major command in the Air Force. AETC's primary mission is to recruit, train, and educate exceptional Airmen. AETC includes Air Force Recruiting Service, two Numbered Air Forces and the Air University. The command operates 12 major installations and supports tenant units on

numerous bases across the globe. There are also 16 Active Duty and 7 Reserve wings in AETC (Tab OO-1 to OO-2).

b. 19th Air Force (19 AF)

19 AF is responsible for training aircrews, remotely piloted aircraft crews, air battle managers, weapons directors, and survival, escape, resistance, and evasion specialists to sustain the combat capability of the United States Air Force, other services and our nation's allies (Tab OO-9). 19 AF includes 19 training locations, with 16 Total Force wings: 10 Active Duty, 1 Air Force Reserve, and 5 Air National Guard units. It commands more than 32,000 personnel and operates over 1,350 aircraft of 29 different models, flying more than 490,000 hours annually, which is 44 percent of the Air Force total flying hours (Tab OO-9).

c. 14th Flying Training Wing (14 FTW)

The 14 FTW is based at Columbus AFB, MS. Its mission is to train world-class pilots. The wing focuses on specialized undergraduate pilot training (SUPT) in the T-6 Texan II, T-38C Talon, and T-1A Jayhawk aircraft. Each day the wing flies an average of 260 sorties on its three parallel runways. In addition to the flying training mission, Columbus AFB maintains more than 900 highly-trained individuals capable of deploying at a moment's notice to support worldwide taskings and contingencies (Tab OO-11).

d. 50th Flying Training Squadron (50 FTS)

The 50 FTS conducts the advanced phase of undergraduate pilot training. This phase consists of instruction in the T-38C. Training includes advanced aircraft handling, tactical navigation, fluid maneuvering and an increased emphasis in 2- and 4-ship formation. At the completion of training, the graduate is awarded the aeronautical rating of pilot (Tab OO-13).

e. 14th Student Squadron (14 STUS)

The 14 STUS is the largest squadron at Columbus AFB, consisting of 21 Active Duty and 82 civilian permanent party personnel as well as approximately 700 student pilots from 25 different nations. The squadron exercises administrative control and provides daily administrative support for student pilots, ensuring seamless continuity of support through all phases of training. The squadron also maintains primary responsibility for the maintenance and disposition of all student pilot training records at Columbus. Additionally, the 14 STUS conducts the majority of student academic and simulator training, employing 27 aircraft simulators to conduct all syllabus-directed T-1A, T-6 and T-38C simulator events while providing classroom instruction in aircraft systems, navigation and employment (Tab OO-14).

f. Specialized Undergraduate Pilot Training (SUPT)

In the primary phase of SUPT, students fly the T-6 Texan II. The emphasis throughout this phase is on basic aircraft control, including takeoff and landing techniques and aerobatics. Students also learn to use aircraft instruments to fly and navigate in all types of weather to several different locations (Tab OO-11).

Following the T-6 phase of training, student pilots enter a specialized, track-specific training—depending on the type of aircraft they have been selected to fly—T-38C for fighter and bomber aircraft or the T-1A for tanker and airlift pilots. Student pilots selected to fly helicopters conduct training at Fort Rucker, AL, with the U.S. Army (Tab OO-11).

To earn Air Force pilot wings, each student flies nearly 200 hours during a 54-week period. Paralleling flying training, students complete 400 hours of flight-related classroom instruction (Tab OO-11).

g. T-38C Talon

The T-38C Talon is a twin-engine, high-altitude, supersonic jet trainer used in a variety of roles because of its design, economy of operations, ease of maintenance, and high performance. The T-38C has swept wings, a streamlined fuselage and tricycle landing gear with a steerable nose wheel. Two independent hydraulic systems power the ailerons, rudder and other flight control surfaces. The T-38C incorporates a "glass cockpit" with integrated avionics displays, head-up display and an electronic "no drop bomb" scoring system. AETC is the primary user of the T-38C for joint specialized undergraduate pilot training. The instructor and student sit in tandem on rocket-powered ejection seats in a pressurized, air-conditioned cockpit (Tab OO-15).

h. Commander's Awareness Program (CAP)

The objective of the Commander's Awareness Program (CAP) is to focus supervisory attention on a student's training progress, specific deficiencies, and potential to complete the flying training program. CAP may also be used to monitor personal issues requiring supervisory attention. A student requiring an extended period of increased supervision or repeated placement on CAP based on performance should be considered for an elimination check (Tab GG-43 to GG-44 and GG-46).

i. Circling in the T-38C

During a circling instrument approach, the pilot descends no lower than circling minimum descent altitude (MDA) for the runway to which the instrument approach is flown. The pilot maintains circling airspeed and 60 percent flaps throughout the entire circling maneuver until aligned with the landing runway. The pilot must not descend below MDA until in a position to place the aircraft on a normal glidepath to the landing runway. Once aligned with the landing runway and in a safe position to land, the pilot slows to final approach airspeed and selects full flaps, if desired. The pilot must remain vigilant for stall indications and have the discipline to execute a go-around or

stall recovery when required. The circling approach presents a potential sink rate problem in the T-38C that may not be accompanied by a stall warning. An overbank during a circling approach creates an insidious descent, which adds to the potential danger (Tab GG-35 to GG-36).

j. Experienced Pilot Designation

A pilot is designated an "experienced pilot" once the pilot meets the following minimum flying hour requirements: (1) 150 total rated hours of either primary or instructor flight time in the aircraft and 600 hours total rated time or (2) 250 total rated primary or instructor flight time in the aircraft and 450 hours total rated time (Tab GG-39 to GG-40).

k. Defense Language Institute English Language Center (DLIELC)

The DLIELC is a Department of Defense (DoD) agency responsible for the management and operation of the Defense English Language Program (DELP) to train international military and civilian personnel to speak and teach English, manage the English as a second language program for the U.S. military, manage nonresident English training programs, provide for students' health, morale and welfare, and conduct the DoD Field Studies Program (Tab OO-20).

l. Military and Zulu Time

Military time is based on a 24-hour clock beginning at midnight (0000 hours) and ending at 2359 hours. Military time eliminates AM and PM designations as regular time uses 1-12 to identify hours in a day. In military time, 12 AM midnight is 0000 or 2400. Zulu time is used in military operations as a standardized time across the globe. On the day of the accident, the local times at Columbus AFB, MS and Dannelly Field, AL were six hours behind Zulu time (Tab II-4).

4. SEQUENCE OF EVENTS

a. Mission

The Mishap Sortie (MS) was the first leg of an off-station student cross-country mission, using the training profile found in items I5201-I5206 of the T-38C SUPT syllabus (Tabs EE-1 and II-11). The 50 FTS Operations Supervisor authorized the MS (Tab L-3).

b. Planning

The MC completed flight planning prior to the MS per applicable regulations and standard operational procedures (Tabs FF-80 to FF-83 and GG-26 to GG-27). Required actions included mission profile planning and review of applicable training records, Notices to Airmen (NOTAMs) bird watch conditions (BWC), and current weather forecast conditions (Tab FF-92 to FF-98).

The MC completed the 50 FTS Operational Risk Management (ORM) worksheet, a standardized checklist identifying common risk factors for a training flight; as cumulative risk increases, the level of authority required to approve the mission profile also increases (Tab L-5 to L-6). The MC calculated a high level of risk for the MS and identified the following risk factors for the mission:

overwater mission, unfamiliar airfield, moderate BWC, forecasted cloud ceilings less than 1,500 feet with 3 miles visibility at the final landing base, temperature less than 4 degrees Celsius at the takeoff field, forecast light rime icing, inexperienced instructor, international student, 8-14 days since the student's last flight, and 7-14 days since the instructor's last flight (Tab L-5 to L-6). The environmental factors, specifically forecast light rime icing, drove a high level of risk, and required the 50 FTS Squadron Commander to approve the sortie (Tab L-5 to L-6).

The MS, call sign MAFIA 57, was the first sortie in the MSP's Advanced Instrument block of training (Tab EE-1). The MSP occupied the front cockpit (FCP), and the MIP occupied the rear cockpit (RCP) (Tab II-4). The MIP was the instructor for the cross-country sortie flown to meet the requirements of I5201-I5206 (Tab EE-1).

Due to the impacts of a recent winter storm, the MS was the first sortie flown by the MC in nine days (Tabs S-3.11, II-1 to II-2). Columbus AFB was open only to mission essential personnel from 14-17 February due to the winter weather (Tab S-21.2 to S-21.3 and S-56.3). The base reopened on 18 February; however, the runways remained closed for flying operations (Tab S-6.3 and S-21.2 to S-21.3). The MSP began planning for the MS with other cross-country students on 18 February and continued preparing the morning of 19 February (Tabs S-1.2, AA-1.2, and AA-2.2).

Due to icing conditions on the airfield, morning flying operations were canceled on 19 February, but the MC continued planning for the cross country as weather conditions were expected to improve (Tab S-38.3 to S-38.4 and S-56.3). The MS was one of six T-38C cross-country missions scheduled on 19 February (Tab EE-1). The MSP and the other T-38C cross-country aircrew attended a mass weather brief at 1600Z on 19 February (Tab AA-2.3). The MIP completed a required semi-annual test the morning of the mishap. He did not attend the weather briefing due to not seeing the text message regarding the meeting time, but he reviewed the weather with another instructor pilot afterwards (Tab S-30.3 and S-37.2).

Due to changing weather conditions, the MC modified the cross-country mission plan several times with other T-38C cross-country aircrews (Tab S-43.2). The MC initially planned to fly a cross-country sortie and stay overnight at MacDill Air Force Base, FL, but due to icing conditions, the plan was modified to fly to Dannelly Field for an instrument approach then land at Tallahassee International Airport (Tab S-23.2, S-37.2, and S-58.2). The cross-country aircrews also discussed postponing their mission one day and taking off on Saturday, 20 February, since the airfield was scheduled to be open for flying training (Tab S-59.3 to S-59.4). As airfield conditions improved throughout the morning, flying operations resumed at approximately 2030Z (Tabs L-2, S-60.2, and AA-2.3 to AA-2.5).

Based on the forecast weather ceilings of 1,400 feet at Tallahassee International Airport, an alternate airfield was required (Tabs BB-1, GG-27, and GG-30). The MC identified Valdosta Regional Airport as their alternate airfield on the flight plan (Tab L-2). The MC, however, did not calculate the fuel required for the alternate airfield on their fuel log as required by AFMAN 11-202v3 (Tabs FF-111 and GG-30). The other T-38C cross-country aircrews did calculate the fuel required for the alternate and determined they did not have enough fuel to drop into Dannelly Field; therefore, the other student cross-country sorties planned to fly directly to Tallahassee if the

forecast weather did not improve by the time they stepped to fly (Tabs S-64.2 and AA-2.4). The MC was the only student cross-country aircrew that did not accurately fuel plan for an alternate airfield and did not fly directly to Tallahassee (Tabs AA-1.3 to AA-1.4 and FF-111). It was unclear to the other aircrews why the MC did not plan for the alternate airfield fuel requirements (Tab AA-1.3 to AA-1.4 and AA-2.5).

The MIP conducted the pre-mission briefing as required by the 50 FTS In-Flight Guide (IFG) (Tabs S-63.5 and FF-92). The MC planned to fly to Dannelly Field, execute a circling instrument approach, and then continue to Tallahassee for a full stop landing with Valdosta as an alternate airfield (Tab L-2).

c. Preflight

The MC received a briefing from the 50 FTS Operations Supervisor, reviewed the go/no-go items, obtained their aircraft assignment, and donned their aircrew flight equipment (AFE) (Tabs S-52.3 and AA-14.4). The MC stepped to their originally assigned aircraft (T/N 68-8114) at approximately 2015Z. The MC aborted prior to taxiing due to high fuel indications during engine start (Tab II-4 to II-5). In accordance with 50 FTS cold weather guidance, which limits aircrew exposure in cold temperatures, the MC returned to the 50 FTS for 30 minutes to warm up before stepping to their spare aircraft (Tabs S-53.2, FF-56, and II-4 to II-5). During the 30 minutes inside the squadron, the MC reaccomplished their step procedures and recalculated their ORM score (Tab S-53.2). The MC confirmed with the 50 FTS Operations Supervisor that the ORM score remained high but did not require a higher level of approval authority other than the Squadron Commander (Tabs L-5 to L-6 and AA-14.7). The MC then stepped to the MA aircraft, T/N 68-8099, reviewed the MA forms, accepted the MA, completed engine start, and taxied uneventfully (Tabs AA-22.13 to AA-22.14 and II-5).

d. Summary of Accident

The MC took off at 2204Z from Columbus AFB, approximately two hours after their originally scheduled takeoff time (Tabs EE-1 and II-5). While en route to Dannelly Field, cockpit recordings revealed the MSP had difficulty understanding and responding to Air Traffic Control (ATC) radio calls (Tab HH-6 to HH-7). The MIP assisted the MSP several times and directly intervened with ATC on one occasion to ensure safety of flight (Tab HH-6 to HH-16). Communication issues with ATC continued to challenge the MSP throughout the remainder of the sortie (Tab HH-6 to HH-16).

At 2213Z, ATC approved the MC for one turn in holding at the initial approach fix (IAF) followed by the Hi-Tacan Alpha (Hi-TCN A) instrument approach (Tab II-5). The MSP flew one turn in holding at the IAF at 16,000 feet mean sea level (MSL) and initiated the approach at 2228Z (Tab II-5).

At 2237Z, the MSP began the circling portion of the instrument approach properly configured with landing gear down and locked and 60% flaps. The MC remained at 1,220 feet MSL due to a 1,180 foot MSL altitude restriction 2.5 NM from the end of RWY 10 (Tab II-5). The MSP turned to a 180 heading for 45 seconds to achieve proper runway displacement for the downwind leg of the

circling maneuver and began descending to the 860 foot MSL minimum descent altitude (MDA) (Tab II-5).

At 2238:43Z, the MA was abeam RWY 28 approach end threshold, on heading 095, at 930 feet MSL, flying 207 KCAS and displaced 1.9 NM from the runway (Figure 1). The MA was approximately 70 feet above the MDA, 15 KCAS above the final turn airspeed of 192 KCAS, and 0.4 NM wider than the desired 1.5 NM runway displacement (Tabs GG-35 and II-5).

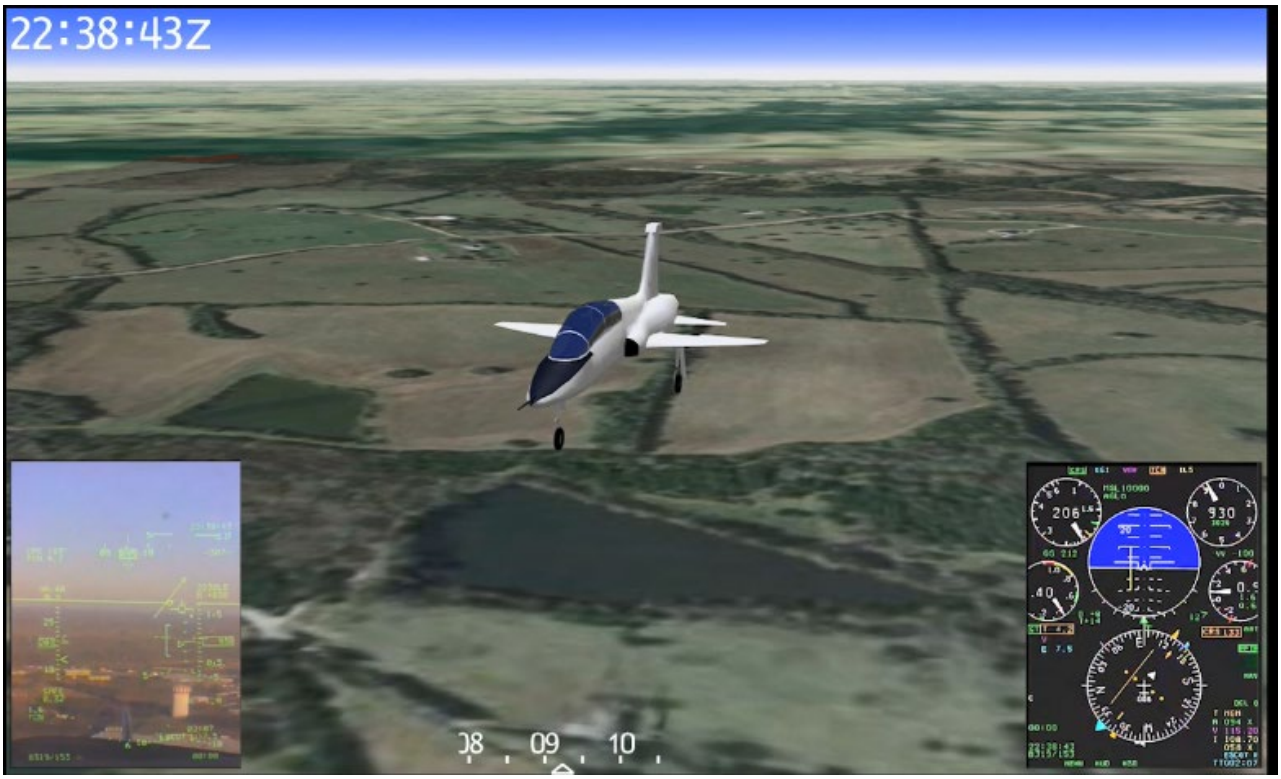

Figure 1 (Tab EE-3)

At 2239:00Z, the MSP initiated a 40-degree left bank level final turn at 210 KCAS (18 KCAS above the final turn airspeed of 192 KCAS) (Tab II-5). Due to the wider than normal runway displacement, the MSP undershot the final approach (Tab II-5).

At 2239:30Z, due to undershooting final, as the MA passed through heading 328 and 830 feet MSL, the MIP directed, "You can roll out right here," (Tabs HH-16 and II-5). The MSP rolled out on heading 316, flying 212 KCAS (20 KCAS above the final turn airspeed) and descending 850 feet per minute (Tab II-5).

At 2239:39Z, the MIP stated, "Slowing down to green speed," directing the MSP to slow from 209 KCAS to the final approach speed of 172 KCAS. At this point, the MSP reduced both throttles to idle power setting, where they remained for the next 18 seconds (Tabs HH-16 and II-5).

At 2239:41Z, the MIP stated, "Leveling off," and the MSP began reducing the MA descent rate to 600 feet per minute (Tabs HH-16 and II-5).

At 2239:44Z, the MIP stated, “Hold that good wire, fly those PAPIs” directing the MSP to fly the MA on a 2.5 to 3.0 degree glidepath to the RWY 28 approach end threshold (Tabs HH-16 and II-5 to II-6).

At 2239:47Z, the MIP stated, “See the runway, there you go,” and the MSP started a 30-35 degree left bank turn to align with RWY 28 as the MA decelerated through 192 KCAS at 400 feet per minute sink rate (Figure 2) (Tabs HH-16 and II-6).

Figure 2 (Tab EE-8)

At 2239:55Z, the MIP calmly stated, “Just a little bit…” and truncated the end of his statement (Tabs HH-16 and II-6). At this point, the MA was on heading 278, at 450 feet MSL, in approximately 36 degrees of left bank, throttles in idle, and decelerating through 164 KCAS at 1,400 feet per minute sink rate (Figure 3) (Tab II-6). In addition, at this time of day, on a heading of 278, the setting sun was in the MC’s field of view, likely affecting the MSP’s ability to discern the information displayed on the heads up display and the MC’s ability to acquire the runway (Tab II-6).

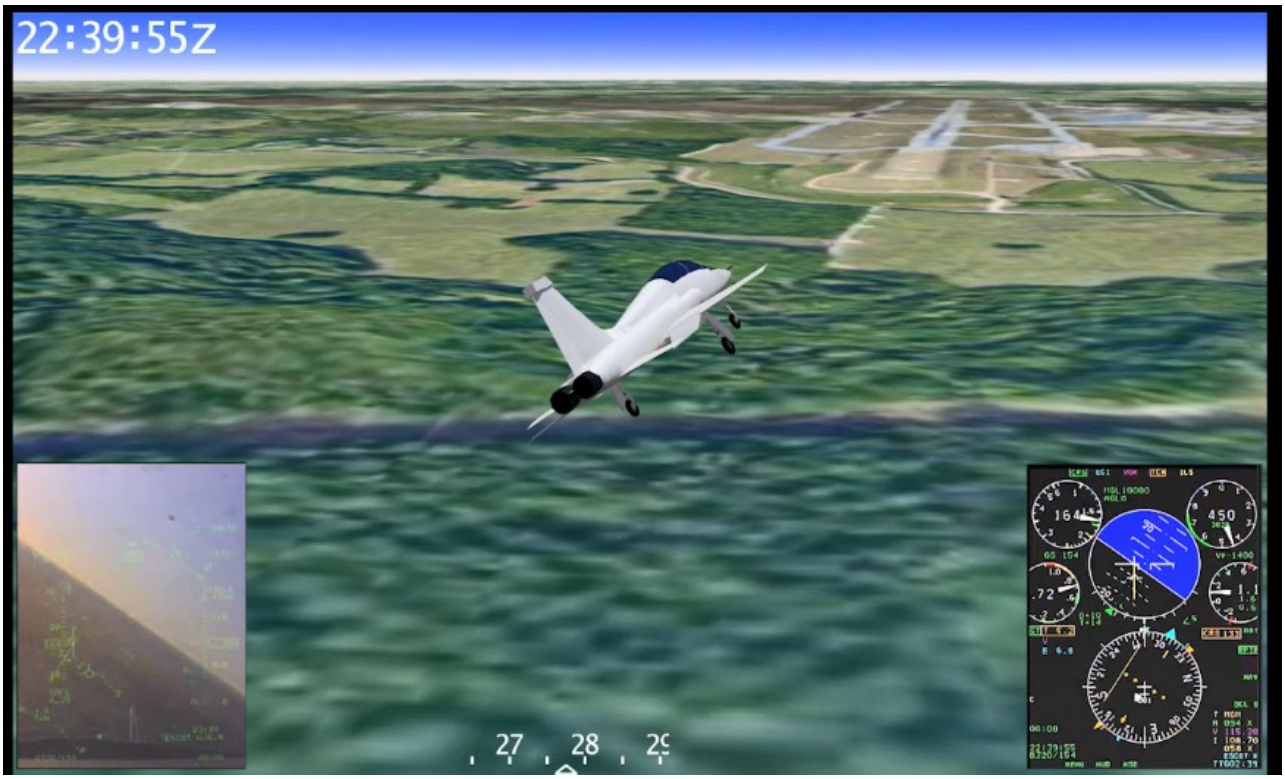

Figure 3 (Tab EE-10)

At 2239:56Z, the MIP stated, “Ooof, start climbing,” (Tab HH-16), which based on technical analysis, was the last point in time when a safe ejection was possible (Tab LL-1 and LL-3).

The AIB determined the MIP took control of the aircraft at 2239:56.5Z and simultaneously rolled wings level, pitched up, and attempted to recover the MA after recognizing the excessive sink rate and low airspeed (Tab II-6).

At 2239:57Z, the MIP advanced the throttles to maximum afterburner while continuing the attempted recovery (Figure 4) (Tab II-6). At this point, the engines were accelerating from idle to 66% revolutions per minute (RPM) with the MA's airspeed at 155 KCAS and a 1,750 feet per minute sink rate) (Tab II-6).

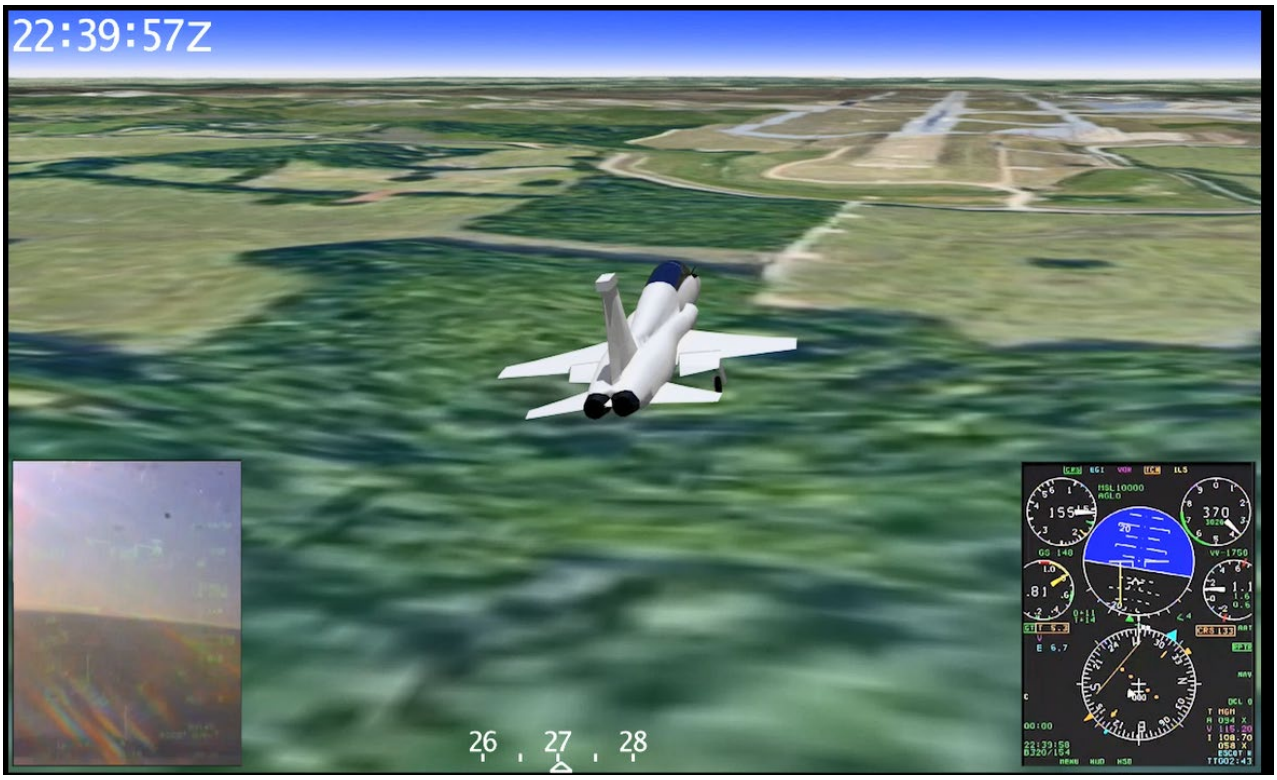

Figure 4 (Tab EE-11)

At 2240:02Z, the MIP continued the approach to stall recovery, but the MA continued to descend due to its energy-deficient state (Tab II-6). The airspeed remained low, and the engines continued to accelerate (Tab II-6). The MA's airspeed was 153 KCAS, 11 degrees nose high pitch attitude, 5 degrees downward flight path, 1,050 feet per minute sink rate, 2 degrees right angle of bank, throttles in maximum afterburner, gear down and locked, and 60% flap setting (Figure 5) (Tab II-6).

Figure 5 (Tab EE-14)

At 2240:03Z, the MA airspeed was 157 KCAS, 5 degrees nose high pitch attitude, 5 degrees downward flight path, 1,100 feet per minute sink rate, 43 degrees right angle of bank, throttles in max afterburner, gear down and locked, and 60% flap setting (Figure 6) (Tab II-6).

Figure 6 (Tab EE-15)

e. Impact

At 2240:04Z, the MA impact sequence started approximately 2,300 feet from the approach end of RWY 28 (Tab II-6). During the impact sequence, the MA struck power lines (70 feet tall), an approach lighting system tower (50 feet tall), and entered a grove of trees before impacting the ground approximately 1,800 feet from the approach end of the runway (Tabs R-25, CC-4, and II-6). The MA impacted the ground at 138 KCAS, 5 degrees nose low pitch attitude, 8 degrees downward flight path, 1,700 feet per minute sink rate, 50 degrees right angle of bank, throttles in max afterburner, gear down and locked, and 60% flap setting (Tab II-6). The MIP and MSP were fatally injured on impact (Tab KK-2).

f. Egress and Aircrew Flight Equipment (AFE)

(1) Ejection Seats

Post-mishap engineering analysis determined neither the MIP nor the MSP initiated ejection and the forward and aft ejection systems were operable prior to the MA impacting the ground (Tab R-95). During the analysis, the Air Force System Program Office (SPO) identified a defective Powered Inertia Reel Device (PIRD) in the rear seat and filed a deficiency report to have the PIRD assembly inspected by the original equipment manufacturer (Tabs C-2 and R-95).

The MSP remained in the MA's front seat, and the MSP's ejection control handle remained in the seated position (un-fired) (Tab R-95).

The MIP was found strapped in the rear seat, approximately 20 feet to the left of the aircraft (Tab R-90). The MIP's ejection control handle remained in the seated position (un-fired) (Tab R-95). The guide rails on the MIP's seat were severed from the aircraft structure, but remained installed on the catapult outer main beam assembly (Tab R-94). The AIB determined that the force of the MA impacting the ground separated the MIP's seat from the MA.

(2) Aircrew Flight Equipment (AFE)

The MSP's recovery parachute had two 0.25-inch diameter holes (Tab R-14). The MIP's Personnel Locator Beacon (PLB) Activation Lanyard was packed with an insufficient knot and would not have activated if the ejection sequence had been initiated (Tab R-14). AFE was otherwise current, properly configured, and in good condition other than the damage attributed to the mishap (Tabs R-14 and Z-66).

g. Search and Rescue (SAR)

Air traffic controllers in the Dannelly Field tower last observed the MA in a left base turn to final approach (Tab FF-113). When tower controllers did not observe the MA over the runway or in the departure corridor, they attempted to contact the MC at 2241Z and 2244Z (Tab FF-9). When the MC failed to respond, the tower tried contacting the MC through radar control (Tab FF-9). Tower controllers also requested multiple aircraft overfly the area to search for the MA (Tab FF-9 to FF-10). At 2248Z, tower requested Atlanta Air Route Traffic Control Center issue an alert for the missing aircraft (Tab FF-9).

At 2245Z, personnel from Alabama Power Company working on power lines near the mishap site dialed 911 and contacted Airport Police at 2300Z (Tab S-55.3).

At 2310Z, Airport Police notified the 187th Fighter Wing (FW) Fire Department that a T-38C had crashed near the end of RWY 28 (Tabs AA-33.1 and MM-1).

At 2313Z, the 187 FW Fire Department notified the Montgomery Police Department (PD) of the mishap and began searching for the mishap site (Tabs H-2, AA-33.1 and AA-33.3).

At 2316Z, 187 FW Fire Department arrived on-scene and confirmed two fatalities at 2318Z (Tab MM-1).

At 2318Z, the Montgomery Fire Department and the Montgomery PD dispatched vehicles to the scene (Tabs H-9 and MM-10).

At 0017Z (20 February), the Maxwell AFB Fire Department Chief arrived and took over Incident Command (IC) (Tab MM-1).

h. Recovery of Remains

The 187 FW Fire Department searched the crash site and confirmed two fatalities at 2318Z (Tab MM-1). The MIP and MSP were officially pronounced dead at 0058Z (20 February) by a physician from Baptist Medical Center-South in Montgomery, AL (Tab MM-6 to MM-7).

In order to disarm the ejection seats, the IC requested assistance from an explosive ordinance disposal (EOD) team (Tab MM-17). An EOD team from Fort Benning, Georgia (GA) arrived on the scene at 0435Z and disarmed the MIP's ejection seat at 0555Z (Tab MM-17). Maxwell AFB Mortuary Affairs transferred the MIP from the scene to a local funeral home at 0930Z (Tab MM-18). EOD determined special equipment was necessary to reposition the MA fuselage to disarm the MSP's ejection seat (Tab MM-4 and MM-18). Equipment arrived on-scene at 1545Z and accessed the MSP's ejection seat (Tab MM-19). A local funeral home transported the MSP from the scene at 2140Z on 20 February (Tab MM-21).

5. MAINTENANCE

a. Forms Documentation

The AIB found one discrepancy on the Air Force Technical Order (AFTO) Form 781H (Tabs I-2, I-4 and Z-1 to Z-2). The MA required an Exceptional Release (ER) prior to flight on 19 February 2021 (Tab I-2, I-4, and I-6). An ER requires an authorized individual to review the forms and certify that the aircraft is airworthy (Tab Z-69). The MA required an ER due to the replacement of Engine #1 (left) on 9 February and the installation of a travel pod for the cross-country mission on 19 February (Tabs I-2, I-4 to I-6, and Z-69). Maintenance personnel authorized the ER; however, it should not have been authorized under the circumstances. The Minimum Essential Subsystems List required that the flight following the engine replacement be a local sortie flown by a dual/rated crew (Tabs I-4, I-6, Z-1 to Z-2 and Z-69). So a sortie meeting that requirement

should have been flown prior to the mishap sortie, since the mishap sortie was a cross-country, not local, sortie (Tabs I-2, I-4, Z-1 to Z-2, and Z-8).

There were no other discrepancies found in the forms for the previous 90 days (Tab Z-69 to Z-70).

b. Aircraft Recent History

The MA aircraft last flew on 2 February 2021 (Tab Z-68). Maintenance personnel executed a basic post-flight/pre-flight inspection that day and found no discrepancies (Tab Z-68).

On 3 February, the MA experienced an Engine #1 compressor stall and Exhaust Gas Temperature (EGT) rise to 850 degrees C on the runway while in afterburner (AB) on takeoff roll (Tab Z-68). A compressor stall could cause engine flameout and/or physical damage to the engine (Tab G-8).

The compressor stall and high EGT placed the MA in a non-mission capable-maintenance (NMCM) status (Tab Z-69). On 9 February, maintenance personnel replaced Engine #1 (Tab Z-69).

On 10 February, the MA experienced an Engine #1 "nozzle flux." T-38C engines have variable exhaust nozzles, and "nozzle flux" occurs when the nozzle is unable to stabilize within specified limits at military power, which is the maximum power setting before setting AB (Tab Z-69). Subsequent evaluations determined a faulty T-5 amplifier (amp). Maintenance personnel removed and replaced the T-5 amp and performed a "trim run" on 10 February, which set the engine parameters within specified limits. Maintenance personnel then updated the MA's status from NMCM to fully mission capable (FMC) (Tab Z-69).

Maintenance personnel completed pre-flight inspections on the MA on 11 and 14 February and found no discrepancies (Tabs I-2 to I-3 and Z-69).

During the pre-flight inspection on 18 February, maintenance personnel annotated low fuel level and zero liquid oxygen (LOX) on the AFTO Form 781H (Tabs I-2 to I-3 and Z-69). Maintenance refueled and serviced the MA with LOX on 19 February (Tabs I-3 and Z-69).

At the time of the pre-flight inspection on 19 February, the MA had 18,394.6 flight hours, and maintenance records reflected no overdue special, calendar, hourly, or required inspections and no grounding discrepancies that would have affected the airworthiness of the MA (Tabs I-2 to I-13, and Z-69).

c. Maintenance Procedures

M1 Support Services contractors perform all T-38C maintenance at Columbus AFB, adhering to Air Force guidance to conduct regular and unscheduled maintenance (Tab Z-69). As discussed previously, the AIB noted one procedural error in the AFTO Form 781H (Tab Z-69 to Z-70). Due to this error, the MA incorrectly reflected FMC status at the time of the mishap sortie; however, the MA was actually partially mission capable (PMCM) (Tab Z-70). There is no evidence to indicate this discrepancy was relevant to the mishap.

d. Maintenance Personnel and Supervision

There is no evidence to indicate maintenance personnel were not fully qualified and appropriately supervised (Tab Z-14 to Z-65).

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

Technical analysis determined the MA fuel was within standards (Tab I-16 to I-30).

Hydraulic fluid samples from the flight (right) and utility (left) reservoirs were slightly below limits (less than 10%) for viscosity at 40 degrees Celsius and 100 degrees Celsius (Tab I-16 to I-30). Analysis conducted by the Air Force T-38 Systems Program Office (SPO) found no evidence of malfunction or failure of the MA flight controls prior to the mishap sequence (Tab R-43).

Technical analysis revealed Engine #1 oil samples tested within standards (Tab I-16). Engine #2 oil samples had elevated iron levels, but met normal specifications IAW T.O.-33-1-37-3 (Tabs I-17 and Z-70). Further analysis concluded Engine #1 and Engine #2 were both operating at the time of impact and there is no evidence substandard engine performance contributed to the mishap (Tab R-69).

Liquid oxygen samples revealed no abnormal conditions (Tab I-29).

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

(1) Engine

The engines were still in the fuselage and sustained minimal damage during the mishap (Tab R-56). The fuselage was intact near the aft section of the airframe over the engines with no gashes or holes indicative of rotating component liberation (Tab R-56). The left inlet for Engine #1 (left engine) had damage near the leading edge of the inlet and minor damage down the inlet (Tab R-56). The right inlet for Engine #2 (right engine) was damaged and filled with debris (Tab R-56). Both engines were concentric, indicating the engines did not impact the ground perpendicular to the axis of rotation with large force (Tab R-56). There were no signs of a post-crash fire despite the airframe still having fuel (Tab R-56).

The left and right engines had a total of 9,638.2 and 12,332.7 flight hours, respectively, with 176.9 and 379.6 flight hours since the Hourly Postflight Inspection (HPO) (Tab R-56 to R-58). There were no shifted components upon visual inspections (Tab R-60 to R-65). No components had any sheared bolts, studs, or broken safety wire (Tab R-60 to R-65). The external components of the engines, primarily in the forward sections of the engines including the front frames, compressor sections, mainframes, and the accessory gearboxes and packages, had evidence of sawdust from processed wood (Tab R-60 to R-65). During initial inspections of the left and right variable exhaust nozzles (VEN), diameters were measured to be approximately 12” and 13” in diameter, respectively (Tab R-60 to R-65). The inlet guide vane (IGV) bleed valve actuators were fully retracted indicating closed IGVs and open bleed valves (Tab R-60 to R-65). The bleed valves and

IGV's positions were consistent with the engines operating below 77% engine speed at the given compressor inlet temperatures in accordance with the operation and service instructions manual (Tab R-60 to R-66).

The front of the left engine showed evidence of foreign object debris ingestion on the front frame struts and stage one-compressor blades (Tab R-61). The front of the right engine showed evidence of debris ingestion on the front frame, IGVs, and stage one-compressor blades (Tab R-66). The right engine ingested a large amount of mud as well as wood material (Tab R-66). The right engine was on the side of the aircraft that rolled and made contact with the ground first (Tab R-66). The right engine's throttle cable disconnected during impact (Tab R-66). It is possible that the right engine throttle setting could have shifted during impact (Tab R-66).

Both engines' stage 2-8 compressor blades showed minor nicks on the leading edge of the blades with no fractures or liberations (Tab R-62 to R-67). The turbines showed little to no sign of debris damage (Tab R-63 to R-68). Heavily burnt black ash was observed in both engines' stage one nozzle cooling holes, indicating wood material was processed through the turbines (Tab R-63 to R-68).

(2) Airframe

The wing remained attached to the fuselage of the aircraft by the 44% spar bolt; all five other wing attachment points had failed (Tab R-28).

Both ailerons were damaged by contact with trees but remained attached to the wing (Tab R-28).

The left flap was found with the inboard hinge still located within the fuselage and attached to an unbroken flap Y-rod, and the outboard hinge was broken from the wing (Tab R-28). The right flap was detached from both the wing and the fuselage, but was within five feet of the fuselage (Tab R-28).

The horizontal stabilizer was damaged by contact with trees but remained attached to the aft section of the fuselage (boattail) (Tab R-29).

The speed brakes were found with the main wreckage of the fuselage (Tab R-29). The left speed brake was damaged but was still attached to the aircraft (Tab R-29). The right speed brake broke free from the aircraft but was still in the correct location under the wing and was held in place by other pieces of wreckage (Tab R-29).

The rudder was still attached to the vertical stabilizer and sustained minor damage (Tab R-29).

The nose of the aircraft forward of the canted Fuselage Station (FS) 264 was destroyed on impact and found primarily under the main fuselage wreckage (Tab R-29). Fragments of both canopies were found in the flight path and were broken by contact with trees (Tab R-29). The canopy frames were found in close proximity to the main fuselage wreckage (Tab R-29). The windscreen was found under the right stabilizer surface relatively intact (Tab R-29). The bulk of the aircraft aft of the canted FS 264 aft was intact and received damage from contact with trees (Tab R-29).

(3) Landing Gear

The nose landing gear (NLG) was in the extended position and had extensive damage from the ground impact (Tab R-41). There was no evidence the NLG contacted the power lines (Tab R-41).

Both Main Landing Gear (MLG) were in the extended position prior to impacting the power lines (Tab R-41). The right MLG had multiple indications of contact with both the power lines and the light tower (Tab R-41) The left MLG broke free from the aircraft and had multiple indications of contact with the power lines (Tab R-41 and R-43). Both main landing gear strut doors were found in the flight path and had broken free from the aircraft due to contact with power lines/light tower/trees (Tab R-41). The right strut door was found on top of the light tower (Tab R-29). The left strut door was found to have contact with the power cables and trees (Tab R-41).

(4) Flight Control Actuators and Motors

The left and right stab actuators were found installed in the boattail section of the aircraft with no signs of damage (Tab-R-31). Both actuators passed operational and leak checks (Tab R-31). A thorough inspection was performed on the piston cavity, pistons, servo valves, spool/sleeve, O-rings, strainers, etc. (Tab R-31 to R-32). All components were found to be in good operating condition (Tab R-31).

Testing of the horizontal stabilizer trim actuator indicated the trim actuator was in good functioning condition at the time of ground impact (Tab R-32). All other portions of the horizontal stabilizer system were located within the wreckage (Tab R-32). No indications of pre-mishap damage were observed (Tab R-32).

The left and right aileron actuators were found to be in excellent condition with no notable damage due to the mishap (Tab R-34). Both aileron actuators were tested on the hydraulic test stand and were found to be in good functional condition (Tab R-35). The actuators and actuator servo valves were disassembled and were found to be in functioning condition (Tab R-35). Inspection did not reveal any pre-impact damage (Tab R-35).

The aileron operating mechanisms components were inspected and were found to be intact and operational (Tab R-35).

The aileron trim actuator was recovered in an approximate neutral position (Tab R-36). This trim condition is consistent with straight and level flight (Tab R-36 to R-37).

The left and right rudder actuators were found completely intact within the center section of the aircraft fuselage and without evidence of damage (Tab R-37). Both actuators passed functional testing with no failures (Tab R-37). The actuators and actuator servo valves were disassembled and in good condition with no signs of damage noted (Tab R-37).

The Stability Augmentation System (SAS) Actuator was recovered in the neutral position (Tab R-38). The SAS actuator was tested on the hydraulic test stand and passed all functional tests (Tab R-38). The actuator was disassembled with no defects noted (Tab R-38).

The speed brake surfaces were found in the partially extended position (Tab R-39). The speed brake actuators were too damaged to be functionally tested on the hydraulic test stand (Tab R-40). The actuators were disassembled for inspection with no anomalies noted (Tab R-40).

The flap motors were electrically tested for proper operation (Tab R-40). The left flap motor passed all functional testing (Tab R-40). The right flap motor was too heavily damaged for operational testing; a single functioning flap motor is sufficient for controlling the position of both flap surfaces (Tab R-40). Neither flap system had any indications of pre-impact damage (Tab R-40). There was no evidence indicating that the flaps were functioning other than properly at the time of the mishap and were in an appropriate 60% flaps down position (Tab R-41).

b. Evaluation and Analysis

(1) Engines

Engine #1 (left engine) and Engine #2 (right engine) were operating at the time of the impact and there is no evidence to indicate their operation contributed to the mishap (Tab R-69). Both engines fully processed wood through the afterburner, which is evident in the findings and observations (Tab R-69).

(2) Aircraft Structure, Flight Controls, and Landing Gear Systems

No evidence of malfunction or failure was found in the aircraft structure, flight controls, or landing gear systems prior to the mishap sequence (Tab R-43).

7. WEATHER

a. Forecast Weather

The local Mission Execution Forecast (MEF) was issued on 19 February 21 (Tab W-2). The MEF for Columbus AFB at 2200Z was clouds scattered at 2,000 feet above ground level (AGL), visibility greater than 7 statute miles, temperature 2 degrees Celsius, and winds from the northwest (330) at 9 knots (Tab W-2). The forecast weather at Dannelly Field from 2053Z to 2253Z predicted clear skies, unrestricted visibility, and winds from the northwest (320) at 14 knots (Tab W-1). The forecast weather at Tallahassee International Airport from 2000Z on 19 February 2021 to 0000Z on 20 February 2021 predicted a broken ceiling at 1,400 feet AGL, visibility greater than 6 statute miles, and winds from the northwest (330) at 10 knots (Tab BB-1).

b. Observed Weather

The local weather at Columbus AFB on takeoff was clouds scattered at 1,800 feet AGL, visibility 10 statute miles, temperature 2 degrees Celsius, and winds from the north (350) at 5 knots (Tab BB-2). The observed weather at Dannelly Field was clear skies, visibility 10 NM, temperature 12 degrees Celsius, and winds from the northwest (320) at 14 knots (Tab HH-6).

c. Space Environment

The space environment and associated weather are not applicable to this incident.

d. Operations

The MS was conducted within prescribed weather requirements and in accordance with published restrictions with one exception (Tab II-7). Based on forecast weather ceilings of 1,400 feet at Tallahassee International Airport, the MC identified Valdosta Regional Airport as their alternate airfield on the flight plan (Tabs L-2, BB-1, and GG-27). However, the MC did not calculate the fuel required for the alternate airfield on their fuel log as required by AFMAN 11-202v3 (Tabs FF-111 and GG-31). If the weather conditions at Tallahassee required the MC to divert, the MC would have arrived at Valdosta with 400 lbs of fuel remaining, which is below the minimum 600 lbs of fuel reserve required (Tabs FF-111, GG-30, and II-7).

8. CREW QUALIFICATIONS

a. Mishap Instructor Pilot

The MIP was an active duty officer assigned to the 50 FTS at Columbus AFB, MS (Tab II-1). The MIP was a current and qualified T-38C Instructor Pilot (Tab II-1).

The MIP was respected by his leadership and fellow instructors and had great rapport with his students (Tab AA-15.7 and AA-30.3). He had a reputation as one of the best and hardest working First Assignment Instructor Pilots (FAIPs) in the squadron and was recently selected 50 FTS FAIP of the Third Quarter and had been voted "Best IP" two times by the student pilots (Tabs AA-25.3 and S-62.7 to S-62.8).

A review of the MIP's training records revealed "average" to "above average" progression throughout SUPT and Pilot Instructor Training (PIT) (Tab Y-2). The MIP graduated from SUPT on 12 December 2019 and was assessed to be "above average" in the Transition and Instrument blocks of training (Tab Y-2). The MIP started T-38C PIT on 6 January 2020 and flew 69 sorties and 75.7 hours (Tabs Y-1 and II-1). He once again received "Excellent" ratings in the Transition and Instrument blocks of training (Tab II-1). However, the MIP's instructors also documented on several sorties throughout training that he needed to offer the student more specific/directive instruction throughout the flight and/or intervene earlier when a simulated dangerous situation was developing (Tab II-1). The MIP graduated on 11 June 2020 (Tab Y-1).

The MIP was current in all flight events and had a total of 297.1 hours of flight time in the T-38C with 185.9 hours of instructor time (Tab II-1). Based on the MIP's current hours, he was considered an inexperienced instructor pilot (Tab GG-39 to GG-40). As an inexperienced instructor pilot, he was restricted to fly in weather conditions with at least 300 foot ceilings and 1 mile visibility or published instrument approach minimums (whichever is greater) (Tab GG-85). In addition, he was required to accomplish an instrument approach and a landing every 30 days compared to 45 days for an experienced instructor, and he was required to accomplish a landing from the rear cockpit every 60 days versus 90 days for an experienced pilot (Tab GG-41).

Due to winter storm conditions at Columbus AFB in mid-February, the MIP's most recent flight, instrument approach, and landing prior to the MS were on 10 February (Tab II-2). The MIP's most recent circling approach was on 7 February (Tab II-2).

On the day of the mishap, the MIP's flight time in the T-38C was as follows (Tab II-2):

	Hours	Sorties
30 days	25.0	22
60 days	40.9	37
90 days	82.7	73

b. Mishap Student Pilot

The MSP was a Japanese student pilot who, prior to starting SUPT at Columbus AFB, attended the Defense Language Institute English Language Course (DLIELC) at Joint Base San Antonio-Lackland, Texas from 25 March 2019 to 23 August 2019 (Tab S-7.5). On arrival at the DLIELC, the MSP tested above the required score on the English Comprehension Level test (Tab S-7.5). The MSP completed the Oral Proficiency Skills for Aviators Course, which culminated in an oral proficiency interview (Tab S-7.4 to S-7.5). His first oral proficiency interview was initially unsatisfactory, but after an additional month of training, the MSP was able to achieve the required score for follow-on language training (Tab S-7.4 to S-7.5). The MSP entered specialized English training on 24 June 2019 (Tab S-7.5). This follow-on training provided the MSP with the specific English language required to aviate, navigate, and communicate at his follow-on training location (Tab S-7.4 to S-7.5). The MSP completed specialized English training on 23 August 2019, scoring "average" to "slightly above average" (Tab S-7.5). After completing DLIELC training, the MSP was assigned to the 14 STUS at Columbus AFB, MS (Tab II-2).

The MSP had a reputation as being a very respectful, hard-working, diligent student who studied long hours in preparation for his sorties (Tabs S-7.7, AA-2.6, AA-12.4, AA-16.2, and AA-29.2). He was also known to help other student pilots prepare for their sorties (Tab AA-1.3 and AA-2.6).

The MSP began T-6 training on 5 September 2019 with Class 20-24 and flew with the 41st Flying Training Squadron (Tab II-2). The MSP's performance and progression during the T-6 phase of training were assessed to be "average" (Tab II-2). On 11 February 2020, the MSP moved back to Class 21-01 due to low aircraft availability and falling behind the training timeline (Tab II-2). The MSP flew a circling instrument approach seven times in the T-6 and once in the T-6 simulator (Tab II-2). The MSP completed T-6 training on 29 June 2020 and entered T-38C training on 6 July 2020 (Tab II-2).

The MSP was assessed to be a "slightly below average" to "below average" T-38C student pilot (Tab AA-4.9, AA-12.4, and AA-35.1). Prior to the MS, the MSP completed 66 sorties and 27 syllabus simulators in the T-38C (Tab II-2). The MSP completed 46 sorties to a "good" or "excellent" level, 1 sortie to a "fair" level, 9 sorties to an "unsatisfactory" level, and 10 ungraded sorties (Tab II-2). The MSP's training records indicated he performed 26 simulator events to a "good" or "excellent" level and 1 ungraded simulator (Tab II-2).

The MSP performed very well during the ground training and academic phase of T-38C training, receiving "As" in all of his classes (Tab II-3). He also performed well throughout T-38C simulator training (Tab II-3). However, the MSP struggled throughout most of T-38C flight training (Tab II-3). On many of his sorties, the MSP's instructors documented that he had difficulty speaking and understanding English, which directly impacted his ability to receive and process instruction as well as listen and talk on the radios (Tab II-3). This challenge was exacerbated while flying instrument sorties, which required more frequent communications with ATC (Tab II-3). The MSP's instructors observed that communication challenges often caused the MSP to "get behind the aircraft" and lose situational awareness, which further led to task management issues, oversaturation, and a break down in his instrument cross check during critical phases of flight (Tabs AA-8.9 and II-2). Further, several instructors documented that the MSP had a tendency to over-control the aircraft, make big corrections, and fail to take corrections out in a timely manner (Tab II-3). He also had difficulty landing and properly prioritizing actions on final approach resulting in instructor intervention (Tab II-3).

On 8 November 2020, the MSP moved back to Class 21-07 due to low aircraft availability and falling behind the training timeline (Tab II-2).

On 23 November 2020, the MSP failed to pass his Transition category check ride due to misunderstanding ATC communications throughout the sortie and failure to account for overshooting winds during a single-engine approach (Tab II-3). He successfully re-accomplished the Transition check ride on 24 November and returned to the normal syllabus flow (Tab II-3).

On 2 February 2021, the MSP was placed on the Commander's Awareness Program (CAP) during the Formation block of training due to two consecutive "unsatisfactory" sorties on 1 and 2 February (F5413 and F5414) (Tab II-2). International students are authorized up to 10 additional aircraft flying hours (T-6A and T-38C combined), and after being placed on CAP, the MSP flew three ungraded sorties (XX83) (Tabs S-3.4 and II-3). The MSP flew these sorties with the squadron's most experienced instructor pilot who documented the MSP's performance improved from "below average" to "average" for this stage of the Formation block of training (Tab II-3). The MSP then flew two sorties with two other experienced pilots on 8 and 9 February (F5415 and F5416) and received a "good" grade on both sorties (Tab II-3). The MSP then successfully passed his Formation check ride (F5590) on 10 February 2021 and was removed from CAP on 12 February (Tab II-2).

The MSP's most recent flight and landing prior to the MS was the Formation category check ride on 10 February (Tab II-2). His last instrument approach in the aircraft was on 25 January and his last two simulator events (low level and instruments/navigation) were on 11 February (Tab II-2 to II-3). Prior to the MS, the MSP had not accomplished a circling maneuver in the T-38C or in the simulator (Tab II-2). In addition, the MSP flew the last 13 dual sorties before the MS with experienced instructors (Tab II-3).

The MSP's total military flight time was 162.1 hours with 73.9 hours in the T-38C (Tab II-2).

9. MEDICAL

a. Qualifications

The MIP completed his most recent Periodic Health Assessment (PHA) and annual Flight Physical on 6 January 2021 (Tab KK-1). Columbus AFB Flight and Operational Medicine issued a Medical Recommendation for Flying or Special Operational Duty (DoD Form 2992) on the same date indicating medical clearance for pilot duties (Tab KK-1). A review of the Aeromedical Information Management Waiver Tracking System (AIMWTS) indicated the MIP required a medical waiver, granted indefinitely on 10 Jun 2020 with recommended annual evaluations (Tab KK-1). MIP completed his last medical waiver evaluation on 27 February 2020 and was medically qualified for flying duties (Tab KK-1). There is no evidence to indicate the MIP's medical condition requiring the waiver, or any other medical condition, was relevant to the mishap.

The MSP completed his most recent PHA and annual Flight Physical on 24 November 2020. Columbus AFB Flight and Operational Medicine Clinic issued a DoD Form 2992 on 24 November indicating medical clearance for pilot duties (Tab KK-1). The MSP medical clearance required use of corrective lenses and carrying an extra pair of glasses while flying. The MSP ordered a second set of glasses after failing visual acuity without glasses on his flight physical on 24 November (Tab KK-1). The MSP did not pick up the glasses after he was notified of their arrival on 29 November (Tab KK-1). A review of AIMWTS also indicated that MSP required a medical waiver, granted on 22 August 2019 with expiration on 31 March 2022 (Tab KK-1). His medical waiver required that he carry a medication with him while flying (Tab KK-1). He last filled the medication on 13 August 2019 (Tab KK-1). Search and Recovery did not recover either the MSP's glasses or the required medication at the mishap site (Tab KK-1). He also possessed medicated eye drops in his flying gear and topical hair treatment not approved for flight (Tab KK-1). There is no evidence to indicate the MSP's medical condition requiring the waiver, any other medical condition, or his unapproved medications contributed to the mishap.

b. Health

The outpatient medical and dental records (paper and electronic) were reviewed for the MIP and MSP. Neither member had significant health issues (Tabs S-69.8 and KK-1).

c. Pathology

The MIP and MSP were transported to Dover AFB, DE, where an Armed Forces Medical Examiner System (AFMES) Medical Examiner performed autopsies on 24 February (Tab KK-2). The AFMES Forensic Toxicology Laboratory performed toxicology tests for alcohol, common drugs, and carbon monoxide. All test results were negative (Tab KK-2). The cause of death for both pilots was multiple injuries due to aircraft impact (Tab KK-2). Based on the pattern of injuries and force involved, the MIP and MSP were fatally injured on impact (Tab KK-2).

d. Lifestyle

AIB interviews with coworkers and the MIP's spouse indicated the MIP was well-rested and did not have significant life stressors (Tabs S-69.2 to S-69.9 and AA-30.6). On the day of the mishap,

the MIP was excited to fly the student cross-country mission (Tab AA-30.4). The MSP was known to stay up late studying, but on the day of the mishap, he was assisting other students with planning and did not appear to have any excessive stressors in his life besides the normal stress associated with pilot training to include the challenges of planning the cross-country mission (Tabs S-26.6 to S-26.7, AA-1.3, and AA-2.6). The AIB determined lifestyle was not a factor in the mishap.

e. Crew Rest and Crew Duty Time

The AETC Supplement to AFI 11-202, Volume 3, *General Flight Rules*, states crew rest is compulsory for aircrew members and is a minimum of 12 non-duty hours before the flight duty period (Tab GG-24). Crew rest is free time and includes time for meals, transportation, and an opportunity for at least 8 hours of uninterrupted sleep (Tab GG-24). The AETC Supplement also addresses maximum flying times, including simulator time (Tab GG-99). For T-38Cs, the maximum flying time is 6.5 hours during one flight duty period, 30 hours in 7 consecutive days, and 75 hours in 30 consecutive days (Tab GG-25 and GG-99). The MIP and MSP had adequate crew rest and did not exceed the maximum flying times (Tabs AA 1.3, AA 2.3, AA 2.5 to 2.6, and S-69.4 to 69.5).

10. OPERATIONS AND SUPERVISION

a. Operations

The 50 FTS conducts specific training in the T-38C for the fighter-bomber track during the advanced phase of undergraduate pilot training (Tab OO-4 and OO-13). The training is 108 training days and is comprised of four units: 64.0 hours of ground training; 100.7 hours of academic training; 39.5 hours of simulator training; and 89.1 hours of aircraft flying training (Tab II-8). This phase focuses on advanced aircraft handling, tactical navigation, fluid maneuvering, and an increased emphasis on 2- and 4-ship formation (Tabs II-8 and OO-13). The 50 FTS conducts this training in accordance with AETCI 36-2605v1, *Formal Flying Training Administration and Management;* AETC T-38C Syllabus, *T-38C Specialized Undergraduate Pilot Training*; and *T-38C Flying Standards* (Tabs GG-42, GG-48 to GG-78, and II-8).

The 50 FTS averages 69 sorties a day and approximately 345 sorties a week; however, T-38C maintenance challenges and the impact of COVID-19 contributed to a slightly lower operations tempo and a backlog of students in the 50 FTS training pipeline throughout 2020 (Tabs S-3.6, S-62.9 and Tab AA-7.8 to AA-7.9). The operations tempo steadily increased and the student backlog decreased as fleet health improved under a new maintenance contractor and COVID-19 safety protocols were implemented (Tabs S-3.6, S-62.9, AA-7.8 to AA-7.9, and AA-8.11 to AA-8.12). However, in January and February 2021, poor weather conditions negatively affected sortie generation, and there was a concerted effort in the 14th Operations Group (14 OG) and 50 FTS to reestablish student timelines resulting in a "slightly above average" operations tempo several weeks prior to the mishap (Tab AA-8.2).

Due to the winter storm the week of the mishap, the 50 FTS canceled all flying operations on 14-18 February (Tab AA-8.2 and AA-14.2). On 19 February, the squadron canceled morning flying and generated 12 afternoon sorties, including the mishap sortie (Tabs S-52.3 and EE-1).

(1) MIP

The MIP's operations tempo was well below normal the week of the mishap (Tab II-2). Due to the winter storm, the MS was the first sortie flown by the MIP in nine days (Tab II-2). Prior to the storm, the MIP was on pace to earn the "50 FTS High Flyer of the Quarter" award having flown 82.7 hours in the previous 90 days (Tabs AA-25.6 and II-2).

(2) MSP

The MSP's operations tempo was also well below normal the week of the mishap due to the winter storm (Tab II-3). This was the MSP's first sortie in nine days, his first sortie after his Formation check ride on 10 February, and his first sortie after removal from CAP (Tab II-1 to II-2). He performed two simulator sorties (Low Level and Instruments/Navigation) on 11 February (Tab II-3). Prior to the storm, the MSP flew 24 sorties and 26.5 hours in the previous 30 days (Tab II-2).

The AIB found no evidence that operations tempo was a factor in the mishap.

b. Supervision

The 50 FTS Operations Supervisor authorized the MS, and the 50 FTS scheduled the sortie in accordance with the T-38C syllabus (Tabs L-3, S-52.2 to S-52.4, S-53.2, and EE-1).

On the day of the MS, the 14 OG Commander and Deputy Commander were actively involved in evaluating airfield conditions and personally drove all three runways and assessed the safety of the parking aprons prior to reopening the airfield for flying operations (Tab S-14.3 to S-14.4 and S-56.4). In addition, as flying operations resumed on 19 February the 50 FTS Operations Supervisor, (acting) Director of Operations, and Squadron Commander were directly involved in assessing the MC's risk and ensuring the cross-country missions launched safely (Tabs S-62.3 to S-62.4, AA-4.9 to AA-4.10, AA-14.4 to AA-14.6, AA-15.2 to AA-15.3, and AA-15.5).

The 14 OG has a robust ORM program, which was significantly revised in 2020 in order to standardize the format across the group and increase the focus on human risk factors (health, stress, and fatigue) (Tabs S-3.8 and AA-17.2 to AA-17.5). Several 14 OG and 50 FTS instructor pilots considered the new ORM worksheet slightly difficult to use at first, but with practice determined it is an effective tool to assess and manage risk (Tab AA-4.3).

The MC completed the 50 FTS ORM worksheet and calculated a high level of risk for the MS, which required the 50 FTS Squadron Commander to approve the sortie (Tabs L-5 to L-6 and AA-14.4). The AIB determined that prior to the MC stepping to their first aircraft, one additional point should have been added to the ORM score due to the Index of Thermal Stress Condition (Tabs L-5, W-1, and FF-56). After stepping to the first aircraft, the subsequent maintenance delay and increased flight duty period associated with the delay as well as wind chill added three more points to the MC's ORM score (Tab L-5). These additional four total ORM points did not significantly change the overall level of risk associated with the sortie or require higher than Squadron Commander-level approval (Tab L-5).

In terms of risk associated with a break in flying training, after more than seven days without an aircraft sortie, flight commanders can authorize additional sorties (non-graded) for a student pilot (Tabs S-15.5 and AA-13.13). Previously, the MSP had an eight-day break in training between 1 and 9 December 2020, which the flight commander documented in the student grade book, but decided not to authorize an additional sortie due to sufficient sorties remaining in the syllabus to achieve desired training standards (Tab II-3). Later, the MSP received a break in training sortie on 6 January 2021 following a 16-day break in flying during the December holiday break (Tab II-2).

The MS was the MSP's first sortie since being removed from CAP; however, the MSP's supervision did not authorize a break in training flight (Tabs AA-3.5, AA-14.6, AA-15.6 and II-2). Based on the ORM scoring criteria, supervision accounted for the break in training by assigning moderate risk to the MSP (2 ORM points) and low risk to the MIP (1 ORM point) (Tab L-5). Instructors and students are considered high risk (4 ORM points each) if they have not flown in over 14 days (Tab L-5). Of note, during the ORM worksheet review for the cross-country sorties, the 50 FTS Squadron Commander identified a 14-day break in flying for one of the instructor pilots and reassigned the instructor to fly a Continuation Training (CT) sortie with another cross-country instructor instead of flying with a cross-country student that day (Tabs S-62.4 and AA-9.3).

Additionally, the 50 FTS assesses international student sorties as low risk (1 ORM point), and it does not restrict inexperienced instructor pilots from flying with international students during any block of student training (Tab L-5 to L-6, AA-8.4, and AA-27.2 to AA-27.3).

11. FLIGHT DATA ANALYSIS

The AIB provided parametric data and HUD and MFD videos to the Chief Test Pilot at the USAF Test Pilot School, Edwards AFB, CA to further analyze the flight parameters and MC actions leading to the mishap as well as determine if the power lines and/or approach lighting system tower affected the MC's chances of a safe recovery (Tab LL-1).

The test pilot assessed there were no apparent issues up to the start of the MC's turn to final approach, accomplished from a 180-degree downwind leg at circling altitude (Tab LL-3).

The MSL alert and radar altimeter were set to 10,000 feet and 0 feet, respectively. The radar altimeter was not on which complies with limitations imposed by the aircrew's cross-country travel pod (Tab LL-3).

During the 180-degree turn to final, the MSP undershot final approach, and the MIP began coaching the MSP by saying, "You can roll out right here," and, "Slowing down to green speed," to which the MSP responded by pulling the throttles to idle (Tab LL-3 to LL-4).

A sampling of experienced 50 FTS instructor pilots stated they would be very uncomfortable if a student pulled the throttles to idle for any amount of time in the final turn of a VFR pattern (Tab AA-35.1 and AA-37.1). The Air Force Chief Test Pilot shared the view that IPs would be uncomfortable spending more than a few seconds at idle and added that most final turn and final approach operations are flown with power at or above 80% (Tab LL-5 and LL-11). Moreover, a

common instructor technique is to "guard" or "ghost" the throttles during critical phases of flight, which enables the instructor to maintain situational awareness of all student power inputs while low to the ground and quickly correct or override an inappropriate or incorrect input (Tab LL-12 to LL-13).

When the MIP said, "Leveling off," the MSP raised the nose by 5 degrees, which only reduced the descent angle from 2.5 degrees to 1.5 degrees, while leaving the power in idle (Tab LL-3 to LL-4).

The MSP held the pitch attitude at a nearly constant four degrees as airspeed rapidly slowed, and the descent angle increased, and the MA continued a shallow turn (approximately 30 degrees of bank), which increased the rate of airspeed loss (Tab LL-4).

During the seven seconds that the MA's four-degree pitch attitude was held nearly constant with the throttles in idle, the MA's dive angle increased from a 1-degree descent at 190 KCAS to a 3.5-degree descent at 170 KCAS at less than 200 feet above the ground (Tab LL-4).

The test pilot assessed that the MSP's actions during the shallow turn were consistent with someone focused on aligning with the runway, habitually holding the same pitch picture and unaware of airspeed or angle of attack (AOA) (Tab LL-4). The MIP's voice remained calm and without signs of stress when he stated, "Just a little bit…" as the nose fell from approximately 200 feet above the ground at a 1,500 feet per minute descent (Tab LL-4).

Shortly afterwards, the MIP quickly said, "Oof…start climbing." His tone of voice and aggressive actions with the stick and throttle suggest the MIP took control almost immediately as seen by the simultaneous roll to wings level and pitch up (Tab LL-4).

The test pilot determined that by the time the MIP transitioned to a recovery or go-around, the MA had established an unrecoverable descent (Tab LL-1). Recovery of the MA above the power lines and tower became impossible at 180 feet above the ground (380 feet MSL), which was 2.5 seconds prior to when the MIP initiated his recovery (Tab LL-3). This finding assumes no delay in the start of the recovery and an immediate selection of full afterburner at the start of the recovery. The test pilot assessed a three-second delay is more realistic, which would add no less than 65 feet to the minimum recovery altitude (445 feet MSL) (Tab LL-3).

In addition, the AIB determined minimum altitude for ejection was approximately 90 feet above the ground (290 feet MSL). The MC passed this point within a second of the start of the attempted recovery (Tab LL-3). At the moment the MIP appeared to recognize the dangerous situation, ejection was the only viable option for the MC to survive (Tab LL-3).

The test pilot also determined the MA was well below the stall AOA when recovery became impossible (Tab LL-1). If the MA had been at final approach speed when the MIP attempted recovery, there may have been enough altitude to recover, but with the AOA rapidly approaching stall warning and the power in idle, there was not enough energy available to recover from the five-degree descent and ground impact was inevitable (Tab LL-4 and LL-6).

12. HUMAN FACTORS ANALYSIS

a. Introduction

Human factors relevant to the mishap were evaluated using the analysis and classification model established by the DoD Human Factors Analysis and Classification System (DoD HFACS) Version 7.0. A factor is any deviation, out-of-the-ordinary or deficient action, or condition discovered in the course of a mishap investigation that in the board's opinion contributed to the eventual outcome. The human factors relevant to this mishap are described below (Tab GG-1 to GG-22).

b. Task Oversaturation and Over/Undercontrolled Aircraft

PC103 Task Oversaturation is a factor when the quantity of information an individual must process exceeds their mental resources in the amount of time available to process the information (Tab GG-13).

AE104 Over/Undercontrolled Aircraft/Vehicle/System is a factor when an individual responds inappropriately to conditions by either over- or undercontrolling the aircraft/vehicle/system. The error may be a result of preconditions or a temporary failure of coordination (Tab GG-5).

c. Delayed a Necessary Action

AE107 Delayed a Necessary Action is a factor when an individual takes the necessary action as dictated by the situation but performs these actions too quickly or too slowly (Tab GG-5).

13. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publically Available Directives and Publications Relevant to the Mishap

(1) AETCI 36-2605V4, Formal Flying Training Administration and Management - T1A, T6A, and T38C, 20 February 2020
(2) AETCI 36-2605V1, Formal Flying Training Administration and Management, 17 September 2019
(3) AETCMAN 11-251, T-38C Flying Fundamentals, 12 October 2020
(4) AFI 11-2T-38V1_AETCSUP, Flight Operations, 29 January 2018
(5) AFI 11-2T-38V3_AETCSUP, T-38 Operations Procedures, 14 May 2020
(6) AFI 51-307, Aerospace and Ground Accident Investigations, 17 March 2019
(7) AFMAN 11-202V3, Flight Operations, 9 September 2020
(8) AFMAN 11-2T-38V3, T-38 Operations Procedures, 13 May 2020
(9) AFI 91-203, Safety Investigation and Hazard Reporting, 27 April 2018
(10) AFMAN 91-223 Aviation Safety Investigations and Reports 5 August 2020
(11) DoD Human Factors Analysis and Classification System, Version 7

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 or the Air Force Safety Center website at: https://www.safety.af.mil.

b. Other Directives and Publications Relevant to the Mishap

(1) T.O. 1T-38C-1, USAF Series T-38C Aircraft Flight Manual, 8 March 2016, through Change 3, 5 October 2017
(2) T.O. 00-20-1, Aerospace Equipment Maintenance Inspection, Documentation, Policies, and Procedures, 6 September 2019
(3) T.O. 1T-38C-2-6-2, Engine Conditioning, 24 January 2019, through Change 2, 1 April 2021
(4) T.O. 1T-38C-2-6, Power Plant, 9 July 2018, through Change 9, 6 April 2021
(5) T.O. 1T-38C-2-4, Pneudralic Systems, 24 October 2018, through Change 8, 18 November 2020
(6) T.O. 42B2-1-3, Fluids for Hydraulic Equipment, 1 December 2019
(7) T.O. 1T-38C-2-1, Aircraft General USAF Series T-38C-Aircraft, 23 July 2018, through Change 3, 15 February 2021
(8) T.O. 1T-38C-2-2, Ground Handling, Servicing, and Airframe Maintenance, 14 September 2018, through Change 10, 1 April 2021
(9) T.O. 33-1-37-3, Joint Oil Analysis Program Manual, volume 3, Laboratory Analytical Methodology, and Equipment Criteria (Aeronautical), 30 April 2018, through Change 1, 30 June 2019
(10) AETC Syllabus P-4VA-A, T-38C Specialized Undergraduate Pilot Training, October 2019
(11) AETC Syllabus P-V5A-B T-38C Pilot Instructor Training with Change 1, December 2017
(12) 50 FTS Standards, T-38C Flying Standards, 23 October 2019

c. Known or Suspected Deviations from Directives or Publications

Any known or suspected deviations from directives or publications are previously discussed in paragraphs 4.b "Planning" and 5.a "Forms Documentation."

6 AUGUST 2021

LAURA L. LENDERMAN
Major General, USAF
President, Accident Investigation Board

STATEMENT OF OPINION

T-38C, T/N 68-8099
DANNELLY FIELD, MONTGOMERY, ALABAMA
19 FEBRUARY 2021

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 2240 Zulu (Z) (4:40 p.m. Local Time) on 19 February 2021, a T-38C, T/N 68-8099, impacted the terrain short of Runway 28 while performing an instrument approach at Montgomery Regional Airport (Dannelly Field), Montgomery, AL.

The Mishap Instructor Pilot (MIP) was a First Assignment Instructor Pilot (FAIP) with approximately eight months of instructor experience. The Mishap Student Pilot (MSP) was a Japanese student pilot who was beginning his last month of pilot training. The Mishap Aircraft (MA) and Mishap Crew (MC) were assigned to the 14th Flying Training Wing (14 FTW) and flew with the 50th Flying Training Squadron (50 FTS) at Columbus AFB, MS.

The Mishap Sortie (MS) was the first leg of an off-station student cross-country mission, and the MSP's first sortie in the Advanced Instrument block of training. Due to a recent winter storm, the MS was also the first sortie flown by the MIP and MSP in nine days, and it was the MSP's first sortie since being removed from the Commander's Awareness Program (CAP).

The Mishap Crew (MC) planned to fly to Dannelly Field, execute a circling instrument approach, and then continue to Tallahassee International Airport, Tallahassee, FL for a full stop landing. At Dannelly Field, the skies were clear with unrestricted visibility and winds were from the northwest (320) at 14 knots. The MSP flew the downwind leg of the circling approach configured with landing gear down and locked, 60% flap setting, and displaced 1.9 NM from the runway (0.4 NM wider than desired). The MA was 18 knots above final turn speed when the MSP began the turn to final. Due to undershooting the final turn, the MIP directed the MSP to roll out on an approximately 40-degree intercept heading to final approach and directed the MSP to slow down. The MSP retracted the throttles to idle and started a 30-35 degree left bank turn to align with the runway. The MA's airspeed and altitude rapidly decreased and the angle of attack (AOA) and sink rate quickly increased. As the MA aligned with the runway and decelerated through 164 KCAS (8 knots below final approach speed), the MIP took control of the aircraft and simultaneously rolled wings level, pitched up, and then advanced the throttles to max afterburner 0.5 seconds later.

At the time the MIP advanced the throttles to max afterburner, the throttles had been at idle for 18 seconds, and the MA's airspeed had decelerated to 155 KCAS (17 knots below final approach speed). At this point, the MA was past the point of a safe recovery, and it impacted the ground seconds later with gear down and locked and 60% flap setting. During the impact sequence, the MA struck power lines (70 feet above the ground) and an approach lighting system tower (50 feet above the ground) approximately 2,300 feet from the approach end of RWY 28. The MA was destroyed, and both the MIP and MSP were fatally injured on impact.

I find by a preponderance of the evidence the cause of the mishap was the MIP's loss of situational awareness on final approach and failure to take timely and necessary actions as a dangerous situation developed. Further, I find by a preponderance of the evidence that the MSP substantially contributed to the mishap after becoming task saturated in the traffic pattern and placing and leaving the throttles in idle. As the circling approach progressed, the MIP failed to recognize the MA's deteriorating performance caused by the excessive length of time the throttles were in idle. This undetected and uncorrected action, coupled with the MSP's additional flight control inputs to align with the runway, resulted in insufficient airspeed and altitude and an increased angle of attack and sink rate, and placed the MA outside the parameters for safe flight.

2. CAUSE

MIP Loss of Situational Awareness and Failure to Take a Necessary Action

The MIP had a reputation as one of the best and hardest working FAIPs in the 50 FTS. He was respected by his leadership and fellow instructors and had great rapport with his students. He was recently selected as the squadron's FAIP of the Quarter and students voted him "Best IP" two times. Witness testimonies confirmed that the MIP loved to fly, and prior to the mishap, he was on pace to earn the "50 FTS High Flyer of the Quarter" award having flown 82.7 hours in the previous 90 days.

The week of the mishap, the MIP's operations tempo was well below normal. The MIP had not flown in nine days due to a recent winter storm, and witnesses described the MIP as relaxed, well-rested, and excited to fly the student cross-country mission.

Due to the winter storm and forecast weather conditions, the majority of the cross-country mission planning occurred the morning of the flight. There were a few irregularities during mission planning and ground operations that were inconsistent with the MIP's reputation and past performance: 1) He was not present for the weather briefing; 2) He did not account for the alternate airfield fuel requirement; and 3) He did not recognize that the MA was restricted to a local (not cross-country) sortie after reviewing the aircraft forms. While these omissions did not directly contribute to the mishap, they point to the MIP's lack of attention to detail the day of the flight and perhaps a lack of appreciation for the high risk associated with the student cross-country mission. These indicate that the MIP may also have lost some amount of proficiency in the days he was out of the cockpit.

The mishap occurred while the MA was on final approach at Dannelly Field. This approach was the MSP's first circling maneuver in the T-38C, and he started the turn to final 0.4 NM wider than

desired and 18 knots above final turn speed. I was unable to determine if the MIP was aware of the aircraft's displacement and increased airspeed before the MSP started the turn to final or if the MIP was allowing the MSP an opportunity to identify and correct the discrepancies himself. The MIP did not provide any instruction to the MSP during the first 30 seconds of the turn at which point, the MIP said, "You can roll out right here." The MSP rolled out on an approximately 40-degree intercept heading to the final approach course flying 20 knots above final turn airspeed and descending at 850 feet per minute. Airspeed may have temporarily dropped out of the MIP's cross check as he and the MSP focused on acquiring the runway and aligning with the final approach. It was not until nine seconds later that the MIP said, "Slowing down to green speed," or final approach speed, to which the MSP responded by pulling the throttles to idle.

After reviewing the flight data, I find the preponderance of the evidence indicates the MIP was either unaware or he temporarily lost awareness that the MSP pulled the throttles to idle as he coached the MSP throughout the final approach and tried to help the MSP locate the runway and capture a normal 2.5 – 3 degree glide path. Due to the performance characteristics of the T-38C, it is highly unusual for an instructor pilot to allow a student pilot to place the throttles in idle in the traffic pattern for an extended period. This opinion was shared by the Air Force Chief Test Pilot who also verified most final turns are flown with the power at or above 80 percent. In addition, a sampling of experienced 50 FTS instructor pilots confirmed they would be very uncomfortable if a student pulled the throttles to idle for any amount of time in the final turn of an approach.

The MIP may have been overly focused on aligning with the runway due to the angling final turn, allowing airspeed and other critical parameters to drop out of his crosscheck. In addition, at the time of the mishap, the setting sun was in the MIP's field of view, and may have further affected his ability to acquire the runway. Regardless, as the final approach progressed, the MIP's comments were confident and relaxed and implied only minor correction was necessary as the MA's airspeed and altitude decreased rapidly and the angle of attack (AOA) and sink rate increased quickly. This provides further evidence the MIP was unaware of a developing dangerous situation. By the time the MIP recognized the precariousness of the situation and took control of the aircraft, the MA was past the point of a safe recovery. Further, when the MIP attempted to recover, there was a 0.5-second delay between rolling wings level/pitching up and advancing the throttles to max afterburner. This indicates the MIP may not have had his left hand positioned for immediate action on the throttles during this critical phase of flight, which may also explain why the MIP was unaware the throttles remained at idle during the final approach.

I find by a preponderance of the evidence the MIP lost situational awareness as the circling approach progressed, did not perceive the significance of the MA's throttles being in idle for an excessive length of time, and failed to take timely and necessary actions as a dangerous situation developed. This ultimately placed the MA in an unrecoverable position.

3. SUBSTANTIALLY CONTRIBUTING FACTOR

MSP Task Oversaturation

The morning of the MS, the MSP arrived at the squadron and focused on planning the cross-country sortie. During mission planning, the MSP attended the weather briefing, and based on forecast weather conditions at Tallahassee, the MC required an alternate airfield; however, the MC did not account for the alternate airfield fuel requirements. I was unable to determine if this error was due to a communication/language barrier between the MSP and MIP (who did not attend the weather brief), a lack of the MSP's knowledge or understanding, or merely an oversight. Although fuel planning did not directly contribute to the mishap, this error highlighted a lack of crew coordination or possible miscommunication between the MIP and MSP prior to the flight.

While en route to Dannelly Field, cockpit recordings revealed the MSP had difficulty understanding and responding to ATC radio calls. The MIP assisted the MSP several times and directly intervened with ATC on one occasion to ensure safety of flight. Communication issues with ATC continued to challenge the MSP throughout the remainder of the sortie and directly contributed to the MSP's becoming task saturated in the traffic pattern.

Approaching the final turn, the MSP allowed the airspeed to increase 18 knots above final turn speed and did not recognize the MA's runway displacement was 0.4 NM wider than desired. There are several possible reasons why this occurred. A student pilot's skills are perishable in a training environment, and it was the MSP's first flight in nine days, his first instrument approach in 3.5 weeks, and his first-ever T-38C circling maneuver. In addition, while it is common for students to "get behind the aircraft" or become overwhelmed in the traffic pattern, this error was a particular trend item for the MSP throughout his training. During several previous T-38C sorties and simulator events, instructors observed the MSP's crosscheck deteriorated, and he became task saturated in the traffic pattern. Instructors attributed the MSP's task saturation, in part, to communication and language challenges as well as the MSP's mechanical piloting skills.

As the MSP became more task saturated throughout the final turn, he became reliant on the MIP's prompting and coaching prior to initiating significant actions. When the MIP prompted the MSP to roll out on an intercept heading on final approach, the MSP's airmanship skills appeared to be overwhelmed by the task of aligning with the runway which led to other, equally important, airmanship priorities such as airspeed, altitude, sink rate, glide path, engines and power setting, etc., to go unaddressed. Further, the MSP's inability to align with the runway may have been exacerbated by the effects of the setting sun only adding to the MSP's task saturation.

After the MSP rolled out on an intercept heading flying 20 knots above final turn speed, the MIP told the MSP to slow to final approach speed. The MSP then placed and left the throttles in idle, which is an unnecessarily low and dangerous power setting for this critical phase of flight and further indicates the MSP was overwhelmed flying the circling approach and unable to identify a more suitable power setting to safely slow to final approach speed.

The MSP's power setting, which went undetected and uncorrected by the MIP, coupled with the MSP's additional flight control inputs to align with the runway, resulted in insufficient airspeed and altitude and an increased angle of attack and sink rate, and placed the MA outside the

parameters for safe flight. I, therefore, find by a preponderance of the evidence that the MSP's task saturation was a substantially contributing factor in the mishap.

4. CONCLUSION

I find by a preponderance of the evidence the cause of the mishap was the MIP's loss of situational awareness on final approach and failure to take timely and necessary actions as a dangerous situation developed. Further, I find by a preponderance of the evidence that the MSP substantially contributed to the mishap after becoming task saturated in the traffic pattern and placing and leaving the throttles in idle. As the circling approach progressed, the MIP failed to recognize the MA's deteriorating performance caused by the excessive length of time the throttles were in idle. This undetected and uncorrected action, coupled with the MSP's additional flight control inputs to align with the runway, resulted in insufficient airspeed and altitude and an increased angle of attack and sink rate, and placed the MA outside the parameters for safe flight.

6 AUGUST 2021

LAURA L. LENDERMAN
Major General, USAF
President, Accident Investigation Board

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