UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT

98TH FLYING TRAINING SQUADRON
306TH FLYING TRAINING GROUP
UNITED STATES AIR FORCE ACADEMY, COLORADO SPRINGS, CO

LOCATION: UNITED STATES AIR FORCE ACADEMY, COLORADO

DATE OF ACCIDENT: 31 JULY 2023

BOARD PRESIDENT: COLONEL ALFRED JOHN ROSALES

Conducted IAW Air Force Instruction 51-307

ACTION OF THE CONVENING AUTHORITY

MAY 16 2025

The report of the accident investigation board, conducted under the provisions of AFI 51-307, *Aerospace and Ground Accident Investigations,* that investigated the 31 July 2023 mishap, on the United States Air Force Academy, Colorado, involving a Telesis 3.0 Parachute System, Serial Number 021959, assigned to the 98th Flying Training Squadron, United States Air Force Academy, Colorado, substantially complies with applicable regulatory and statutory guidance and on that basis is approved.

BRIAN S. ROBINSON
Lieutenant General, USAF
Commander, Air Education & Training Command

EXECUTIVE SUMMARY
UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION

UNITED STATES AIR FORCE ACADEMY, COLORADO
31 JULY 2023

On 31 July 2023, at approximately 1103 hours local time (L), a United States Air Force Academy (USAFA) cadet (MJ1), became incapacitated while on the third freefall jump in the training program and sustained severe injuries when hitting the ground. MJ1 had exited the aircraft in an unstable body position. While unintentionally rolling on his back, he pulled the main ripcord and one of his arms entangled in the lines of the parachute. Immediately after the entanglement, MJ1's parachute started to spin at a high rate of speed and more likely than not rendered him incapable of pulling the handle for the backup parachute. MJ1 impacted the ground unable to execute a proper parachute landing fall to minimize shock and injury.

The Airmanship 490 (AM-490) freefall jump occurred at Davis Airfield on USAFA, Colorado Springs, Colorado (CO). MJ1 was using a fully functional Telesis 3.0 Parachute System with a Performance Designs 9-Cell 300 square feet canopy, Serial Number 021959. The mishap aircraft (MA) was a UV-18B, also known as the Twin Otter, tail number 77-0465, operated by the 98th Flying Training Squadron (98 FTS) and owned by the 306th Flying Training Group (306 FTG) located at USAFA. MJ1 recovered from his severe injuries and returned to USAFA to resume the graduation requirements to commission as an active-duty officer. The estimated value of government property lost is $490.00 to replace the parachute equipment.

The Accident Investigation Board (AIB) President found, by a preponderance of the evidence, this mishap was caused by an uncontrollable downward spiral with an entanglement of the parachute inducing stagnant hypoxia and rendering MJ1 unconscious or incapable of pulling the reserve parachute handle prior to impacting the ground at an unsafe speed.

Additionally, the AIB President found, by a preponderance of the evidence, six additional contributing factors to the mishap. First, MJ1 should not have participated in the freefall event on 31 July 2023 since he was not wearing required prescription glasses as directed by his medical clearance. The AM-490 Student Guide and the AM-490 brief with the mishap jumpmaster (MJM) should have, but did not prevent MJ1 from stepping to the aircraft without the required prescription glasses. Of note, testimonial evidence also highlighted an additional student did not wear required prescription glasses on the same aircraft as MJ1 during the third freefall jump. Second, MJ1 pulled the ripcord in an unstable body position while rolling to his back, contributing to MJ1's entanglement with the parachute. Although the probability of MJ1 entangling with the parachute from pulling the ripcord in an unstable body position is extremely low, an emergency can still occur. Expert testimony revealed that approximately 5 of 90 cadets typically execute an unsatisfactory and unsafe pull of the main ripcord on their side (or back) every AM-490 course with approximately 99% of those resulting in a safe and successful freefall parachute event.

Third, due to his incapacity, MJ1 was unable to execute a parachute landing fall to minimize the impact with the ground as instructed in AM-490 ground training. Evidence suggests MJ1 likely impacted the ground on his back and/or side. Fourth, AM-490 video debrief instructors did not grade MJ1's first and second jump strictly adhering to the AM-490 syllabus course training

standards. Jumps are evaluated using a Q1 (satisfactory), Q2 (marginal) or Q3 (unsatisfactory) grading system. The AM-490 parachute instructors graded MJ1's first freefall jump as Satisfactory and the second freefall jump as Marginal. However, two US Air Force expert qualified jumpmasters assigned to the Accident Investigation Board graded MJ1's first freefall jump as Marginal instead of Satisfactory and the second freefall jump as Unsatisfactory instead of Marginal based on the AM-490 syllabus course training standards. Through a sampling of various student jumps from AM-490 cadets, the AIB assigned expert jumpmasters highlighted that the video debrief grading appears to be more lenient than the AM-490 course training standards most likely due to being desensitized from reviewing hundreds of jumps a year from inexperienced cadets. It is more likely than not that MJ1 would have received more training than the approximately five to 15 minutes of retraining after his second jump on his exit and freefall parachute positions if video debrief grading strictly adhered to AM-490 course training standards.

Fifth, AM-490 ground retraining after MJ1's second freefall jump did not require individual grades to be documented on the approved course training record. The AM-490 training record only requires an acknowledgement of the specific item retrained, optional staff comments, and the instructor's initials, but not actual grades (i.e. Satisfactory, Marginal, or Unsatisfactory). MJ1's inability to apply the ground retraining accomplished after the second freefall jump in the program was evident through MJ1's actual unsatisfactory freefall and pull position on the mishap jump. AM-490 ground training has regression rules in the syllabus requiring an overall grade of "Unsatisfactory" if a cadet has repeat grades of "Marginal" for the same item from one phase to the next, denoting a trend. Other than suspended harness training, the syllabus ground regression rule was unable to be applied to MJ1's ground retraining to ensure he met the course training standards prior to his third freefall jump because instructors are not required to document grades. Of note, AM-490 does not have similar regression rules incorporated into the aerial training section of the syllabus like the ground training section. If the syllabus did have a similar regression rule even with the lenient grading mentioned in the third contributing factor, then MJ1's second freefall jump would likely have been an overall unsatisfactory grade directing further training beyond the directed ground retraining.

Sixth, MJM did not know MJ1's training performance from the previous two freefall jumps. She considered his delay exiting the aircraft after two separate hand signals to jump was nervous tension expected from students with normal progression. MJM was unaware of MJ1's less than satisfactory grade on the previous jump, or the retraining accomplished prior to the third freefall jump. AM-490 program provides jumpmasters with information on previous cadets with jump refusals but does not provide them with knowledge of AM-490 cadets' previous marginal or unsatisfactory performance or of cadets assigned to the Commander's Awareness Program. Of note, MJ1 was not entered in the Commander's Awareness Program.

SUMMARY OF FACTS AND STATEMENT OF OPINION
PERFORMANCE DESIGNS 300 CANOPY, S/N 021959
UNITED STATES AIR FORCE ACADEMY, COLORADO
31 JULY 2023

TABLE OF CONTENTS

PSEUDONYMS, ACRONYMS AND ABBREVIATIONS

12 FTW	12th Flying Training Wing
19 AF	19th Air Force
98 FTS	98th Flying Training Squadron
306 FTG	306th Flying Training Group
ACP	Arch-Count Pull
AETC	Air Education and Training Command
AF	Air Force
AFI	Air Force Instruction
AGL	Above Ground Level
AIB	Accident Investigation Board
AM-490	Airmanship 490
AOC	Air Officer Commanding
ATP	Army Techniques Publication
B1	By-stander 1
BI1	Body Instructor 1
BI2	Body Instructor 2
BP	Board President
CAP	Commander's Awareness Program
Capt	Captain
CO	Colorado
Col	Colonel
CYPRES	Cybernetic Parachute Release System
DEM	Demonstrator
DPAS	Defense Property Accountability System
DZ	Drop Zone
DZCO	Drop Zone Controller
EAAD	Electronic Automatic Activation Device
EL1	Element Leader 1
EL2	Element Leader 2
EMS	Emergency Medical Service
EM1	EMS Member 1
EP	Emergency Procedure
ER	Emergency Room
ERM	Equipment/Rigger Member
ES	Equipment Specialist
FAA	Federal Aviation Administration
FFB	Free Fall Body
FLTCC	Flight Commander
FFC	Former Flight Commander
GCM	Ground Controller Member
Hrs	Hours
I&R	Inspection and Repack
ID1	Identifier 1
ID4	Identifier 4
ID7	Identifier 7
ISM1	Interim Safety Member 1
ISM2	Interim Safety Member 2
ISM3	Interim Safety Member 3
JMM	Jump Master Member
L	Local Time
LA	Legal Advisor
LC1	Landing Controller 1
LC2	Landing Controller 2
LCSUP	Landing Controller Supervisor
Maj	Major
M	Marginal
MSgt	Master Sergeant
MA	Mishap Aircraft
MALFO	Malfunction Officer
MCA	MAJCOM Approver
MCP	Mishap Co-Pilot
META	Meteorological Aerodrome Report
MFF	Military Free Fall
MJ1	Mishap Jumper 1
MJ2	Mishap Jumper 2
MJ3	Mishap Jumper 3
MJM	Mishap Jump Master
MM	Medical Member
MO1	Mishap Observer 1
MO2	Mishap Observer 2
MO3	Mishap Observer 3
MP	Mishap Pilot
MSM1	MALFO Staff Member 1
MSM2	MALFO Staff Member 2
MSM3	MALFO Staff Member 3
MSM4	MALFO Staff Member 4
MSM5	MALFO Staff Member 5
MSM6	MALFO Staff Member 6
MSM7	MALFO Staff Member 7
MSM8	MALFO Staff Member 8
MT	Mishap Team
OB1	Observer 1
PD	Performance Designs
Pg	Page
PLA	Parachute landing Assistant
PPM	Personnel Parachute Program Manager
REC	Recorder
RT	Retrainer
RIG1	Rigger 1
RIG2	Rigger 2
S	Satisfactory
SBP	Second Board President
SEC	Standard Evaluation Chief
SIB	Safety Investigation Board
SIBM1	SIB Member 1
SIBM2	SIB Member 2

SIBM3	SIB Member 3	SSgt	Staff Sergeant
SIBM4	SIB Member 4	Sq ft	Square Feet
SIBM5	SIB Member 5	SQCC	Squadron Commander
SIBM6	SIB Member 6	TSgt	Technical Sergeant
SIBI1	SIB Investigator 1	TI	Tunnel Instructor
SIBI2	SIB Investigator 2	TNCO	Training Non-Commissioned officer
SIBS1	SIB Support 1	UK1	Unknown 1
SIBS2	SIB Support 2	UK2	Unknown 2
SIBS3	SIB Support 3	U.S.	United States
SLA	Special Legal Advisor	USAF	United States Air Force
SM1	Staff Member 1	USAFA	United States Air Force Academy
SME	Subject Matter Expert	VD	Video Debriefer
SOS	Single Operating System	WOB	Wings of Blue

The above list was compiled from the Summary of Facts, the Statement of Opinion, the Tabs, and the Witness Testimony.

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 17 July 2024, Lieutenant General Brian S. Robinson, Commander, Air Education and Training Command (AETC), appointed Colonel (Col) Jonathan M. Creer as an Accident Investigation Board President to conduct an aerospace accident investigation of the 31 July 2023 parachuting mishap which occurred at the United States Air Force Academy (USAFA) (Tabs W-1 and W-2). Based on unforeseen circumstances, Col Jonathan M. Creer was replaced by Col Alfred J. Rosales on 26 August 2024 as the Accident Investigation Board President. The investigation was conducted in accordance with Air Force Instruction (AFI) 51-307, *Aerospace and Ground Accident Investigation*, dated 18 March 2019 at the USAFA from 24 July 2024 through 1 October 2024. Other assigned Board members included the Medical Advisor, the Legal Advisor (Captain), Special Legal Advisor (Lieutenant Colonel), the Recorder (Master Sergeant), the Equipment/Rigger (Master Sergeant), the Jump Master (Technical Sergeant), and the Ground Controller (Staff Sergeant).

b. Purpose

In accordance with AFI 51-307, *Aerospace and Ground Accident Investigations*, 18 March 2019, 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

On 31 July 2023, at approximately 1103 hours local time (L), a USAFA cadet (MJ1), while incapacitated during the third freefall jump in the training program, sustained severe injuries when hitting the ground (Tabs S-2, S-3, and FF-2). MJ1 exited the aircraft in an unstable body position (Tab S-2 to S-3). While unintentionally rolling on his back seconds out of the door, he pulled the main ripcord and one of his arms entangled in the lines of the parachute (Tab S-2 to S-3). Due to the entanglement, MJ1's parachute started to spin at a high rate of speed and more likely than not rendered him incapable of pulling the handle for the backup parachute (Tabs S-2 to S-3, L-2, V-26.11 and V-26.12, FF-3, and FF-7 to FF-16). MJ1 impacted the ground and he was unable to execute a proper parachute landing fall to minimize landing shock and injury (Tabs S-2, S-3, FF-2 and V-25.6). The Airmanship 490 (AM-490) freefall jump occurred at Davis Airfield in USAFA, Colorado Springs, Colorado (CO) (Tab EE-2). MJ1 used a fully functional Telesis 3.0 Parachute System with a Performance Designs 9-Cell 300 square feet canopy, Serial Number 021959 (Tab BB-87). The mishap aircraft (MA) was a UV-18B, also known as the Twin Otter, tail number 77-0465, operated by the 98th Flying Training Squadron (98 FTS) and owned by AETC's 306th Flying Training Group (306 FTG) located at USAFA (Tab U-4 and U-11). Except for his memory loss involving the mishap jump, MJ1 recovered from his severe injuries and returned to USAFA to resume the graduation requirements to commission as an active-duty officer (Tab V-21.2 and V-21.10).

The estimated value of government property lost is $490.00 to replace the parachute equipment (Tab P-2).

3. BACKGROUND

a. Air Education and Training Command (AETC)

AETC was established and activated in January 1942 (Tab CC-2). AETC's primary mission is to recruit, train, and educate Airmen to meet the nation's needs (Tab CC-2). AETC includes the Air Force Accessions Center (previously named Air Force Recruiting Service), two Numbered Air Forces and the Air University (Tab CC-3). The command operates 12 major installations and supports tenant units on numerous bases across the globe (Tab CC-3). There are also 16 Active Duty and seven Reserve wings in AETC (Tab CC-3).

b. 19th Air Force (19 AF)

The 19 AF is responsible for training aircrews, remotely piloted aircraft crews, air battle managers, weapons directors, USAFA Airmanship programs, and survival, escape, resistance, and evasion specialists to sustain the combat capability of the United States Air Force (USAF), other services and our nation's allies (Tab CC-17). The 19 AF includes 19 training locations, with 16 Total Force wings: 10 Active Duty, one Air Force Reserve, and five Air National Guard units (Tab CC-18). 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 46 percent of the Air Force's total flying hours (Tab CC-18).

c. 12th Flying Training Wing (12 FTW)

The 12 FTW is responsible for four single-source aviation pipelines – Pilot Instructor Training, Combat Systems Officer Training, Remotely-Piloted Aircraft Pilot Indoctrination, and Basic Sensor Operator Qualification (Tab CC-22). The 12 FTW manages all airmanship programs for USAFA cadets and initial flight training for all Air Force Airmen scheduled to enter pilot, combat systems officer or remotely-piloted aircraft training (Tab CC-22). The 12 FTW also hosts an Introduction to Fighter Fundamentals program and conducts Electronic Warfare Training for the USAF and multi-national forces (Tab CC-22).

d. 306th Flying Training Group (306 FTG)

The 306 FTG, located at the USAFA in Colorado Springs, CO, provides management and oversight of Academy airmanship programs involving 2,500 cadets annually and of the USAF Initial Flight Training program involving approximately 2,200 undergraduate flight training candidates annually (Tab CC-25). The group ensures powered flight, soaring and parachuting courses contribute measurably to the leadership and character development of cadets (Tab CC-25). Additionally, the group ensures quality initial flight training and identifies those officers with the ability to succeed in follow-on undergraduate flight training (Tab CC-25).

e. 98th Flying Training Squadron (98 FTS)

The 98 FTS conducts parachute training for 700 Academy cadets annually (Tab CC-26). This training focuses on safety and emergency procedures, which enhance student confidence and maximize performance under extremely stressful conditions (Tab CC-26). In addition to basic jump training (Airmanship 490), the 98th FTS also oversees the Airmanship 491 (AM-491) "Wings of Green" and Airmanship 496 (AM-496) "Wings of Blue" competitive and demonstration parachute programs. Training is conducted using three UV -18Bs, or "Twin Otters" (Tab CC-27).

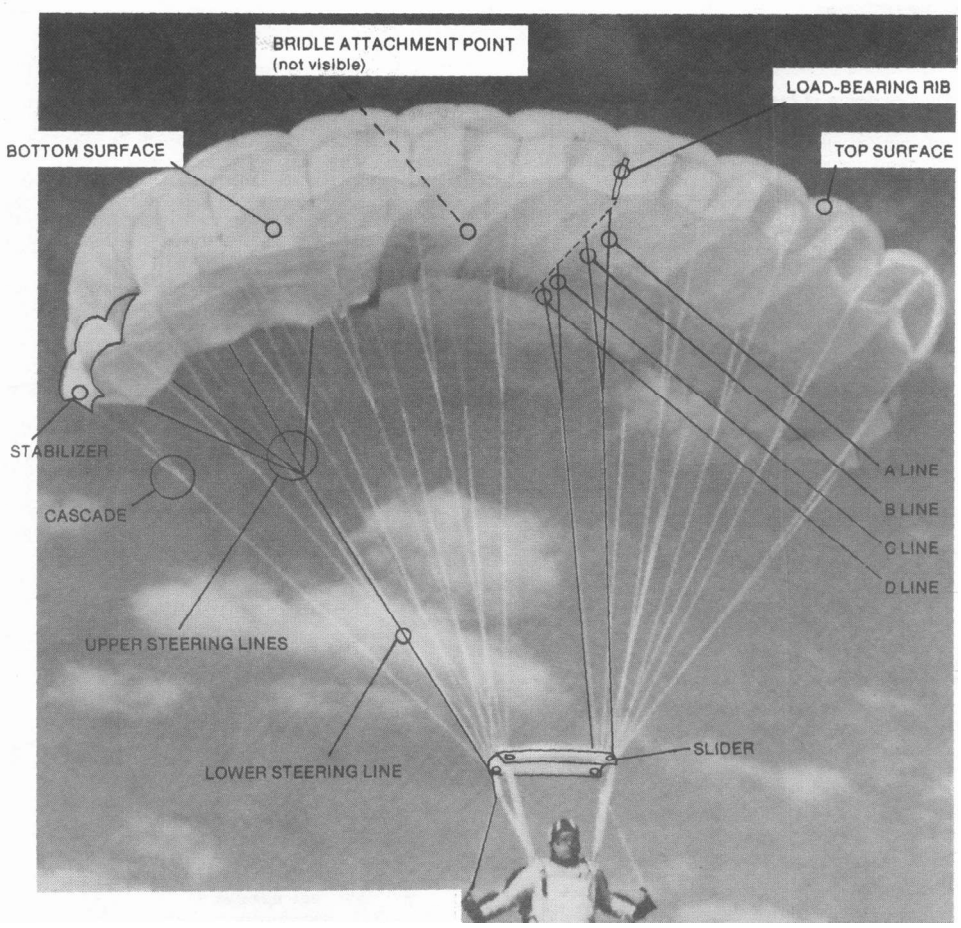
f. UV-18B Twin Otter

The main aircraft used for parachuting operations at USAFA is the UV-18B; a militarized version of the De Havilland Canada DHC-6 Twin Otter (Tab BB-107). It is a high winged aircraft with a 65-foot wingspan, 51'9" fuselage, and non-retractable landing gear, and is powered by a twin turboprop engine (Tab BB-107). Each aircraft can carry 18 student parachutists on center facing, troop-type seats and one jumpmaster (Tab BB-107).

g. Performance Designs 9-Cell Main Canopy (PD-9-Cell)

A Performance Designs 9-Cell (PD 9-Cell) Main Canopy is a ram-air canopy built by joining top and bottom surfaces with airfoil-shaped ribs (Tab DD- 187). Suspension lines attach to every other rib; those ribs with suspension lines are called load-bearing ribs (Tab DD-187). A PD 9-cell canopy has 10 load bearing ribs (Tab DD-187). Two small fabric stabilizers extend down from each wing tip (Tab DD-187). As their name implies, stabilizers help reduce canopy oscillation (Tab DD-187). Each load-bearing cell rib has four lines attached to it: the A line at the nose, followed by the B and then the C lines, ending with the D line near the tail (Tab DD-187). The A and B lines join into a single line several feet below the canopy (Tab DD-187). The line is called the A-B line (Tab DD-187). The junction is called a cascade (Tab DD-187). The C and D lines also are joined as a cascade and they form the C-O lines (Tab DD-187). The A-B line passes through a front grommet in the slider, while the C-O line passes through a rear grommet (Tab DD-187). Eight upper steering lines attach to the trailing

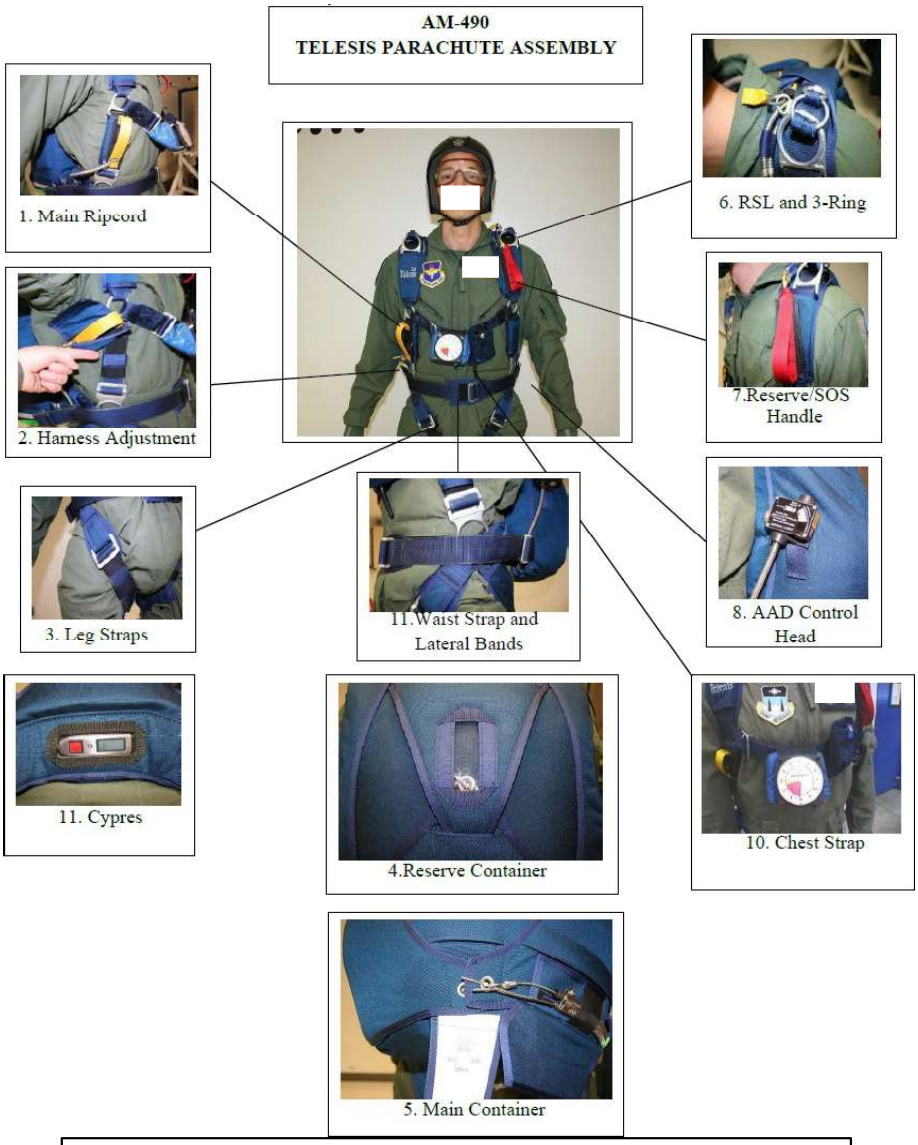
edge of the canopy, four on each side (Tab DD-187). The four upper steering lines in each side join into a single lower control line or two lower control lines (Tab DD-187). Each lower steering line passes through a rear slider grommet (Tab DD-187). The PD 9-Cell is available in a variety of sizes ranging from 135 sq ft to 340 sq ft (Tab DD-3).



Example of Ram-Air Canopy Features (Tab DD-187)

h. Telesis Parachute System

The Telesis harness and container system is the standard AM-490 parachute assembly. This system is Federal Aviation Administration (FAA) approved and is commercially made for civilian sport parachuting (Tab BB-84). The Telesis parachute system houses the PD-9 Cell main canopy, and includes several other features, such as a reserve canopy, the CYPRES 2 Expert release, and the FXC Model 12000 Automatic Parachute Ripcord Release (Tab DD-27 to DD-93). Furthermore, the Telesis system, along with the PD-300 Canopy, CYPRES 2 Expert, and FXC Model 12000 Automatic Parachute Ripcord Release are on the Air Force Personnel Parachute Approve-for-Use List (Tab BB-490 and BB-494).



Telesis Parachute Assembly System (Tab BB-86)

i. Model 12000 Automatic Parachute Ripcord Release (Main Canopy Release)

The FXC Model 12000 Automatic Parachute Ripcord Release is a precision device, designed for parachutists making premeditated parachute jumps (Tab DD-214). The Release is adjustable from 2,000 to 25,000 feet in the air, and it is completely mechanical in action, not relying on batteries, squibs or pyrotechnic devices (Tab DD-214). The Model 12000's function is to automatically withdraw the parachute ripcord pins in the event the

FXC 12000 (Tab DD-214)

parachutist reaches the point of the unit's preset altitude, and for whatever reason, the parachutist's rate-of-descent is exceeding 100 feet per second (Tab DD-214). Under normal conditions the Model 12000 would not operate, due to the parachutist having deployed his main chute, thus slowing his rate-of-descent below 70 feet per second (Tab DD-214). FXC 12000 activation altitude for student parachutes attending AM-490 is 3000 feet above ground level (AGL) (Tab BB-80).

j. Cybernetic Parachute Release System 2 Expert (CYPRES 2 Expert)

CYPRES 2 (Tab DD-100)

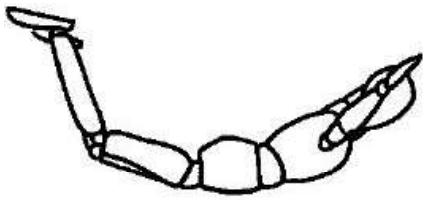
CYPRES 2 Expert is an electronic automatic activation device (EAAD) (Tab DD-98). The CYPRES 2 Expert is set to automatically activate at the defined altitude during freefall or vertical speed that is greater than 35 meters per second or 78 miles per hour (Tab DD-98).

k. Airmanship 490 Freefall Parachuting Program (AM-490)

This program provides USAFA cadets with a unique experience and aims to develop leaders of character for the Air Force and Space Force. Through the AM-490 program, students learn freefall parachuting as they attempt to earn the Air Force Basic Parachutist badge (Tab BB-72). Each student is responsible for ensuring that they are mentally, physically, and administratively ready for each ground and aerial training day (Tab BB-72). The AM-490 staff (permanent party members) and cadet instructors (AM-496 "Wings of Blue" team members) ensure each student is properly trained and equipped to jump safely (Tab BB-72). Upgrade cadets in AM-491 ("Wings of Green") also help conduct aspects of training under the supervision of staff and qualified AM- 496 cadets (Tab BB-135). AM-490 uses a Maximum of 10 to 1 student/instructor ratio during ground training but prefers to use a 6 to 1 student/instructor ratio (Tab BB-9).

l. AM-490 Freefall Body Position Training

The AM-490 program teaches students that the basic freefall body position should be assumed as soon as possible upon leaving the aircraft to permit proper deployment of the main parachute (Tab BB-77). It instructs students to lower the center of gravity by arching the back and maintaining balance in the "boxman" position, which means to arch and thrust the pelvis forward by squeezing the lower back, glutes, and hamstrings (Tab BB-77). Feet should be roughly shoulder width apart and the knees bent approximately 45 degrees (Tab BB-77). The upper arms should be at a 90-degree angle to the body, the elbows bent at approximately 90 degrees, and the hands relaxed with the fingers spread; furthermore, arms and legs are to be raised above the body while being balanced and symmetrical, exaggerating the arch (Tab BB-77). This position must be maintained to ensure stability in freefall (Tab BB-77). Instability creates a hazard to the jumper, and it has been noted in relevant guidance as the primary cause of military freefall malfunctions (Tab BB-572).



Student Guide Instruction Body Position Illustration (Tab BB-77)

m. Arch-Count-Pull Sequence Training

AM-490 students are directed to pull their ripcords within ten seconds from exiting the aircraft and to utilize the Arch-Count-Pull (ACP) sequence (Tab BB-78 to BB-80). The ACP sequence starts on the jumpmaster's command "GO!"; once the jumper has exited the aircraft in the poise position (facing towards the front of the plane), with upper arms against the jumper's sides, he then begins to count (Tab BB-78 to BB-82). The jumper starts at ARCH thousand, then TWO thousand – around this time, the jumper should be focusing on proper body position to maintain stability (Tab BB-78 to BB-82). The jumper continues at THREE thousand, FOUR thousand, and FIVE thousand – the jumper should have transitioned to the stable free fall position with arms/elbows at the 90-degree configuration and legs bent approximately 45 degrees (Tab BB-78 to BB-82). At around SIX thousand and SEVEN thousand, the jumper should be focusing on maintaining an arch; the jumper then counts ARCH thousand, then LOOK thousand, tilting the jumper's head to the right without dropping the head down, and the jumper looks through the corner of the jumper's right eye at the yellow main ripcord (Tab BB- 78 to BB-82). During PULL thousand, the jumper's left arm counters while the right arm grabs and pulls the main ripcord (Tab BB-78 to BB-82), At the last count, CHECK thousand, the jumper looks over the left shoulder to visualize the pilot chute leaving container and then returns eyes back to the front-facing position while maintaining an arch (Tab BB-78 to BB-82). While the ACP sequence envisions deploying the parachute within 10 seconds, for grading purposes, deploying the parachute within 5 to 11 seconds constitutes a satisfactory count; deploying the chute within zero to 4.9 seconds is a marginal count; deploying after 11 seconds is an unsatisfactory count (Tab BB- 142).

n. Malfunction Procedures

The AM-490 lesson plan, issued on 19 May 2023, instructs students on basic malfunction procedures and post-jump parachute opening problems (Tab BB-12 to BB-20). The AM-490 syllabus provides approximately 9.5 hours of training on the suspended harness portion of AM-490. Emergency Procedures (EPs) discussed are as follows: line twists, hung slider, end cell closure, pilot chute over the nose, premature brake release, unable to clear one brake, a combination of the above, floating rip cord, hard pull of the main, pack closure, pilot chute hesitation, pilot chute in tow, broken lines, rips, holes and tears, horseshoes, bag lock, streamers, line-over, and controllability check failure (Tab BB-16 to BB-20). Additionally, EPs/malfunctions training includes canopy wraps where jumpers become entangled with each other, hazardous landings (i.e. power line avoidance, tree landings, and unintentional water), reserve parachute malfunctions, and dual canopy procedures (Tab BB-16 to BB-20).

During suspended harness training, students are required to practice and visualize their EPs (Tab BB-16 to BB-20, and BB-143). Students are tested on their correction of these EPs prior to the aerial events of AM-490 (Tab BB-140). Students receive sustained training every day prior to jump operations, which, according to the lesson plan, will involve going over a minimum of two EPs (Tab BB-56 and BB-145). Noteworthy, according to Army Techniques Publication (ATP) 3-18.11, *Special Forces Military Free-Fall Operations*, December 2021, Change 4, 4 May 2023, all EPs that a jumper may encounter must be addressed within 24 hours prior to parachuting operations (Tab BB-500 to BB-516). With the exception of USAFA's AM-490 Freefall program, the USAF exclusively uses the United States (U.S.) Army Special Forces Military Free-Fall program to certify active-duty Airmen in freefall operations. Due to the length of time from the mishap, it is unclear which EPs were covered the morning of 31 July 2023.

Students are taught the Single Operating System (SOS) malfunction sequence when required (Tabs BB-15 to T19, BB-92 to BB-99, and DD-59). The SOS on the Telesis parachute system utilizes one handle operation for both the breakaway of the main parachute and the reserve ripcord pin (Tab DD-59). Pulling on the SOS results in the main canopy detaching and the reserve canopy being deployed (Tab DD-59). These malfunction procedures are covered in the suspended harness lessons for AM-490 students (Tab BB-12 to BB-20 and BB-92 to BB-99). Because the use of this parachute system is unique to the USAFA program, parent Air Force Instruction guiding directives do not specify or reference any mandatory procedures; instead, the AM-490 syllabus and lesson plans are the primary source for malfunction procedures during AM-490 operations. The malfunction relevant for this report is the horseshoe malfunction. A horseshoe malfunction occurs when the pilot chute, bridle (line attached to pilot chute and main canopy), suspension lines, or canopy is hung on the jumper or part of the jumper's equipment (Tab BB-17). The jumper is directed to "immediately execute SOS procedures" (Tab BB-17).

4. SEQUENCE OF EVENTS

a. Mission

MJ1 was completing his third jump in the AM-490 training syllabus. The program requires five freefall jumps to complete the syllabus. The training began on 24 July 2023 and was scheduled to continue through 7 August 2023. Operations were being conducted on Davis Airfield, USAFA, Colorado Springs, CO. The training event was authorized by the 98 FTS Commander (Tab BB-135 to BB-137). The MA was a UV-18B aircraft, also known as the Twin Otter with tail number 77-0465 belonging to the 306 FTG and operated by 98 FTS at USAFA (Tabs K-3, U-4 and BB-107).

b. Planning

As part of the AM-490 program, MJ1 completed three days of ground instruction starting on 24 July 2023 through 27 July 2023. Training on 24 July 2023 involved ground training facility orientation, in-processing, physiological training, freefall body position training, parachute landing fall courses 1 and 2, suspended harness training courses 1 and 2 (while donning the Telesis training harness), and canopy control course 1 (Tabs G-41, BB-5, BB-11 to BB-12, BB-15, BB-25, BB-37, and BB-47).

On 25 July 2023, MJ1 was instructed on field packing (recovering parachute following landing), canopy control course 2, Parachute Landing Fall course 3, and Mock Door courses 1 and 2 (simulating exit from mock aircraft), and suspended harness course 3 (Tabs G-41, BB-23, BB-30 to BB-36, BB-42 and BB-60). EPs/malfunction procedures, to include SOS procedures, are discussed during at least one of the suspended harness training courses (Tabs V-17.5 and BB-12 to BB-20).

On 26 July 2024, MJ1 attended drop zone aerial operations training and canopy control 3 (Tab G-41). MJ1 was also evaluated for suspended harness courses 3 and 4, which are the graded scenario tests required to pass before progressing to the aerial phase of training; MJ1 received satisfactory markings on most training factors except for hazardous landings, and high speed malfunctions (Tab G-41). Per the 98 FTS Lesson Plan for AM-490, "I haves" is a statement from a parachutist recognizing they have multiple equipment problems with the primary parachute and must execute the SOS procedures (Tab BB-17). MJ1's AM-490 Training Record noted that MJ1 did not appropriately execute SOS procedures with regards to power lines and did not correctly identify a high-speed malfunction (Tab G-41). Instructor testimony highlighted MJ1 was strong in the ground training procedures, had a good attitude and was motivated to do well (Tabs O-41, R-21, R-23, R-25 to R-26, V-1.6 and V-17.13). On 27 July 2023, MJ1 attended freefall body training course 3 (Tab G-41). Freefall body training course 3 involved instruction on body position in an advanced freefall simulator, commonly known as a vertical wind tunnel (Tab BB-53). MJ1 participated in the vertical wind tunnel. No issues were noted or recalled with his performance in the wind tunnel (Tabs R-26, R-28, and V-11.6 to V-11.7).

On 28 July 2023, MJ1 conducted two freefall jumps (Tab G-42). Jumps are evaluated using a Q1 (satisfactory), Q2 (marginal) or Q3 (unsatisfactory) grading system; they evaluate the exit, freefall, count, pull, safety, equipment care, canopy control and landing (Tab G-42). A cadet instructor then assigns a grade to each component, and an overall grade for the whole jump (Tabs G-42 and BB-141 to BB-142). MJ1's jumps were recorded, and a cadet instructor thereafter debriefed MJ1 on each jump's grade (Tab G-42). For MJ1's first jump of the day, MJ1 received an overall satisfactory (Q1) grade, although the first jump's grade sheet noted a marginal exit due to de-arching on exit and looking down (Tabs G-42 and Z-3). MJ1's grade sheet also annotated "swim[ming]" in freefall (involving the flailing of the arms and kicking of the feet) but showed recovery before main parachute deployment (Tab G-42). For MJ1's second jump, a marginal (Q2) rating overall was awarded, with marginals on the exit and on the freefall (Tabs G-42 and Z-4). MJ1 was noted as having asymmetrical legs at exit while looking down, and swimming during both exit and freefall (Tab G-42). MJ1 was directed to receive additional training in accordance with the syllabus and lesson plan guidance for any Q2 jump (Tab BB-140 and BB-142). MJ1 received approximately five to 15 minutes of ground retraining on the same day, 28 July 2023 (Tabs G-42 and V-17.9). The additional training involved stable body position in the mock aircraft door, and proper free fall body position (Tabs R-45, V-17.9 to V-17.11). He was scheduled to perform his third jump on 31 July 2023 (Tab K-9).

c. Preflight/Jumpmaster Briefing

On the morning of the mishap, the Drop Zone Control Officer (DZCO) provided an operations brief for all staff and cadet team jumpers around 0630L (Tab R-30). Following the operations brief, the student jumpers received a briefing from MJM; several cadet instructors also conducted gear

checks, inspecting student equipment (Tab V-19.5 and V-26.8). Students were organized by loads and canopy colors for grading purposes (Tab K-6 and K-9). Once students were on the plane, MJM again conducted final gear checks prior to students exiting the aircraft (Tab V-19.11). The AM-490 lesson plan directs to brief a minimum of two emergency procedures, and testimony affirms this was accomplished (Tabs BB-56, BB-84 to BB-407, V-1.8, V-18.9 and V-19.7). Noteworthy, Air Force Instruction (AFI) 10-3503 AETC Supplement, *Personnel Parachute Program*, 13 March 2023, paragraph 8.2.1 provides that sustained airborne training, consisting, at a minimum, of the jumpmaster briefing, post-egress procedures, emergency procedures, canopy entanglement procedures and landing procedures, among other aspects, must be conducted within 24 hours prior to any USAF parachute operation (Tab BB-221). Additionally, ATP 3-18.11 provides that jumpmasters must ensure all military freefall jumpers understand all aspects of the sustained training and the operation; additionally, the jumpmasters will also observe all jumpers to ensure they are fully involved in practicing all malfunction procedures they could encounter (Tab BB-914 to BB-930). With the exception of USAFA's AM-490 Freefall program, the USAF exclusively uses the U.S. Army Special Forces Military Free-Fall program to certify active-duty Airmen in freefall operations.

d. Summary of Accident

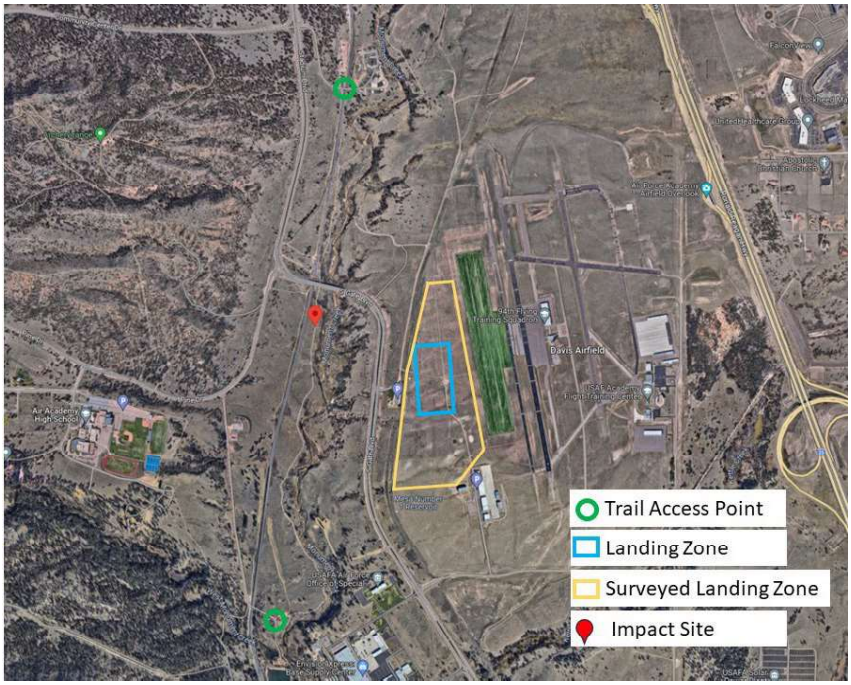
On 31 July 2023, there were a total of three missions with AM-490 cadets (Tabs K-3, K-9, and R-41). MJ1 was part of the third mission of the day (Tabs K-3, K-9 and R-41). Due to weather conditions, following the first mission, the subsequent missions were delayed for approximately two hours (Tab R-30). Around 1000L, the second mission was sent up with staff members and Wings of Blue jumpers who landed safely (Tab R-30). Around 1044L, the third mission was scheduled to occur, with seven passes with two students each pass (Tabs K-3, K-9 and R-30). The first pass was uneventful (Tab R-37 to R-42). The second and third passes involved jump refusals, resulting in MJM sending those jumpers to the front of the plane, and moving MJ1's pass forward in the queue (Tabs K-9, R-30, R-38, R-41, and V-24.7).

The mishap occurred on MJ1's first jump of the day (Tabs K-9, R-38, R-41). MJ1 was the first jumper on his pass; after establishing the body position at the door, MJM checked the green light and gave MJ1 a "green light, go" hand gesture, signaling for MJ1 to exit (Tab R-38). MJ1 did not exit immediately after the first-hand signal (Tab R-38). MJM gave another hand signal, at which point MJ1 looked at MJM (Tabs R-38 and V-19.9). By this time, approximately five seconds had elapsed (Tab R-38). MJM thought MJ1 was nervous, as expected from jumpers with normal progression, and MJM was unaware of MJ1's previous grades, believing his previous two jumps were "really good" (Tab V-19.7). MJM gave MJ1 a third hand signal to "green light, go" along with a thumbs up, after which MJ1 let go and jumped from the aircraft (Tab R-38 and V-19.9).

MJ1 exited the aircraft at approximately 5000 feet AGL (Tabs K-3 and K-9, R-15 and BB-2). Although MJ1 conducted a poise exit, which involves a forward-facing exit towards the direction of flight, he immediately began kicking his legs and swimming his arms (Tab S-2 and S-3). At this point, MJ1's body position was unstable, and he was rolling to his right side (Tab S-2 and S-3). As this occurred, MJ1 pulled the main parachute ripcord approximately two seconds into the ACP sequence (Tab S-2 and S-3). MJ1 was simultaneously rolling with his back towards the ground and head looking down at the ground during the deployment sequence

(Tab S-2, S-3, BB-36, and FF-3). The main pilot chute deployed near MJ1's left side and up toward MJ1's left foot (Tab S-2 and S-3). The main parachute opened out of the deployment bag while the right riser wrapped across the back of the Telesis container near MJ1's reserve closing flap and continued under MJ1's left elbow (Tab S-2 and S-3). The lines from the right riser wrapped around MJ1's left arm and wrist (Tab S-2 and S-3). This is described as a horseshoe malfunction and calls for immediate SOS procedures according to the AM-490 training materials (Tab BB-17). As MJ1 experienced opening shock, the left leg strap slid down MJ1's thigh (Tab S-2 and S-3). Opening shock is a term used to explain the rapid deceleration experienced when the parachute is deployed. This allowed the harness of the parachute to be shifted to the left side of MJ1 in a high and abnormal position on MJ1's back and neck (Tab S-2 and S-3). MJ1's left leg was bent approximately 90 degrees at the knee with the harness leg straps low on the thigh area (Tab S-2 and S-3).

This configuration initially turned MJ1 approximately 100 to 120 degrees towards the tail of the parachute (Tab S-2 and S-3). The increased input on the right side of the parachute canopy induced a clockwise turn (Tab S-2 and S-3). As the descent continued with no corrective action, the spin increased, causing MJ1 to be oriented towards the tail of the parachute and nearly parallel to the ground, with MJ1's back toward the ground (Tab S-2 and S-3). MJ1 continued a clockwise downward spiral until impact with the ground without a parachute landing fall (Tab S-2 and S-3). Two USAF qualified jumpmasters assigned to the AIB recreated MJ1's entanglement and harness configuration and concluded that MJ1's left arm was wrapped by the right riser and line group securing his arm to the left riser (Tab FF-7). During the recreation, the chest strap was noted to be close towards the jumpmaster's neck and the right riser was behind his head (Tab FF-7 to FF-8). This configuration did place an uncomfortable pressure on the jumpmaster during the recreation (Tab FF-8). Based on the jumpmasters' assessment, the pressure of the chest strap on MJ1's neck would have been worse due to the spinning he experienced during the incident (Tab FF-8).



As MJ1 was descending, Land Controller 1 (LC1) was directing MJ1 on the radio to perform "controllability checks," and stated this multiple times (Tab V-7.3). According to the AM-490 student guide, landing controllers are not permitted to give specific directions in case of a parachute malfunction; they may simply say, "Perform a controllability check" or "Check altitude" (Tab BB-120). However, no controllability checks were observed from LC1 and MJ1 appeared limp and non-responsive (Tab V-7.3 and V-7.6). Based on a physiologist's assessment following video review requested by the AIB, it is more likely than not that MJ1 experienced stagnant hypoxia (Tab FF-15 to FF-16). According to the physiologist, the harness appeared to have shifted upwards, impacting MJ1's circulation by creating excessive external pressure along the carotid arteries (Tab FF-15 to FF-16). During descent, likely after 1:08 minutes, MJ1 showed a decline in and then an absence of motor activity (Tab FF-15 to FF-16). This led the physiologist to believe that MJ1 had become unconscious (Tabs FF-15 and FF-16). The centripetal force brought on by the canopy pulling created rotations around the parachute (Tab FF-15 to FF-16). The canopy acted as an anchor point, mimicking rotations of a motor arm of a centrifuge (Tab FF-15 to FF-16). The absence of motor function in MJ1 observed after 1:08 minutes is more likely than not the symptom of a gravity-induced loss of consciousness (Tab FF-15 to FF-16).

e. Impact

MJ1 impacted the ground approximately 2400 feet from the landing zone at approximately 1103L (Tab S-60). Landing was not observed as the site was obscured by terrain (Tab S-2 and S-3). However, emergency first responders indicated severe traumatic injuries immediately following impact to the ground (Tabs FF-2 and V-25.6). The Malfunction Officer (MALFO) was informed by the Mishap Pilot (MP) that MJ1 landed west of the creek on the Santa Fe Trail (Tab R-7). As the MALFO approached the impact site, he could see bystanders making their way towards MJ1 (Tab R-7). The MALFO noted that MJ1 was 30 meters east of the train tracks, two meters from the trail and 300 meters south of the Tri-Bridge intersection (Tab R-7). Review of MJ1's mishap jump video by the AIB medical member and AIB physiologist conclude the significant spin and rotational velocity more likely than not impaired MJ1's ability to execute the malfunction procedures and a parachute landing fall to minimize injury (Tab FF-2 and FF-15 to FF-16).

f. Egress and Aircrew Flight Equipment (AFE)

MJ1's parachute system performed as designed (Tab BB-88). Data from the reserve CYPRES 2 electronic activation device was not analyzed due to conditions for activating the cutter having not been met (Tab GG-2). Activation requires a jumper to reach vertical speeds of 35 meters per second or 78 miles per hour within the activation window, which is approximately 130 feet AGL to approximately 750 feet AGL; if such speeds are not met, the device will treat the "jump" as an uncritical scenario without the need for an activation (Tabs DD-106 and GG-2).

g. Search and Rescue (SAR)

At the time of the mishap, the DZCO recognized a malfunction in the canopy of MJ1, as well as an abnormal descent (Tab V-14.10 to V-14.11). The DZCO then activated the USAFA airfield crash network to inform agencies of an in-flight or ground emergency (Tab V-14.11). Prepositioned emergency medical services (EMS) were notified at approximately 1104L (Tab FF-2).

Additionally, the MALFO was alerted by DZCO personnel (Tab R-7 to R-8). The MALFO drove north on the drop zone towards MJ1's location (Tab R-7 to R-8). The MALFO met a cadet on the drop zone (DZ) and asked for his radio to contact the DZCO (Tab R-7 to R-8). The DZCO informed MALFO that the MA overhead had eyes on MJ1 and that MJ1 was located West of the DZ near the creek on the Santa Fe trail (Tab R-7 to R-8). The MALFO arrived on scene at approximately 1112L (Tab R-7 to R-8). EMS arrived on-scene at 1113L (Tab FF-2). The MALFO and a bystander approached MJ1 and noted MJ1 was unconscious, laying prone underneath the canopy (Tab R-7). The MALFO and bystander repositioned MJ1, removed MJ1's helmet, and the MALFO removed MJ1's parachute prior to EMS care (Tab R-7). EMS arrived at MJ1 at 1117L and assumed care of MJ1 (Tab R-7, Tab FF-2). MJ1 was secured and transported via EMS at 1135L and arrived at Penrose Main Hospital Emergency Room at 1150L (Tabs R-7 to R-8, Tab AA-5.7).

h. Recovery of Remains

Not Applicable.

5. MAINTENANCE

a. Forms Documentation

Not Applicable.

b. Inspections

(1) Aircraft

The UV-18B (S/N 77-0465) that was used as the jump platform was serviced and preflight procedures were accomplished and documented on Air Force Technical Order form 781 prior to jump operations (Tab U-4 to U-6). The aircraft maintains a current FAA registration and Airworthiness certificate (Tab BB-9 and BB-16).

(2) Parachute

The PD 9-Cell 300 square feet main canopy was packed in a Telesis 3.0 container, which is inspected and re-packed every 365 days in accordance with commercial guidance memorandum (Tab DD-217 to DD-218). The inspections are tracked in the Defense Property Accountability System (DPAS) and recorded on a local inspection and repack (I&R) form (Tab D-3 and D-4).

c. Maintenance Procedures

Even though all inspections were up to date, the parachute record log did not match the DPAS print-out or the local I&R (Tab D-3 and D-4 and Tab S- 17). There is no evidence to suggest the incorrect annotations were a factor in the mishap.

MJ1 Parachute Maintenance Records/Items	DPAS Form 1 Information/date	Parachute Record Log Date	Local I&R Form Date
EAAD	Cypres Expert 750		
Main Parachute Ripcord Release	FXC Model 12000		
Harness Container	Telesis 3.0		
Main Canopy	PD-300 S/N 21959 11 Feb 23	Inspection date annotated 10 Feb 23	11 Feb 23
Reserve Canopy	PD-253 S/N 005455 11 Feb 23	Inspection date annotated 10 Feb 23	11 Feb 23

Maintenance Records Summary (Tabs D-3, D-4, and S-3)

d. Maintenance Personnel and Supervision

Not Applicable

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

Not Applicable

f. Unscheduled Maintenance

Not Applicable

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

(1) Telesis 3.0 Parachute

During the medical response, MJ1's gear was cut off and removed (Tabs R-7, V-13.7 to V-13.9 and V-13.15). Slight damage was observed to the parachute system, including a burn mark on the left rear riser and stitching broken on the right-side harness lateral adjustment (Tabs S-39 and R-7). No further damage was notated. MJ1's parachute system harness assembly is comprised of reserve static line, main ripcord handle, and SOS handle (Tab BB-86). There is no evidence to suggest that a pre-existing defect in the parachute was a factor in the mishap.

(2) Personnel Equipment

MJ1's helmet, altimeter, and one-way communication radio were undamaged. The only damage noticed was to the parachute landing assistant (PLA) (Tab R-7). The PLA is a laser-based training and safety tool to support military canopy parachutists; it uses a precision light detection and ranging sensor system that audibly alerts parachutists with two precise warning tones at preselected altitudes, guiding them to initiate and complete the flare (or chute deployment) sequence accurately (DD-220). It was observed that the PLA speaker was broken off during hard landing (Tab R-7). The PLA speaker was found 14 feet from MJ1's body (Tab R-8).

b. Evaluation and Analysis

A thorough inspection of MJ1's helmet, parachute, altimeter, FXC, and PLA were conducted after the mishap (Tab R-7 to R-8). The PLA data was pulled via the PLAKO data system by the on-site equipment specialist to show MJ1's altitude and velocity before ground impact (Tab L-2 to L-5).

7. WEATHER

a. Forecasted Weather

Weather was forecasted to steadily intensify throughout the morning but to return within limits by 1000 to 1200L (Tab F-6).

b. Observed Weather

All weather data is analyzed by the DZCO to determine safe conditions for AM-490 students prior to drops (Tab V-14.6). Students enrolled in AM-490 jump operations are only permitted to jump in ground winds from 0-15 knots (Tab BB-112 and BB-119). On 31 July 2023, weather progressively worsened, which caused a two-hour weather delay for AM-490 students (Tab R-30). Once weather was within prescribed limits and winds were from the north at 9 knots (kts) and gusting 13 kts, parachuting operations resumed for AM-490 (Tab R-30). The Meteorological Aerodrome Report at the time MJ1 exited the aircraft showed ground winds were coming out of 010 degrees (wind direction) at 12 kts, visibility was 10 statute miles and skies were clear (Tab F-12).

c. Space Environment

Not Applicable.

d. Operations

The AM-490 students were not permitted to jump when winds exceeded the prescribed limits of 15 kts (Tab BB-112 and BB-119). Once weather stabilized, the sorties resumed (Tab R-30 and R-41). There is no evidence that weather was a factor in the mishap.

8. CREW QUALIFICATIONS

a. Malfunction Officer (MALFO)

MALFO was an active-duty air force non-commissioned officer qualified to perform parachute malfunction responsibilities in the vicinity of the drop zones as described in Air Force Instruction 13-210, *Joint Airdrop Inspection Records, Malfunction/Incidents, Investigations and Active Reporting* (this is also referred to as an AF Joint (AFJ)) (Tab V-13.5). MALFO had over two years of experience at the time of MJ1's mishap jump (Tab V-13.2).

b. Mishap Jump Master (MJM)

MJM was a USAFA cadet qualified to serve as a jump master for USAFA operations (Tabs G-44, V-19.4 and BB-438). MJM was a jump master for over a year and half at the time of the mishap and was the primary jump master for four different AM-490 student sessions (Tab V-19.4).

c. Mishap Jumper 1 (MJ1)

MJ1 was a USAFA cadet participating in the AM-490 course as a student parachutist (Tab V-21.3). AM-490 cadets are graded during and after each parachute drop (Tab BB-140). MJ1's grades are defined as: Satisfactory (S) or Q1, signifying the cadet performs the operation, task or procedure in a satisfactory manner and deviations occur but are recognized and corrected in a timely manner; and Marginal (M) or Q2, signifying the cadet performs the operation, task, or procedure in a satisfactory manner, but has limited proficiency and deviations occur which detract from overall performance (Tab BB-140). Following MJ1's second jump, MJ1 received retraining in two areas: freefall body (FFB) and exit (Tab G-42).

Date	MJ1	Overall Grade	Retraining
28 Jul 23	Jump 1	Q1 (S)	N/A
28 Jul 23	Jump 2	Q2 (M)	FFB/Exit
31 Jul 23	Jump 3	Mishap	N/A

MSP Jump History/Grades (Tab G-42)

9. MEDICAL

a. Qualifications

Per review of the medical records, MJ1 was medically cleared to participate in AM-490 on 12 May 2023 and again on 6 July 2023 after a records review, provided he wears military flight frames (glasses) while in the Airmanship program (Tab FF-2). He was also prohibited from wearing contact lenses during the program (Tab FF-2). Review of MJ1's gear revealed that MJ1 was wearing normal goggles and not the larger goggles that accommodate for the wear of glasses underneath the goggles (Tab Z-5). Additionally, witness testimony stated they did not see MJ1 wearing glasses, and AM-490 jumpmasters do not enforce the wear of prescription glasses beyond the AM-490 brief (Tab V-24.4 and V-26.15). The preponderance of evidence suggests that MJ1 was not wearing corrective lenses/glasses, thus he was not adhering to the medical directive to wear flight frames at the time of the mishap jump.

b. Health

Based on review of the medical records as well as testimony, MJ1 was in good health during the 72-hour period prior to the mishap as well as the 14 days leading up to the mishap (Tabs V- 2.11, V-12.9 to V-12.10, V-19.14, V-21.17, V-24.5, and FF-2,). On the date of the mishap, MJ1 was

transported to the local trauma center Penrose Hospital in Colorado Springs (Tab FF-2). MJ1 sustained major traumatic injuries due to the impact with the ground in the immediate aftermath of the mishap (Tab FF-2). There is no evidence that poor health or illness contributed to the mishap.

c. Pathology

There was no evidence provided or available to the AIB regarding any toxicology results (i.e. urine drug screen, ethanol or carbon monoxide poisoning) for the additional individuals (i.e. OB1, MJ2, MP, MCP, MJM) involved in the jump on the day of the mishap. Urine and blood sample toxicology obtained from MJ1 on the day of the mishap revealed a negative blood ethanol level, and a urine drug screen was only positive for opiates, which is consistent with medical care received in the period immediately following the mishap (Tab FF-2). Drugs and/or alcohol involving MJ1 are not suspected as a factor in the mishap. Based on available medical reports from MJ1's hospital stay, no carbon monoxide blood levels were obtained (Tab FF-2). However, based on medical reports, it is not suspected that carbon monoxide poisoning was a factor in the mishap (Tab FF-2).

d. Lifestyle

Testimonial evidence did not reveal any lifestyle factors (i.e. unusual habits, behaviors, and/or stress) affecting MJ1 as causal or contributory to the mishap (Tab V-1.13, V-2.11, V-12.9 to V-12.10, and V-19.14). There is no evidence to suggest lifestyle was a factor in the mishap.

e. Crew Rest and Crew Duty Time

Based on testimony and review of MJ1's AM-490 risk management card, there is no evidence to suggest that fatigue or violation of crew rest/duty contributed to the mishap (Tabs K- 11, V-16.9, and V-21.18).

10. OPERATIONS AND SUPERVISION

a. Operations

The AM-490 course during the summer period is a high operations tempo environment involving multiple coordinating resources. The average class size consists of 75 to 90 cadets/students over multiple classes for a total of approximately 500 to 600 students during the summer training period (Tabs V-13.12, V-18.15, V-22.3, and BB-143). The program operations include two portions: the initial academic training (ground and fitness training) and a subsequent jump training over a 10-day period with 41.25 total training hours (Tab BB-133). During the jump training the students are expected to complete a total of five jumps to obtain the basic parachutist badge (Tab BB-133). The AM-490 program utilizes resources from the 306 FTG and 98 FTS to include: ground training building, the Davis Airfield, pre-positioned Asteri EMS support, staff and pilots of the 98 FTS, 2 UV-18Bs (Twin otter aircraft), and cadet instructors of the AM-496 "Wings-of-Blue," to accomplish the training (Tabs K-3, V-14.4 to V-14.5, V-16.4 to V- 16.5, V-18.20, BB-135, and CC-31).

b. Supervision

Cadet instructors are supervised by 98 FTS staff during the duration of the course (Tab BB-135). This supervision also involves mentorship as the staff seeks to develop the cadet instructors'

character and leadership qualities (Tabs V-9.6 to V-9.7, V-16.2 and BB-135). Staff attend course instructions run by cadets and will provide cadet instructors feedback on their instructions, though that is not mandatory for every class (Tab V-1.13, V-9.6, and V-18.16 to V-18.18). Supervision has been described as available and timely with advice and direction when sought but also "hands-off" as the cadet instructors are given autonomy to run the course (Tab V-6.6 and V-11.7). Supervision can also identify students for the Commander's Awareness Program (CAP) who, in the ground or aerial training phase, may need extra instruction to meet performance standards (BB-138). The class commander or staff AM-490 instructor, based on grading jumpmasters or training instructors' recommendations, can place cadets on CAP (BB-138). A cadet may be placed on CAP at any time during training for any of the following reasons: difficulty in learning and understanding key concepts; difficulty in performing procedures properly and in a timely manner, failure to progress at a reasonable rate; inappropriate attitude for a military course; or failure to meet safety standards (BB-138).

MJM did not know MJ1's training performance from the previous two jumps and told the AIB that she was informed they were "really good" (Tab V-19.7). She considered his delay exiting the aircraft after two separate hand signals to jump as nervous tension expected from students with normal progression (Tab V-19.9). MJM was unaware of MJ1's less than satisfactory grade on the previous jump, or the retraining accomplished prior to the third jump (Tab V-19.7). According to guidance applicable to the personnel parachute program, jumpmasters are responsible for operational risk management and ensuring all parachutists meet currency, refresher training, and recurring training requirements (Tab BB-199 to BB-200, BB-287 and BB-455 to BB-456). According to the AFI for the Flying Operations for Personnel Parachute Operations and associated AETC supplement, cadets who complete AM-492, like MJM, can serve as jumpmasters for the USAF for Academy operations (Tab BB 215 and BB-438). At the time of the mishap, the AM-490 program provided jumpmasters with information on previous cadets with jump refusals but did not provide them with knowledge of AM-490 cadets previous marginal or unsatisfactory performance, retraining performance, or cadets assigned to CAP (Tab V-26.23 and V-26.24).

The AM-490 Student Guide and Syllabus are in place for grading of student performance. Aerial jumps are evaluated using a Q1 (satisfactory), Q2 (marginal) or Q3 (unsatisfactory) grading system; instructors evaluate the exit, freefall, count, pull, safety, equipment care, and canopy control and landing, assigning a grade to each component, and then an overall grade for the whole jump (Tabs G-42 and BB-140 to BB-142). If any portion of a jump is graded as "Unsatisfactory" (Q3), then the overall grade for the jump is "Unsatisfactory" (Q3); if two portions of a jump are graded as "Marginal" (Q2), then the overall grade for the jump is "Marginal" (Q2); and if three portions of a jump are graded as "Marginal" (Q2), then the overall grade for the jump is "Unsatisfactory" (Q3) (Tabs G-42 and Tab BB-140 to BB-142). Debriefers will determine a cadet's grades and may, based on cadet performance, make recommendations to class commanders to place cadets on CAP (Tabs G-42 and Tab BB-140 to BB-142).

Based on a grading jumpmaster or instructor's recommendation, a class commander or AM-490 staff instructor can place a cadet exhibiting marginal performance into CAP to monitor the cadet who may need extra instruction to meet performance standards (Tab BB-138 and BB-140). A cadet may be placed on CAP at any time for several reasons, including difficulty in performing procedures properly and in a timely manner and failure to meet safety standards, among others (Tab BB-138 and BB-140). Any cadet who demonstrates continued unsatisfactory performance in

the aerial phase, indicated by a grade of unsatisfactory on two different jumps, is placed on CAP (Tab BB-138 and BB-140). MJ1 did not receive an unsatisfactory on his first two jumps which preceded the mishap, and thus he was not referred to CAP (Tabs G-42, Z-3 and Z-4).

AM-490 video debrief instructors did not strictly adhere to the AM 490 syllabus course training materials in grading MJ1's first and second jumps (Tab FF-4 and FF-6). The AM-490 parachute instructors graded MJ1's first freefall jump as Satisfactory and the second freefall jump as Marginal (Tabs G-42, FF-4 and FF-6). Two US Air Force qualified expert jumpmasters assigned to the AIB reviewed the videos and independently graded the first jump as Marginal and the second jump as Unsatisfactory based on the AM-490 syllabus course training standards (Tab FF-4 and FF-6). Through a sampling of various student jumps from AM-490 cadets, the AIB-assigned jumpmasters noted that the video debrief grading appears to be more lenient than the AM-490 course training standards, most likely due to being desensitized from reviewing hundreds of jumps a year from inexperienced cadets (Tab FF-4 and FF-6).

11. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publicly Available Directives and Publications Relevant to the Mishap

(1) AFI 10-3503, *Personnel Parachute Program*, 23 September 2020
(2) AFI 10-3503 AETC Supplement, *Personnel Parachute Program*, 13 March 2023

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.

b. Other Directives and Publications Relevant to the Mishap

(1) ATP 3-18.11, *Special Forces Military Free-Fall Operations*, December 2021, Change 4, 4 May 2023
(2) AETC Syllabus AM-490, *Basic Parachute Training*, October 2021
(3) 98 FTS Lesson Plan AM-490, *Airmanship 490 Basic Parachute Training*, 19 May 2023
(4) 98 FTS AM-490 Student Guide, *Airmanship Basic Freefall Parachuting*, 31 May 2023
(5) 306 FTG Supplement to AFI 11-410 AETC Supplement, *Personnel Parachute Operations*, 24 January 2013

c. Known or Suspected Deviations from Directives or Publications

Not Applicable.

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8 APRIL 2025

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

STATEMENT OF OPINION

PERFORMANCE DESIGNS 300 CANOPY, S/N 021959
UNITED STATES AIR FORCE ACADEMY, COLORADO
31 JULY 2023

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

1. OPINION SUMMARY:

On 31 July 2023, at approximately 1103 hours local time (L), a United States Air Force Academy (USAFA) cadet (MJ1), became incapacitated while in the third free fall jump in the training program and sustained severe injuries when hitting the ground. MJ1 exited the aircraft in an unstable body position. While unintentionally rolling on his back, he pulled the main ripcord and one of his arms entangled in the lines of the parachute. Immediately after the entanglement, MJ1's parachute started to spin at a high rate of speed and more likely than not rendered him incapable of pulling the handle for the backup parachute. MJ1 impacted the ground unable to execute a proper parachute landing fall to minimize landing shock and injury.

The Airmanship 490 (AM-490) training jump occurred at Davis Airfield on USAFA, Colorado Springs, Colorado (CO). MJ1 was using a fully functional Telesis 3.0 Parachute System with a Performance Designs 9-Cell 300 square feet canopy, Serial Number 021959. The mishap aircraft (MA) was a UV-18B, also known as the Twin Otter, tail number 77-0465 operated by the 98th Flying Training Squadron (98 FTS) and owned by the 306th Flying Training Group (306 FTG) located at USAFA. MJ1 recovered from his injuries and returned to USAFA to complete the graduation requirements to commission as an active-duty officer. The estimated value of government property lost is $490.00 to replace the parachute equipment.

CAUSE: I found, by a preponderance of the evidence, that this mishap was caused by MJ1's uncontrollable downward spiral with an entanglement of the parachute inducing stagnant hypoxia and rendering MJ1 unconscious or incapable of pulling the reserve parachute handle prior to impacting the ground at an unsafe speed.

2. SUBSTANTIALLY CONTRIBUTING FACTORS:

I found, by a preponderance of the evidence, six additional contributing factors to the mishap.

a. **MJ1 was not in compliance with medical directives at the time of the mishap jump:** MJ1 should not have participated in the freefall event on 31 July 2023 since he was not wearing required prescription glasses as directed by his medical clearance. The AM-490 Student Guide and the AM-490 brief with the mishap jumpmaster (MJM) should have, but did not prevent MJ1 from stepping to the aircraft without the required prescription glasses. Of note, testimonial evidence

also highlighted AM-490 jumpmasters do not enforce the wear of prescription glasses beyond the AM-490 brief and an additional student did not wear required prescription glasses on the same aircraft as MJ1 during the third freefall jump.

b. **MJ1 pulled the ripcord while in an unstable body position rolling to his back, contributing to MJ1's entanglement with the parachute:** Although the probability of MJ1 entangling with the parachute from pulling the ripcord in an unstable body position is extremely low, an emergency can still occur. Based on expert testimony, approximately 5 of 90 cadets typically execute an unsatisfactory and unsafe pull of the main ripcord on their side (or back) every AM-490 course with approximately 99% of those resulting in a safe and successful freefall parachute event. AM-490 does not have mitigating measures in place to preclude a cadet from pulling the main ripcord on their side (or back) like the Military Free Fall School operated by the U.S. Army Special Operations Command's John F. Kennedy Special Warfare Center and School and the United States Parachute Association Basic Safety Requirements.

c. **MJ1 did not execute a proper parachute landing fall:** MJ1 was unable to execute a parachute landing fall to minimize the impact with the ground as instructed in AM-490 ground training. Evidence suggests MJ1 likely impacted the ground on his back and/or side.

d. **MJ1's previous jumps were not graded in adherance to course training standards:** AM-490 video debrief instructors did not strictly adhere to the AM-490 syllabus course training materials in grading MJ1's first and second jumps. Jumps are evaluated using a Q1 (satisfactory), Q2 (marginal) or Q3 (unsatisfactory) grading system. The AM-490 parachute instructors graded MJ1's first freefall jump as Satisfactory and the second freefall jump as Marginal. However, two United States Air Force expert qualified jumpmasters assigned to the Accident Investigation Board (AIB) graded MJ1's first freefall jump as Marginal instead of Satisfactory and the second freefall jump as Unsatisfactory instead of Marginal based on the AM-490 syllabus course training standards. Through a sampling of various student jumps from AM-490 cadets, the AIB assigned expert jumpmasters highlighted the video debrief grading appears to be more lenient than the AM-490 course training standards most likely due to being desensitized from reviewing hundreds of jumps a year from inexperienced cadets. Had personnel strictly adhered to grading requirements in the AM-490 course training standards, it is more likely than not MJ1 would have received more training than the approximately 5 to 15 minutes retraining he received after his second jump on his exit and freefall positions.

e. **MJ1's ground retraining following his second freefall jump was not sufficient to ensure he met course training standards because it was not graded:** AM-490 ground retraining after MJ1's second freefall jump did not require individual grades to be documented on the approved course training record. The AM-490 training record only requires an acknowledgment of the specific item retrained, optional staff comments, and the instructor's initials, but it did not

involve applying actual grading standards to a cadet's performance during the retraining (i.e. Satisfactory, Marginal, or Unsatisfactory). MJ1's inability to apply the ground retraining accomplished after the second freefall jump in the program was evident through MJ1's actual unsatisfactory freefall and pull position on the mishap jump. AM-490 ground training has regression rules in the syllabus requiring an overall grade of "Unsatisfactory" if a cadet has repeat grades of "Marginal" for the same item from one phase to the next denoting a trend. Other than suspended harness training, the syllabus ground regression rule was unable to be applied to MJ1's ground retraining to ensure he met the course training standards prior to his third freefall jump because instructors are not required to document grades. Of note, AM-490 does not have similar regression rules incorporated into the aerial training section of the syllabus like the ground training section. If the syllabus did have a similar regression rule even with the lenient grading mentioned in the third contributing factor, then MJ1's second freefall jump would likely have been an overall unsatisfactory grade directing further training beyond the directed ground retraining.

f. **MJM was not made aware of MJ1's previous training performance prior to mishap jump:** MJM was not informed of MJ1's training performance from the previous two jumps, because, based on information she received, she believed they were "really good." On the mishap jump, MJM concluded his delay in exiting the aircraft after two separate hand signals to jump was nervous tension expected from students with normal progression. MJM was unaware of MJ1's less than satisfactory grade on the previous jump, or the retraining accomplished prior to the third jump. As a result, MJM was unable to assess the operational risk of allowing MJ1 to exit the aircraft. According to applicable Air Force instructions for the personnel parachute program, jumpmasters are responsible for operational risk management and ensuring all parachutists meet currency, refresher training, and recurring training requirements. According to the Air Force Instruction for the Flying Operations for Personnel Parachute Operations and associated AETC supplement, cadets who complete AM-492, like MJM, can serve as jumpmasters for the USAF for Academy operations. At the time of the mishap, the AM-490 program provided jumpmasters with information on previous cadets with jump refusals but did not provide them with knowledge of AM-490 cadets' previous marginal or unsatisfactory performance, retraining performance, or cadets assigned to the Commander's Awareness Program. Of note, MJ1 was not entered into the Commander's Awareness Program.

3. OTHER CONSIDERATIONS:

Due to the uniqueness of the USAFA program and the complexity of the different operations that occur during AM-490/491/496 programs, 306 FTG guidance is unclear. USAFA parachute operations are outlined in the AETC Supplement to Air Force Instruction 10-3503 (AETC Sup), *Personnel Parachute Program*, 13 March 2023, of which a 306 FTG supplement is being coordinated. Although the AM-490 Program is mentioned in the AFI 10-3503 supplement, there is no clear guidance on whether they are following military freefall (MFF) guidance, United States Parachute Association guidance, or a combination of both. Regarding the malfunction procedures, the AETC Supplement specifies that sustainment training must be conducted within 24 hours prior

to any MFF operation. If USAFA operations are considered MFF operations for AM-490 students, then at a minimum, provisions of Army Techniques Publication (ATP) 3-18.11, *Special Forces Military Free-Fall Operations*, December 2021, Change 4, 4 May 2023 would apply. ATP 3-18.11 mandates that the sustainment training prior to a jump include the jumpmaster briefing, discussion on aircraft specific procedures, exit procedures, emergency procedures, canopy entanglement procedures, and landing procedures. The jumpmaster must ensure all jumpers understand all aspects of the sustained training and the operation. Additionally, the jumpmaster will also observe all jumpers to ensure they are fully involved in practicing all malfunction procedures they could encounter. Despite thorough review and research into applicable regulations, it remains unclear whether these requirements specifically apply to AM-490 or the broader USAFA parachute programs.

CONCLUSION:

I found, by a preponderance of the evidence, that this mishap was caused by MJ1's uncontrollable downward spiral with an entanglement of the parachute inducing stagnant hypoxia and rendering MJ1 unconscious or incapable of pulling the reserve parachute handle prior to impacting the ground at an unsafe speed.

I found, by a preponderance of the evidence, six additional contributing factors to the mishap. They are as follows: MJ1 was not in compliance with medical directives at the time of the mishap jump; MJ1 pulled the ripcord in an unstable body position rolling to his back; MJ1 was unable to execute a proper parachute landing fall; MJ1's previous jumps were not graded adhering to course training standards; MJ1's ground retraining was not graded to ensure he met course training standards; and MJM did not know MJ1's training performance prior to mishap jump.

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8 APRIL 2025

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

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