

UNITED STATES AIR FORCE
AIRCRAFT ACCIDENT INVESTIGATION
BOARD REPORT



F-16C, T/N 88-0496

311th FIGHTER SQUADRON
54th FIGHTER GROUP
HOLLOMAN AIR FORCE BASE, NEW MEXICO



LOCATION: WHITE SANDS MISSILE RANGE, NEW MEXICO

DATE OF ACCIDENT: 31 JANUARY 2017

BOARD PRESIDENT: MAJOR GENERAL PATRICK M. WADE

Conducted IAW Air Force Instruction 51-503

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

**F-16C, T/N 88-0496
WHITE SANDS MISSILE RANGE, NEW MEXICO
31 JANUARY 2017**

On 31 January 2017, at 19:18:31 hours local (L), an F-16C, Tail Number (T/N) 88-0496, fired 155 20mm training projectile bullets on the supporting Joint Terminal Attack Controllers' (JTAC) position at the Red Rio bombing range (located on the White Sands Missile Range), injuring one military member and killing a civilian contractor. The mishap pilot (MP) and mishap instructor pilot (MIP) were assigned to the 311th fighter squadron, Holloman Air Force Base, New Mexico (NM). The MP was enrolled in the F-16 Formal Training Unit program, flying a night, close-air support (CAS) training sortie under the MIP's supervision. After a successful bomb pass and two failed strafing attempts, the MP errantly pointed his aircraft at the observation point and fired his gun. One 20mm TP bullet fragment struck the mishap contractor (MC) in the back of the head. A UH-60 aircrew extracted the MC, provided urgent care, and transported him to Alamogordo, NM. The MC died at the hospital at 21:01 hours L.

The MP was a USAF First Lieutenant, with 86 total flying hours, 60.9 in the F-16. He was flying his first night CAS sortie, wore Night Vision Goggles, and operated the mishap aircraft equipped with a *LITENING Gen4 SE* targeting pod, a 500-pound inert laser-guided bomb, and 210 rounds of 20mm TP. The MIP was a USAF Captain, stationed at Holloman AFB, with 887 total flying hours, 857 F-16 hours and 107 instructor pilot hours. The MIP operated an F-16D configured the same as the MP's jet. The MC was a retired USAF Master Sergeant and former JTAC. He joined the ground element on the OP to demonstrate short-wave infrared technology. The MC was equipped with Level 3 body armor and a Kevlar helmet, but he was not wearing them. The MIP directed the MP to perform an infrared pointer aided strafe on a simulated SA-8 training target site, 900 meters away from the ground element. The MIP never verified the MP saw the intended target or the ground element's location. For an undetermined reason, the MP disregarded his on-board sensor information, aimed at the OP and fired his gun.

The Accident Investigation Board President (AIB BP) found, by the preponderance of evidence, that the cause of the mishap was pilot error. The MP misperceived that the ground element's location was the intended target. The MP misinterpreted his instruments and failed to follow his on-board systems directing him to the proper target.

The AIB BP found, by the preponderance of evidence, the MIP's failed supervision and instruction substantially contributed to the mishap. Specifically, that his failed cross-monitoring of the MP's performance during the MP's fatal strafing attack, his task misprioritization (focusing on coordinating and controlling other aircraft while the MP was performing the strafing attack), and his overconfidence, complacency and overaggressiveness during the mishap sortie substantially contributed to the mishap.

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.

SUMMARY OF FACTS AND STATEMENT OF OPINION
F-16C, T/N 88-0496
31 JANUARY 2017

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ACRONYMS AND ABBREVIATIONS

AB	Afterburner	IAW	In Accordance With
ACMI	Air Combat Maneuvering Instrumentation	IAM	Inertially-Aided Munition
ACLS	Advanced Cardiac Life Support	INS	Inertial Navigation System
AETC	Air Education and Training Command	IP	Initial Point
AF	Air Force	IQT	Initial Qualification Training
AFB	Air Force Base	IR	Infrared
AFE	Aircrew Flight Equipment	ISR	Intelligence Surveillance and Reconnaissance
AFI	Air Force Instruction	JFIRE	The Joint Application of Firepower
AFMAN	Air Force Manual	JT1	JTAC Trainee
AFTO	Air Force Technical Order	JTAC	Joint Terminal Attack Controller
AFRL	Air Force Research Laboratory	JTAC QC	JTAC Qualification Course
AGL	Above Ground Level	KHMN	Holloman Airport Weather Identifier
AIB	Accident Investigation Board	L	Hours Local Time
AIMWTS	Aeromedical Information Management Waiver Tracking System	LGB	Laser Guided Bomb
AMU	Aircraft Maintenance Unit	LST	Laser Spot Track
ASOS	Air Support Operations Squadron	Lt Col	Lieutenant Colonel
BPO/PR	Basic Post-Flight/Pre-Flight Inspection	MA	Mishap Aircraft
CAP	Commander's Awareness Program	MAJCOM	Major Command
CAS	Close Air Support	Maj	Major
Capt	Captain	MC	Mishap Contractor
CC311	311 Fighter Squadron Commander	MEF	Mission Execution Forecast
Col	Colonel	METAR	Meteorological Aviation Report
CP1	Check Point One	MF	Mishap Flight
CPR	Cardiopulmonary Resuscitation	MIP	Mishap Instructor Pilot
CWS	Combined Wingman Syllabus	MJ1	Mishap JTAC
DD Form	Department of Defense Form	MJI1	Mishap JTAC Instructor One
DLO	Desired Learning Objective	MJI2	Mishap JTAC Instructor Two
DO	Director of Operations	MLUX	Millilux
DO311	311 Fighter Squadron Director of Operations	MM or mm	millimeter
DOD or DoD	Department of Defense	MP	Mishap Pilot
DJ1	Dutch JTAC One	MS	Mishap Sortie
DJ2	Dutch JTAC Two	MSL	Mean Sea Level
DJ3	Dutch JTAC Three	MSO	Mishap Student Observer
Dutch	Netherlands Armed Forces	NM	New Mexico
DVR	Digital Video Recorder	NMF	Non-Mishap Flight
EMS	Emergency Medical System	NMF1	Non-Mishap Flight-Lead
EOR	End of Runway	NMF2	Non-Mishap Flight Student
FAC(A)	Forward Air Controller-Airborne	NOTAM	Notice to Airmen
FCC	Flight Commander	NVG	Night Vision Goggle
FG	Fighter Group	NVG LOWAT	NVG High-Angle Strafe Low Altitude
FMS	Foreign Military Sales	OP	Observation Point
FS	Fighter Squadron	Ops Sup	Operations Supervisor
FTU	Formal Training Unit	Ops Tempo	Operations Tempo
FW	Fighter Wing	ORM	Operational Risk Management
GBU	Guided Bomb Unit	PPE	Personal Protective Equipment
GBU-12	Guided Bomb Unit Twelve	PHA	Physical Health Assessment
GLO1	Ground Liaison Officer One	RATD	Radar-Assisted Trail Departure
GLO2	Ground Liaison Officer Two	RCO	Range Computer Operator
HAFB	Holloman Air Force Base	RO	Responsible Officer
HFACS	Human Factors Analysis and Classification Systems	ROA	Range Operations Authority
HUD	Heads-Up Display	RM1	Range Manager One
		RM2	Range Manager Two

S91	Skull 91 Crewmember One	TO	Technical Order
S92	Skull 91 Crewmember Two	TOD	Tech Order Data
S93	Skull 91 Crewmember Three	Top 3	Operations Supervisor
SA-6	Surface-to-Air Missile 6 site	TP	Training Projectile
SA-8	Surface-to-Air Missile 8 site	UH-60	Utility Helicopter - 60
SAM	Surface-to-air Missile	UPT	Undergraduate Pilot Training
SAN	Surface Attack Night	U.S.	United States
SAR	Search and Rescue	USAF	United States Air Force
SIM	Simulator	V1	Vehicle One
SOF	Supervisor of Flying	V2	Vehicle Two
SWIR	Short Wave Infrared	V3	Vehicle Three
TAC	Tactical	WSMR	White Sands Missile Range
TGP	Targeting Pod	Z	Zulu Time
TISL	Target Identification Set, Laser		
T/N	Tail Number		

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

SUMMARY OF FACTS

1. AUTHORITY AND PURPOSE

a. Authority

On 08 February 2017, Major General Mark Brown, Vice Commander of the United States Air Force (USAF) Air Education and Training Command (AETC) convened an accident investigation board to inquire into all facts and circumstances surrounding a fatal mishap that occurred on 31 January 2017, involving an F-16C aircraft, Tail Number (T/N) 88-0496, on the White Sands Missile Range (WSMR), near Holloman Air Force Base (AFB), New Mexico (NM) (Tab Y-2). On 08 February 2017, Brigadier General Patrick M. Wade, Mobilization Assistant to the Commander, United States (U.S.) Air Forces Europe/U.S. Air Forces Africa was appointed to lead this investigation (Tab Y-2). Other USAF personnel appointed to this investigation board included a Legal Advisor (Lieutenant Colonel), Pilot Member (Lieutenant Colonel), Medical Member (Captain), Maintenance Member (Master Sergeant), and a Recorder (Staff Sergeant) (Tab Y-4 to Y-6). The investigation occurred at Holloman AFB, NM, from 16 March 2017 through 12 Sep 2017.

b. Purpose

In accordance with AFI 51-503, *Aerospace and Ground Accident Investigations*, this accident investigation board conducted a legal investigation to inquire into all the facts and circumstances surrounding this Air Force 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 January 2017, at 19:18:49 hours local time (L), a USAF F-16C, T/N 88-0496, fired 155, 20mm, training projectile (TP) rounds on the supporting Joint Terminal Attack Controllers' (JTAC) position located on the observation point (OP) at the Red Rio bombing range (part of WSMR, near Holloman AFB), injuring one military member and fatally injuring a civilian contractor, a retired USAF Master Sergeant and former JTAC (Tabs Q-5 and V-32.6).

The 20mm rounds also damaged two rental vehicles and one government vehicle (Tab S-3). The mishap pilot (MP) was a student pilot enrolled in the F-16 Formal Training Unit (FTU) program and assigned to the 311th Fighter Squadron (311 FS), 54th Fighter Group (54 FG), 56 Fighter Wing (56 FW), Holloman AFB NM (Tab G-2). The MP was flying a night, close air support (CAS), live-fire, training mission under the supervision of the mishap instructor pilot (MIP) in an F-16D (two seat version of the F-16), with a student observer (MSO) in the rear seat (Tabs K-3 and T-19).

The ground element, supporting the live fire CAS training mission, included a mixed party of USAF JTACs, from the 7th Air Support Operations Squadron, and Dutch JTACs, from the Armed Forces of the Netherlands (Dutch) (Tabs R-4, R-28, V-20.3 and V-32.8). The Dutch JTACs were participating pursuant to a Foreign Military Sales (FMS) program, accompanied by a U.S. JTAC liaison from the Idaho Air National Guard, 124th Air Support Operations Squadron (MJ11) (Tabs R-4 and V-32.4). Located with the JTACs, were two Army ground liaison officers (GLO1 and GLO2) and a retired USAF Master Sergeant and former JTAC there in his role as a civilian military contractor representative (MC) (Tabs R-12, V-20.3 and V-32.6).

3. BACKGROUND

a. Air Education and Training Command (AETC)

AETC's primary mission is to recruit, train, and educate Airmen to deliver airpower for America (Tab CC-3). The command includes two numbered air forces, the Air Force Recruiting Service, and the Air University (Tab CC-14). There are also 15 active-duty and seven Reserve wings (Tab CC-14). AETC has more than 28,000 active duty members, approximately 6,700 Air National Guard and Air Force Reserve personnel, 14,000 civilian personnel, and 10,000 contractors assigned (Tab CC-14). The command is responsible for over 1,300 aircraft (Tab CC-14).



b. 56th Fighter Wing (56 FW)

The 56 FW's mission is to train F-35 and F-16 fighter pilots (Tab CC-2). The 56 FW is currently the largest FW in the world and the Air Force's only active-duty F-16 training wing (Tab CC-2). As part of AETC and home to 23 squadrons with both F-35A Lightning II aircraft and F-16s, 56 FW graduates more than 400 F-16 pilots and 300 air control professionals annually (Tab CC-2).



c. 54th Fighter Group (54 FG)

The 54 FG's mission is to train F-16 pilots while deploying mission ready warfighters (Tab CC-3). The 54 FG, a detachment of 56 FW, was activated at Holloman AFB, NM, on 1 March 2014 (Tab CC-3). The 54 FG executes an extensive flying hour program that trains an average of 180 students per year, averaging more than 10,800 sorties and 14,600 hours each fiscal year (Tab CC-3).



d. 311th Fighter Squadron (311 FS)

The 311th Fighter Squadron is part of the 54th Fighter Group at Holloman AFB, NM which is a geographically separated unit under the 56th Fighter Wing at Luke AFB, Arizona (Tab CC-3). It operates the F-16 Fighting Falcon aircraft conducting advanced fighter training (Tab CC-3).



e. 124th Air Support Operations Squadron (124 ASOS)

Part of the Idaho Air National Guard 124th Fighter Wing, located at Gowen Field, Boise, Idaho, the 124th Air Support Operations Squadron's mission is to provide forward air controllers in support of front line Army maneuver units to coordinate and control CAS missions of the Air Force and joint forces in support of the ground battle (Tab CC-4). Air Liaison Officers provide coordination between Army command posts at all levels and Air Force and joint force command centers (Tab CC-4). They also support the needs of the community by providing people and resources for ongoing and emergency services, including disaster relief, and search and rescue (Tab CC-4).



f. 7th Air Support Operations Squadron (7 ASOS)

Located at Fort Bliss, El Paso, Texas, the 7th Air Support Operations Squadron's mission is to provide forward air controllers in support of front line Army maneuver units to coordinate and control CAS missions of the Air Force and joint forces in support of the ground battle (Tab CC-15). Air Liaison Officers provide coordination between Army command posts at all levels and Air Force and joint force command centers (Tab CC-15).

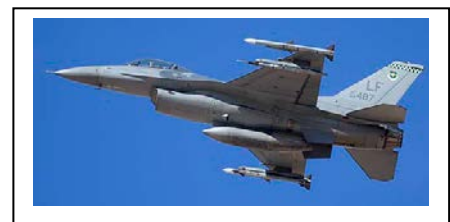


g. Foreign Military Sales (FMS)

The Foreign Military Sales (FMS) program is a form of security assistance authorized by the Arms Export Control Act (AECA), as amended [22 U.S.C. 2751, et. seq.] and a fundamental tool of U.S. foreign policy (Tab CC-10). Under Section 3, of the AECA, the U.S. may sell defense articles and services to foreign countries and international organizations when the President formally finds that to do so will strengthen the security of the U.S. and promote world peace (Tab CC-10). Under FMS, the U.S. Government and a foreign government enter into a government-to-government agreement called a Letter of Offer and Acceptance (Tab CC-10).

h. F-16C Fighting Falcon

The F-16C is a compact, multi-role aircraft (Tab CC-6). It is highly maneuverable and has proven itself in air-to-air combat and air-to-surface-attack (Tab CC-6). Currently, the U.S. and many international partner nations fly the F- 16C (Tab CC-6).



i. Summary of Major Participants

Mishap Pilot (MP): a pilot in the USAF, with the rank of First Lieutenant, assigned to the 311 FS FTU, enrolled in the F-16 basic course (B course) (Tab G-2). The B course is a six-month training course where first-time fighter pilots learn to fly and employ the F-16 (Tabs BB-15 and BB-48).

Mishap Instructor Pilot (MIP): a pilot in the USAF, with the rank of Captain, assigned as an instructor pilot in the 311 FS (Tab G-17). He is also a qualified Forward Air Controller (Airborne) (FAC(A)) (Tab G-16). This is a special qualification that allows the terminal attack control of aircraft orchestrating CAS attacks (Tab BB-48).

Non-Mishap Instructor Pilot (NMF1): a pilot in the USAF, with the rank of Major, assigned as an instructor pilot in the 311 FS (Tab V-3.1). Instructor pilot for the non-mishap two-ship flight (*Bolt Flight*) participating in the 31 January 2017 night training mission (Tab V-3.2).

Non-Mishap Student Pilot (NMF2): a pilot in the USAF, with the rank of First Lieutenant, assigned to the 311 FS Formal Training Unit (FTU), enrolled in the F-16 B course (Tab V-13.2-13.3). The *Bolt Flight* student pilot participating in the 31 January 2017 night training mission (Tab V-13.2).

Mishap Instructor JTAC one (MJ11): a Joint Terminal Attack Controller in the Idaho Air National Guard, with the rank of Technical Sergeant, assigned to the 124 ASOS (Tab R-4). He is the liaison officer for Dutch JTACs participating in the FMS program for training (Tab R-4).

Mishap Instructor JTAC two (MJ12): a Joint Terminal Attack Controller in the USAF, with the rank of Technical Sergeant, assigned to the 7 ASOS (Tab V-20.2). He coordinated with MJ11 for members of the 7th ASOS to participate in the training on 31 January 2017, and provided instruction to the Mishap Joint Attack Controller (MJ1) (Tab R-28).

Mishap JTAC one (MJ1): a student Joint Terminal Attack Controller in the USAF, with the rank of Major, assigned to the 7 ASOS (Tab V-23.2). MJ1 was participating in the 31 January 2017 training to complete initial JTAC qualification training (IQT) prior to attending the formal JTAC Qualification Course (JTAC QC) (Tab V-23.2).

Mishap Contractor (MC): a civilian military contractor representative for “Force Protection Hand Held SWIR Cameras – ISR Systems” (Tab V-27.10). The MC was a retired USAF military member, previously qualified as a JTAC (Tab V-32.6). The MC coordinated with members of the Netherlands Armed Forces to accompany them during the 31 January 2017 training, so the MC could demonstrate his company’s SWIR camera (Tabs R-12 and V-27.12 to V-27.13).

4. SEQUENCE OF EVENTS

a. Mission

As part of the F-16 pilot training “B course”, the MP flew a “SAN-3” mission the night of 31 January 2017, in accordance with the prescribed syllabus, *AETC Syllabus F16C0B00PL* (Tabs T-19 and BB-14). SAN-3 is a student pilot’s first sortie employing the F-16 in a CAS scenario at night (Tab BB-17). To graduate F-16 flight training, each B course student must complete a required number of training modules, each module having specified training objectives and missions (Tab BB-17). The Surface Attack Night (SAN) is one such module, requiring multiple flying missions (also called sorties) to complete (Tab BB-17). The MP previously flew the SAN-2 portion of the SAN module, on 27 January 2017, and had completed a CAS training mission, CAS-1, on 14 December 2016, both prerequisites for the MP to fly the SAN-3 (Night Close Air Support) mission (Tabs T-3, T-18, T-19 and BB-20).

On the night of the mishap, the planned SAN-3 mission included two student pilots and two instructor pilots, making up two, two-ship flights, of F-16s (Tabs K-3 and T-19). The MP flew as a student wingman, in an F-16C with the call sign, *Biggie 42* (Tabs K-3, T-19 and AA-30). The MIP flew with the call sign *Biggie 41*, in an F-16D, with a student observer in the second seat (Tab K-3). The mishap flight (MF) included the MP and MIP's F-16s, flying as one entity, under the direction of the MIP (Tab K-3). The non-mishap flight (NMF) consisted of the second set of F-16s (Tab K-3). The NMF flight-lead (NMF1) was the instructor, flying with the call sign, *Bolt 31* (Tab K-3). The NMF student (NMF2) flew with the call sign, *Bolt 32* (Tab K-3). The mission plan included the MIP acting in the dual roles of the MP's instructor pilot, and as FAC(A) (a FAC(A) is an airborne qualified aviation officer who exercises control of aircraft engaged in CAS to ground troops) for both the MF and NMF (Tabs K-3, R-5, R-29, T-11 and BB-48). The SAN-3 syllabus requires either a FAC(A) or a JTAC to complete the sortie, but does not require both (Tab BB-20). The Mishap Sortie (MS) did not require the MIP to act as a FAC(A), as qualified JTACs were already included (Tab R-5).

Supporting the SAN-3 night CAS mission from the ground, were a party of JTACs, including mishap JTAC instructor one (MJ11) with the call sign, *Vandal 01* and a student JTAC (MJ1) with the call sign, *Hustler 01*, with mishap JTAC instructor two (MJ12) acting as MJ1's instructor (Tab R-4 to R-15). Participation in the CAS mission would enable MJ11 to receive terminal attack control currency training (to maintain certification as a JTAC, qualified JTACs must control aircraft during a live CAS mission on a regular basis), while MJ1 was completing initial JTAC IQT prior to attending the formal JTAC QC (Tab R-5 and R-28).

b. Planning

Aircrew

On 31 January 2017, at approximately 11:00:00 hours L, the MP and MIP arrived at the 311 FS (Tab AA-30). The two student pilots, the MP and NMF2, prepared and printed mission materials, after coordinating with their respective instructor pilots, MIP and NMF1 (Tab V-13.2-V-13.3). The MIP then pre-briefed both the MP and NMF2 on The Joint Application of Firepower (JFIRE) terms, definitions, and night operations specifics, in preparation for the mission (Tab AA-27). The previous day, 30 January 2017, the MIP had coordinated with the ground element lead, MJ11, regarding the mission scenario (Tab R-5). The MIP had used the same scripted training scenario on that previous night with another student pilot (Tab V-15.2 to 15.4), which MJ11 and some of the Dutch JTACs also supported (Tabs R-5 and V-32.2).

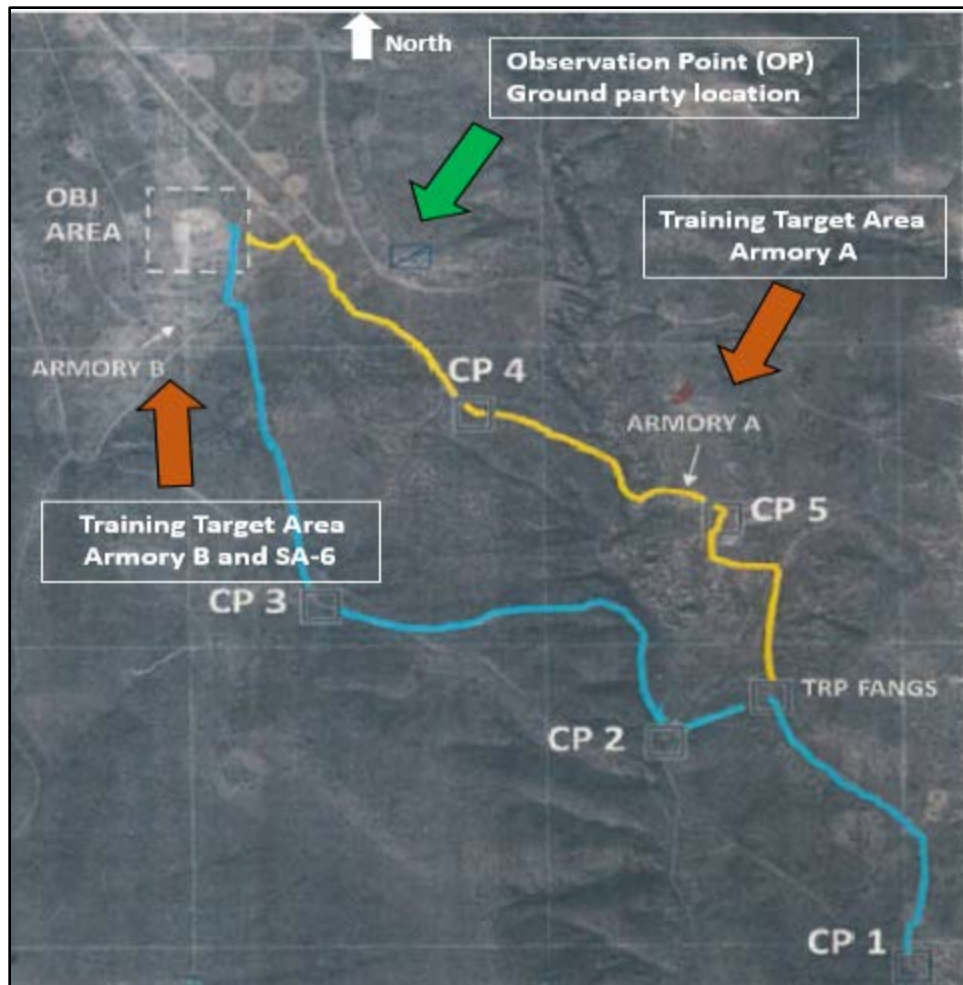


Figure 1: Training target locations & Ground Party OP (Tab Z-9)

The MP, MIP and MSO filled out the 54 FG Risk Management Tool, prior to attending the squadron mass brief (Tab AA-2). The Risk Management Tool is a form used for operational risk management (ORM), utilizing a checklist of factors to identify risks associated with the planned mission, including mission, weather/environment, and human factors (Tab AA-2). All three pilots scored as moderate on the ORM risk scale (on a scale of low, moderate, high and severe) and did not require higher than normal approval level to fly (high and severe risk levels require squadron or group commander approval to fly, respectively) (Tab AA-2).

At approximately 15:45:00 hours L, the 311 FS Director of Operations (DO311) conducted the mass briefing (Tab V-30.2 and V-30.18). A mass briefing is a formal gathering by squadron leadership for all pilots flying during a specified timeframe (Tab BB-46). A mass briefing discussed such items as the mission execution weather forecast (MEF) and any Notice to Airmen (NOTAM) of potential flying hazards for the airspace near Holloman AFB (Tab V-30.2). The pilots would be using night vision goggles during the mission, and the illumination level for NVG use was forecasted as “high” (Tabs W-2 and BB-46).

The MIP, who wrote that night's training scenario, briefed the mission to the other three pilots, at approximately 15:55:00 hours L (Tab V-3.2). The MSO was a late addition to the mission, due to schedule changes, and did not attend the mission brief (Tabs V-3.3 and V-14.2). In the mission brief, the MIP covered standard flight operations, night concerns, mission scenario, weapons employment and contingencies (Tab AA-27).

The MIP's plan was to execute the mission as two flights of two-ships (*Biggie 41/42 and Bolt 31/32*) with the MIP acting as the MP's instructor and the FAC(A) for both flights (Tab V-3.10, V13.3 and V-13.6). To get both student pilots qualified to do NVG High Angle Strafe down to a lower altitude, they were required to complete NVG Low Altitude (NVG LOWAT) qualification maneuvers (Tab BB-20). The MIP developed a complex flying plan involving handing off the student pilots back and forth between the instructors while inflight, since NMF1 was not certified to perform NVG LOWAT qualification (Tabs V-3.10 and V-3.12). Overall, NMF1 described the MIP's mission plan as very complex, especially for students, and not typical for night CAS (Tab V-3.6 to V-3.7). While complex, the AIB did not find any evidence that the mission plan was unauthorized (Tab V-11.3).

Following the MIP's mission brief, NMF1 and NMF2 went to a separate briefing room and discussed *Bolt flight* specifics (expected formations, contracts, and other administrative procedures) for approximately 5 minutes (Tab V-13.6).

Ground Element

Pursuant to the FMS program, the Dutch receive JTAC training opportunities in the U.S. (Tabs V-32.4 and CC-10). The MJ11, a member of the Idaho National Guard's 124th ASOS, is a qualified JTAC who serves as the U.S. liaison for the Dutch JTAC training and coordinates venues and training opportunities in the U.S. (Tab V-32.4). Some months prior, MJ11 had coordinated with the Holloman Range Office and GLO1 to conduct a Dutch JTAC training event on WSMR (Tab V-32.4 to V-32.5).

The MC was a military contractor representative for "Force Protection Hand Held SWIR Cameras – ISR Systems" (Tabs R-51 and V-27.10). The lead Dutch JTAC (DJ3) was familiar with the MC from meeting him at previous multinational training events (Tab V-27.3). On 18 January 2017, the MC reached out by e-mail to the Dutch forces inquiring if they were traveling to the U.S. soon for JTAC training (Tab V-27.10). DJ3 informally arranged to meet up with the MC the following week in Alamogordo, New Mexico (Tabs V-27.13 to V-27.14). There was no set timeline for when the MC would meet up with the Dutch JTACs, but DJ3 noted his preference that the MC try and be at WSMR when DJ3 would also be at WSMR, during the second week of training (Tab V-27.13).

The Dutch JTACs traveled to Alamogordo, NM, in two groups; the first group arrived on or about 23 January 2017 (Tab V-27.13, V-33.1 to V-33.2). MJ11 met the Dutch in Alamogordo and the next day, 24 January 2017, he and the first group of Dutch JTACs received a Holloman Ranges JTAC briefing from one of the range managers (RM2) (Tab BB-6 to BB-7). The second Dutch group arrived the following Sunday, 29 January 2017 (Tabs R-51 and V-27.7) At some point during the first week, at the hotel, the MC introduced himself to MJ11, explaining to MJ11 that he

was a retired JTAC and an “old head” (experienced JTAC) in the career field (Tab V-32.6). MJI1 testified that this was the first time he had met the MC (Tab V-32.6).

On 30 January 2017, MJI1 took the second set of Dutch JTACs, including DJ1, DJ2, DJ3, and the MC (who had asked MJI1 to come along), for a Holloman Ranges briefing, held at the 49th Operations Support Squadron Range Office, Holloman AFB (Tabs R-51 and V-32.8). RM2 gave the range brief specifically for personnel who were JTAC-qualified (Tabs R-51 and V-32.8). RM2 noted that the projection system was not working in the Range Conference Room for either Dutch JTAC range briefings; so instead of giving the standard briefing RM2 gave the briefing off some printed slides (Tabs R-51 and V-38.7). According to RM2 and his supervisor (RM1), there is a separate brief for non-JTAC personnel prior to going on the range (Tab R-47 and R-51). Additionally, RM1 and RM2 testified that local policy dictates non-JTAC personnel must have an approved waiver from the Range Operations Authority (ROA) prior to going on the range (Tabs R-47, R-51, V-38.3, and V-38.10). However, RM2 testified that this waiver policy was not in the local Range instruction or other formal guidance; range personnel were in the process of updating the instruction to include the ROA waiver requirement (Tab R-51).

The MC signed the JTAC briefing form along with the Dutch JTACs (Tabs R-51 and BB-7). The RM2 explained that he used the same briefing form, dated 24 January 2017, for both groups’ signatures because he wanted to keep all the Dutch JTACs signatures together on one (Tab V-38.4 to V-38.5). RM2 was familiar with MC from prior mutual military service (both were JTACs) and did not think it odd for the MC to participate in the JTAC briefing, but the RM2 was unaware at the time that the MC had also signed the briefing form (Tab R-52). Even though the MC sat through the entire briefing, RM2 testified that he did not know or suspect that the MC was planning to go with the Dutch JTACs onto the range (Tabs R-51 and V-38.13). RM2 noted that if he had known the MC intended to go out on the range, he would have not allowed the MC to enter the range (Tab R-4, R-41 and R-58). MJI1 described the range briefings as short; that RM2 began by noting everyone receiving the brief were JTACs and already familiar with training ranges and that RM2 superficially covered things like local wildlife and provided warnings against picking up unexploded ordnance (Tab V-32.8). MJI1 testified that there was no discussion during the range brief about who was, or was not, allowed on the range (Tab V-32.8). MJI1 further testified that it was not clear to him from RM2’s range brief that local policy did not allow the MC on Red Rio Range (Tab V-32.8).

MJI1 spent most of the morning of 31 January 2017 completing range entry requirements with the WSMR security office (Tabs R-4 and V-32.3). Once MJI1 completed the WSMR security requirements, he was eligible to escort other personnel onto the range (Tabs R-4 and V-20.2). The 7th Air Support Operations Squadron (7 ASOS), stationed at Fort Bliss, El Paso, Texas (about 1:30 hours south of Holloman AFB), had planned to do JTAC training on 30 January 2017 with the German Airforce (GAF) stationed at Holloman AFB, but the GAF had cancelled (Tab R-27). Because MJI2 knew that the 311 FS were doing CAS missions all week, MJI2 called MJI1 and asked if they could join with MJI1’s Dutch JTACs for training (Tab R-27 to R-28). MJI1 agreed (Tab R-28).

The afternoon of 31 January 2017, MJI1, three Dutch JTACs (DJ1, DJ2, DJ3) and the MC left from their hotel for the Red Rio Range (Tab V-25.2). The MC rode with the Dutch JTACs in their

rented Chevrolet Tahoe (V2) (Tab V-8.5 and V-27.4). MJI1 had invited the locally stationed Army ground liaison officers (GLO1 and GLO2) to go to the range with the JTACs to observe training that night, in recognition of their efforts in helping to coordinate the training for the Dutch (Tab R-4). MJI1 met GLO1 and GLO2 at the hotel, and they rode with MJI1 in his rented Toyota 4Runner (V1) to Red Rio Range (Tab V-5.2 and V-25.2). The two vehicles rendezvoused at the range gate where they also met up with members of the 7th ASOS (MJ1, MJ2 and JT1), at approximately 17:17:00 hours L (Tab V-25.2). The 7th ASOS members traveled in a government, Ford Econoline, passenger van (V3) (Tab V-25.2 to V-25.3). At 17:20:00 hours L, Range Control (call sign Cherokee) cleared all three vehicles, via radio, to enter the range; there were no Range Control personnel posted at the gate (Tabs V-35.2 and EE-4). The ground element arrived at the Red Rio OP at approximately 17:40:00 hours L and prepared for the mission (Tabs R-5, R-28 and EE-4). Evidence showed that MJI1, MJ2, MJ1, GLO1, GLO2, DJ1, DJ2, and DJ3 put on some level of personnel protective equipment (PPE) prior to the start of the mission (Tabs R-12, R-35, V-5.14 and V-20.7). The MC had brought protective gear with him to the range, which included Level 3 body armor and a Kevlar helmet; however, the AIB found no evidence that he ever put on his armor or helmet (Tabs R-12, R-35, V-5.15 and V-20.7).

Using the aircrew provided scenario, the ground elements discussed the night's training plan so they could meet their desired training objectives (Tab R-5). The plan was for MJI1 (he needed to maintain his JTAC currency to remain qualified) to control the F-16s for the first two target training events of the mission, providing terminal attack control (terminal attack control means the authority to clear the attacking aircraft to engage a target) (Tab R-5 and R-28). MJI1 would then pass control to MJ1 so MJ1 could complete his JTAC IQT, under the supervision of MJ2 (Tab R-6 and R-28 to R-29). Following two or three terminal attack controls by MJ1, MJ1 would then pass control to one of the Dutch JTACs, DJ1, until the end of the mission (Tab R-28).

c. Preflight

At 17:00:00 hours L, the four pilots met at the 311 FS operations desk for the Operations Supervisor's (known as "Top 3") "step brief" (Tab V-30.2). DO311 was the Top 3 that night, and provided the step brief, which included the status of the airfield and runways, aircraft assignments, spare aircraft procedures (if a pilot's jet failed preflight, the pilot would move to another aircraft), bird avoidance safety hazards, and the fire danger conditions for the scheduled ranges (Tabs V-30.2 and AA-22 to AA-25). The Top 3 also reviewed the pilot's respective ORM risk sheets and concurred with the risk assessments (Tabs V-30.5 to V-30.7 and AA-2).

At approximately 17:15:00 hours L, each pilot walked to their assigned aircraft (Tab AA-27). The MIP and MP's aircraft were configured with two external fuel tanks, a *LITENING Gen4 SE* targeting pod (TGP), one inert guided bomb unit-12 (GBU-12), and 210 rounds of 20mm TP (Tab D-3 and D-9). After starting and performing ground operations, the mishap flight took off from Holloman AFB at 18:08:22 hours L (Tab BB-50).

d. Summary of Accident

Flight to Red Rio Range

At 18:08:22 hours L, the MIP's F-16 departed Holloman AFB (Tab BB-50). The MP delayed 20 seconds on the runway and then took-off, following the MIP (Tab BB-50). Following initial gravitational force exercise and NVG confidence maneuvers, the MF then flew their aircraft north to the Red Rio Range and checked in with *Vandal 01* (JTAC MJ11) who was located on the OP, at 18:21:20 hours L, using the primary range radio frequency (Tabs BB-48 and BB-50).



Figure 2: Joint Use Airspace and Working Areas (Drawing not to scale) (Tab Z-10).

Attack on “Armory A” and “Armory B”

As part of the initial communications, the MIP relayed to MJ11 relevant data, including the amount and type of ordnance the MF was carrying (both simulated and actual), their TGP laser codes, and that the MIP was “FAC(A)-capable” (Tab BB-48 and BB-50). At 18:23:00 hours L, MJ11 passed a situational update to the MF that the actual ground element was “currently established at the OP; the notional ground element (simulated friendly forces) is at contact point 1 (CP1)” (Figure 1) (Tabs Z-9 and BB-50). At 18:24:03 hours L, the MIP correctly read-back the target coordinates and elevation for the first two pre-planned “9-line” targets Armory A and B (a 9-line is a military standard format to quantify applicable data for a prospective target) which were actual shipping

containers (Figure 3) to MJI1 (Tabs Z-11 and BB-51). At 18:25:18 hours L, MJI1 directed the MIP in MIP's FAC(A) role to brief and manage the additional aircraft, NMF, arriving in the mission airspace (Tab BB-50 to BB-51).

TGT	Armory A	Armory B	
1. IP	NY	WA	Initial Point (IP)
2. HDG	195	150	IP to target heading (degrees magnetic)
3. DIST	9.9	10.0	IP to target distance (nautical miles)
4. ELEV	5850'	5950'	Target elevation (feet)
5. TGT DESC	2 Bldgs along road	BLDG 201 and any vehicles parked at it	Target Description
6. TGT LOC	13S CT 8741 3346	13S CT 8600 3407	Target location (military grid reference system)
7. MARK	None	None	Target identifying mark
8. FRND POSIT	1000M NW	800M NE	Location of nearest friendlies
9. EGRS	NY	WA	Aircraft egress "to" IP
RMKS AND RESTR	Remain in Block TOT: <u>175</u> FAH 210+15	Remain in Block TOT: <u>175</u> FAH 230+15	Remarks and restrictions

Figure 3: CAS 9-Line for Armory A and Armory B (Tab Z-11)

At 18:29:32 hours L, MJI1 used a handheld infrared (IR) pointer to “sparkle” the first target and directed the MIP to “match sparkle” (illuminate the same location) with his aircraft’s TGP IR pointer (Tab BB-49 and BB-51). Both IR markers are viewable through NVGs, so by matching the IR markers it allowed both the ground based MJI1 and the airborne MIP to confirm that they were looking at the same intended target (Tab BB-49). The MIP and MP then proceeded to the initial point (IP) prior to conducting the first attack (Tab BB-51). The first attack consisted of the MIP employing a simulated Guided Bomb Unit Twelve (GBU-12) Laser Guided Bomb (LGB) while the MP employed an actual inert GBU-12 on training target Armory A (Tabs R-5 and BB-51). MJI1 provided terminal control for the attack and cleared the MIP to “continue dry” (to

“continue dry” means the attacking aircraft does not release weapons) since he was simulating a weapons drop and cleared the MP “hot” (“hot” means the aircraft is free to release weapons) to release his actual inert GBU-12 (Tabs R-6, BB-49 and BB-51). At 18:36:38 hours L, the MJ11 confirmed “good effects” (good effects means the bomb effectively destroyed the target) after observing the MP’s GBU-12 hit Armory A (Tab BB-49 and BB-51). The MIP immediately conducted another simulated attack on training target Armory B with a simulated GBU-38 Inertially Aided Munition (IAM) after receiving another “continue dry” call from the MJ11 (Tabs R-5, BB-49 and BB-51).

Attack on “SA-6” (Simulated Surface-to-Air Missile Site)

At 18:39:25 hours L, as part of the scripted scenario, the MJ11 transmitted a simulated enemy surface-to-air missile (SAM) launch aimed at the MP’s aircraft, to give the MP threat reaction training (Tab BB-51). After the MP completed threat avoidance maneuvers, the MIP directed the MP to fly his F-16 to initial point (IP) “Washington” while the MIP flew to, IP “New York,” to hold for the next attack (Tabs R-7 and BB-51). At 18:40:10 hours L, MJ11 then passed terminal attack control to the next JTAC, *Hustler 01* (MJ1), for the next portion of the training scenario (Tabs R-6 and BB-51).

At 18:40:27 hours L, MJ1 transmitted 9-line data for training target “SA-6” (a mockup of a surface-to-air missile 6 site) (Figure 4) to the MF (Tabs R-29 and BB-51). The MIP correctly read-back the coordinates to MJ1 and the MIP proceeded to look for the target with his TGP (Tab BB-49 and BB-51). At 18:50:18 hours L, the MIP called “capture” (meaning he found the target with his TGP) and confirmed the target description with MJ1 (Tabs R-29 and BB-51). At 18:52:13 hours L, the MP described the same target area to the MIP and confirmed he was backing up MIP’s attack (Tab BB-51). The MIP proceeded to drop an inert GBU-12 on the SA-6 (Tab BB-52). At 18:53:38 hours L, MJ1 transmitted “good effects” on the radio (Tab BB-52). The MF then established an overhead orbit near the target that they just attacked (Tab BB-52).

SA-6	SA-8
(BY 1) NY / (RR 1) WA	(BY 2)
(BY) 200 / (RR) 150	195
(BY) 10.1 / (RR) 10.0	10.0
5230'	5090'
SA-6	SA-8
13S CT 8656 3350	13S CT 8739 3387 87326 47875
JTAC Laser 1511' 12	
800M N	800M NW (Eagles @ CP 1)
(BY) NY / (RR) WA	NY
GBU-12 Each FL Remain in Block LTL: 200 TOT: _____	FAH 200 CW 230 PTL 200 Expect separate clearance from BY 1

Figure 4: 9-line SA-6 and SA-8 (Tab Z-12)

First Approach to “SA-8” (Simulated Armored Personnel Carrier)

At 18:54:24 hours L, MJ1 transmitted 9-line data for training target “SA-8” (a mockup using an actual defunct armored personnel carrier training target) to the MF (Figure 4) (Tab BB-49 and BB-52). Figure 5 shows the distance between the friendly OP and the SA-8 training target was approximately 897 meters (Tab S-9). After the MIP acknowledged and read back the coordinates to MJ1, the MIP confirmed with MJ1 that he was “tally target,” (which meant he was able to see the intended target through his NVGs) (Tabs R-29 and BB-52). At 18:57:15 hours L, the MIP requested to use “high-angle” strafe (an aircraft dive angle of 25 degrees, nose low, plus or minus 5 degrees) to attack the SA-8 target (Tabs R-29, V-21.3 and BB-52). The 9-line for the SA-8 delineated a final attack heading between 200 degrees magnetic, clockwise, to 230 degrees magnetic (Figure 4) (Tabs Z-12). At 18:58:00 hours L, the MIP queried MJ1 if the reciprocal heading of 020 – 050 degrees magnetic was approved (meaning to come from the opposite direction, with a final attack heading between 020 and 050 degrees, flying roughly northeast) (Tab BB-52). At 18:58:13 hours L, MJ1 approved the request and directed the MF to keep their attack “high-angle” (Tabs R-29 and BB-49). At 18:58:32 hours L, the MIP told the MP to fly around to the left and make a high-angle strafe pass, but incorrectly told the MP to keep his final attack heading 215 degrees magnetic, plus or minus 15 degrees or 350 degree magnetic, plus or minus 15 degrees (Tab BB-52). At 18:59:00 hours L, the MP transmitted that he was “capture target” (Tabs N-4 and BB-52). At 18:59:11 hours L, MJ1 transmitted he was “strobing on the observation

point” (MJ1 was marking his location with an IR flashing beacon mounted on his helmet) (Tabs V-14.4, V-23.3, V-23.4, V-23.7 and BB-52). At 18:59:34 hours L, the MIP responded, “Biggie is visual friendlies” (Tabs V-20.6 and BB-52). The MP never stated or confirmed that he too was “visual friendlies” (Tab BB-52).



Figure 5: Overhead view of distance between the OP and the SA-8 training target (Tab S-9)

At about this same time, NMF1 checked-in with the MIP as the FAC(A), *Bolt flight* (NMF) having arrived in the airspace to join the training scenario (Tabs AA-27 and BB-52). The MIP instructed the NMF to proceed to IP “Washington,” north of the SA-8 training target area (Figure 2) (Tabs V-13.7, Z-10 and BB-52). At 19:04:42 hours L, the MIP instructed the MP to position his targeting pod on the notional ground element, at contact point 3, and scan from there to the objective area (Figure 1) (Tabs Z-9 and BB-52). At 19:05:18 hours L, the MIP requested terminal attack control for *Bolt Flight’s* attack on the SA-8 target; MJ1 approved this request (Tabs R-7 and BB-52). The MIP then transmitted “Biggie has control, SA-8, 9-line” at 19:05:22 hours L (Tabs R-7, BB-52 and DD-77).

At this time, the MP was not looking at the SA-8 target area (Tab BB-52). The MIP requested MJ1 to take terminal attack control of the MP for a high-angle strafe attack on the SA-8 training target (Tabs BB-53 and DD-77). At 19:06:45 hours L, MJ1 approved the MIP’s request (Tabs R-29 and BB-53). The MP’s Digital Video Recorder (DVR) shows that at this same time, the MP had moved his TGP sensor and tracked the friendly OP (Tab BB-53). The MP called “capture target” at 19:07:20 hours L, with no description of what he was actually seeing in his TGP or through his NVGs (Tabs N-2 and BB-51). Figure 6 shows that the MP’s TGP sensor was tracking on the friendly OP (Tab Z-6).

Before the MP could begin his strafing procedure, the MIP told the MP to “abort” his attack, at 19:08:00 hours L, to allow the NMF to attempt a bombing run on the SA-8 training target with

their GBU-12 inert bombs (Tab L-3). At 19:08:15 hours L, the MP reset his TGP by pressing “CZ” (Cursor Zero) on the TGP multifunction display (Figure 6) (Tab BB-47 and BB-53). This action moved the MP’s sensors and steering data back to the intended SA-8 training target’s coordinates, and away from the JTAC’s position at the OP (Tab BB-53).



Figure 6: MP's targeting pod sensor on the friendly OP at 19:07:20 hours L (Tab Z-6)

At 19:08:00 hours L, the MIP then provided terminal attack control for the NMF to drop their inert GBU-12s, but neither aircraft dropped their bombs (Tabs BB-53 and V-13.8).

At 19:08:09 hours L, the MIP told the MP to setup for his attack so he could stop delaying (Tab BB-53). The MIP then instructed *Bolt Flight* to fly back to the north (Tab BB-53). The MIP directed MJ1 that MJ1 had control of the MP for a high-angle strafe attack on the SA-8 training target, which MJ1 acknowledged at 19:10:30 hours L (Tabs N-4 R-29 and BB-53). At 19:10:40 hours L, the MP transmitted “2 is ready, capture target,” relaying that he was ready to conduct the strafe attack, and that his targeting data was pointing to the correct target (Tabs N-4, BB-49 and BB-53). At this point, a review of the MP’s DVR shows that his TGP sensor was correctly looking at the SA-8 training target (Tabs Z-6 and BB-53).

At 19:10:50 hours L, the MP called “Biggie 2 is in, 035” (meaning, the MP is commencing a high-angle strafe attack on a final heading of 035 degrees magnetic) (Tabs N-4, Z-14 and BB-53). The AIB’s review of the DVR showed the MP did not follow his steering information, which was properly guiding the MP to the SA-8 training target (Tab BB-53). Instead, he rolled out on a final heading of 019 degrees magnetic, pointing at the friendlies position on the OP, and squeezed the trigger at 19:11:13 hours L (Figures 7 and 8) (Tab BB-53). The MP’s aircraft parameters were 2,790 feet above ground level with 408 knots (469.52 mph) indicated airspeed (Figure 7) (Tab BB-53).

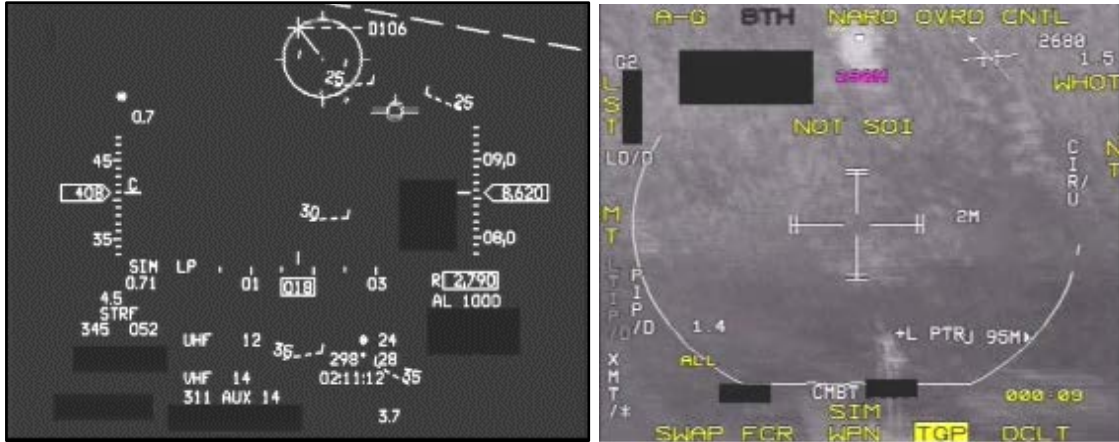


Figure 7: MP's heads up display & targeting pod sensor /First strafe attempt at 19:11:12 hours L (Tab Z-21 and Z-22)

Because the MP had his master armament switch in “SIM” (simulation mode), the gun did not fire (Tab BB-53). Right after he realized the gun was in SIM, the MP, at 19:11:22 hours L, moved the master armament switch to “ARM,” enabling the trigger to fire the gun (Tabs N-4 and BB-54). The internal cockpit voice recorder (also called a hot mic) captured the MP expressing frustration over the master armament switching error, but the cockpit recording provides no evidence that the MP was aware that he had nearly fired upon the friendly's position (Tab N-4).

Through this first high-angle strafe attack, the MIP was flying at approximately 15,000 feet in a right hand turn, orbiting over the SA-8 training target, between 3.5 and 4.5 nautical miles away from the MP, (Figure 8) (Tab Z-14). The MIP was marking the SA-8 for the MP by “sparkling and lasing” the training target (the MIP used both his TGP's IR pointer and laser to designate the target) (Tab BB-53). The IR pointer is visible through NVGs and the MP had synchronized his TGP sensor to pick-up the MIP's laser designator (the laser is not visible to the human eye, even with NVGs) (Tab BB-47). For this strafe attempt, the MP's aircraft steering data pointed at the correct target (SA-8 training target) (Tab BB-53).

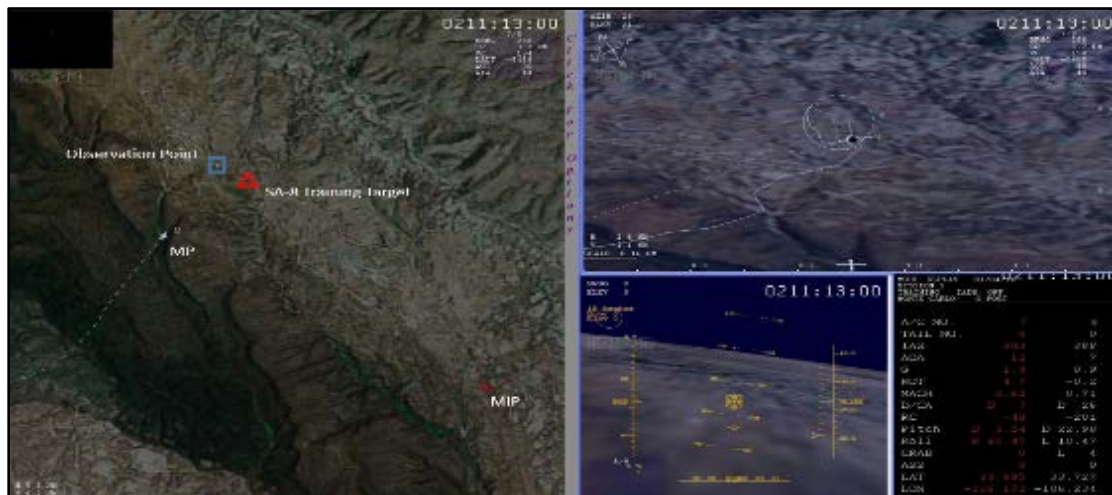


Figure 8: Digital reconstruction of MP's first strafe pass at 19:11:13 hours L (Tab Z-14)

After the MP had recovered, the MIP directed the MP over the primary radio to setup for an immediate re-attack, which MJ1 also heard and approved, since MJ1 still had terminal control of the MP (Tabs N-4, R-29 and BB-53). Neither the MIP nor MJ1 verbalized any recognition or warning to the MP that the MP had been pointing at the OP and not the SA-8 training target when he attempted to fire his gun (Tab N-4). The MIP's only feedback was to remind the MP to make sure to check his master arming switch (Tab N-4).

At 19:13:25 hours L, the MP made his second high-angle strafe attack attempt and called "in, heading 220" (Tabs BB-54). MJ1 cleared the MP "hot" at 19:13:27 hours L while the MIP again "sparkled" the target with his TGP's IR pointer (Tabs BB-54). The MP rolled out on an aircraft heading of 228 degrees magnetic, 26 degrees nose down, 2,610 feet above ground level with 380 knots indicated airspeed (Figure 9) (Tabs Z-15 and BB-54). The MP's heads-up-display video (Figure 10) showed a steer point "diamond" (Inertial Navigation System data) which correlated to the SA-8 training target (Tabs Z-17 and BB-54).

On the second high-angle strafe pass, the MP flew in accordance with his aircraft's steering data and pointed the aircraft correctly at the SA-8 training target (Tabs Z-15 and BB-54). However, the MP aborted the attack and did not squeeze the trigger (Tab BB-54). The MIP subsequently queried the MP why he did not open fire during the pass and the MP responded over the intra-flight radio (heard only between the MIP and the MP) that "the sparkle just looked different so I did not want to shoot, I wasn't uhh, it wasn't as circular as I thought I saw, it looked like a light maybe on top of a building, I was wrong" (Tabs N-5 to N-6 and BB-54). The MIP did not respond to the MP's explanation or provide any cross monitoring to ensure his student pilot was on the correct target (Tabs N-6 and BB-54). When MJ1 asked over the primary radio for the reason the MP did not fire, the MIP, and not the MP, responded that "*Biggy 2*, he's, yeah he is going to setup for an attack, he is going to hold south while *Bolt* attacks" (Tabs N-6 and BB-54). MJ1 and the other ground element members, who were also monitoring the primary radio, were never told that the MP thought he saw something that looked like a light on a building (Tabs N-6 and R-6).

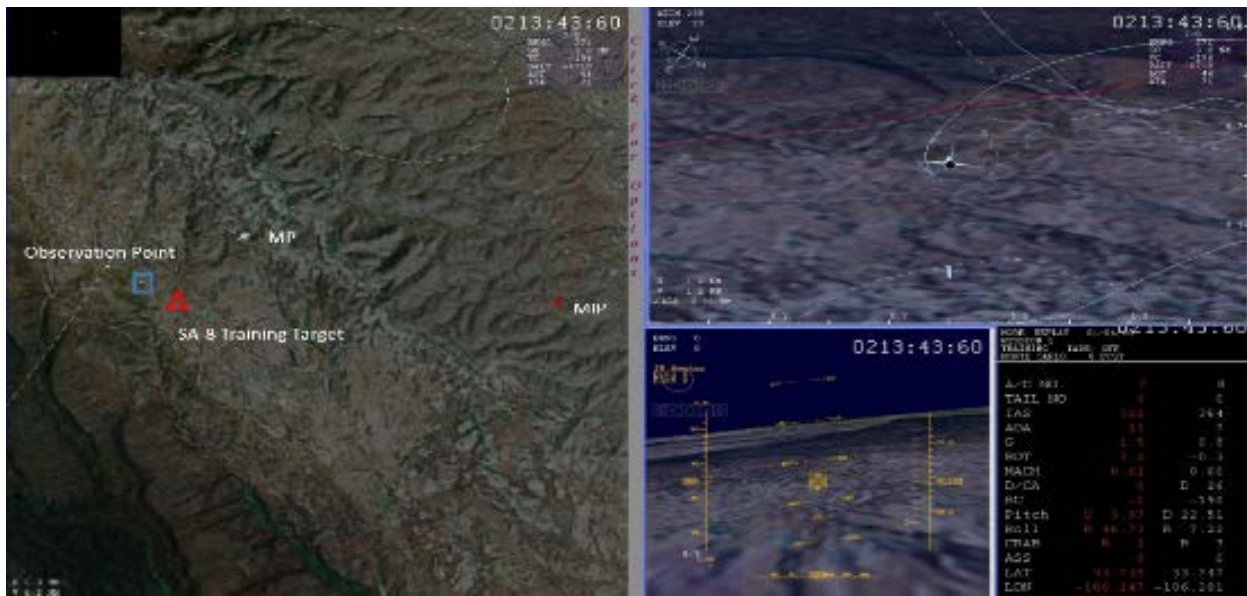


Figure 9: Digital Reconstruction of the MP's second strafe pass at 19:13:43 hours L (Tab Z-15)

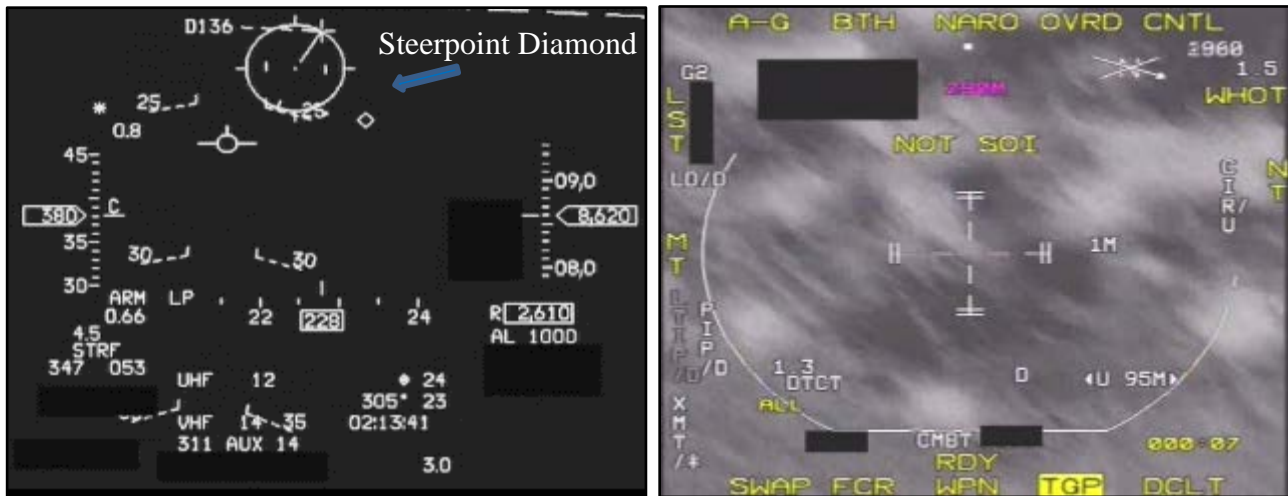


Figure 10: MP's HUD and TGP sensor /second strafe attempt at 19:13:41 hours L (Tab Z-17 and Z-31)

At 19:14:15 hours L, the MIP sent the MP to hold his aircraft south of the target area while the NMF attempted for a third time to drop their inert GBU-12s on the SA-8 training target (Tab BB-54). At 19:14:36 hours L, MJ1 cleared the NMF "hot" to drop on the SA-8 training target, and then transmitted "good effects," after observing the bombs impact the target, at 19:16:14 hours L (Tabs N-6, R-29 and BB-54).

Third Approach to "SA-8"

At 19:16:36 hours L, the MIP asked MJ1 to approve the MP to conduct a high-angle strafe attack on the SA-8 training target for "any squitters," (simulated enemy survivors attempting to flee from the simulated SA-8) which MJ1 approved (Tabs N-6, R-29 and BB-54). The MIP instructed the MP to setup for this third strafing attempt about the same time as the MP told the MIP over the intra-flight radio that he was "Joker" (meaning the MP's aircraft had approximately five minutes of fuel before requiring a return to base) (Tabs N-6, BB-48 and BB 54). At 19:17:00 hours L, the MIP told the NMF to stay above 17,000 feet mean sea level and to hold south of the SA-8 training target (Tabs N-7 and BB-54). The NMF1 responded that NMF was six nautical miles away from the SA-8 target area (Tabs N-7 and BB-54). The MIP then transmitted "*Windmill, Biggie's got about five-mike playtime remaining*" (Tabs N-7 and BB-55). There is no response from the ground element (Tabs N-7 and BB-55). Additionally, and for an unknown reason, the MIP began using the JTAC callsign for DJ1, *Windmill*, who was next to control from the ground party but had not yet been given control from MJ1 (Tabs N-7 and BB-55).

At 19:17:21 hours L, the MIP told the MP that he was "lasing" the target with his TGP (Tabs N-7 and BB-55). The MIP told the MP "this will be TISL [Target Identification Set, Laser] strafe" (Tabs N-7 and BB-55). The MIP pointed his laser on the SA-8 training target so the MP could track the MIP's laser with his TGP (Tab BB-55). This action put a cue in the MP's HUD where the SA-8 training target was located on the ground (Figure 11) (Tabs Z-7, Z-18 and BB-55). At 19:17:32 hours L, the MP called to MIP that he was "spot" SA-8, with no other description of what

the MP was seeing (“spot” means that the MP was tracking the SA-8 training target with his TGP sensor) (Fig 11) (Tabs N-7 and BB-55).

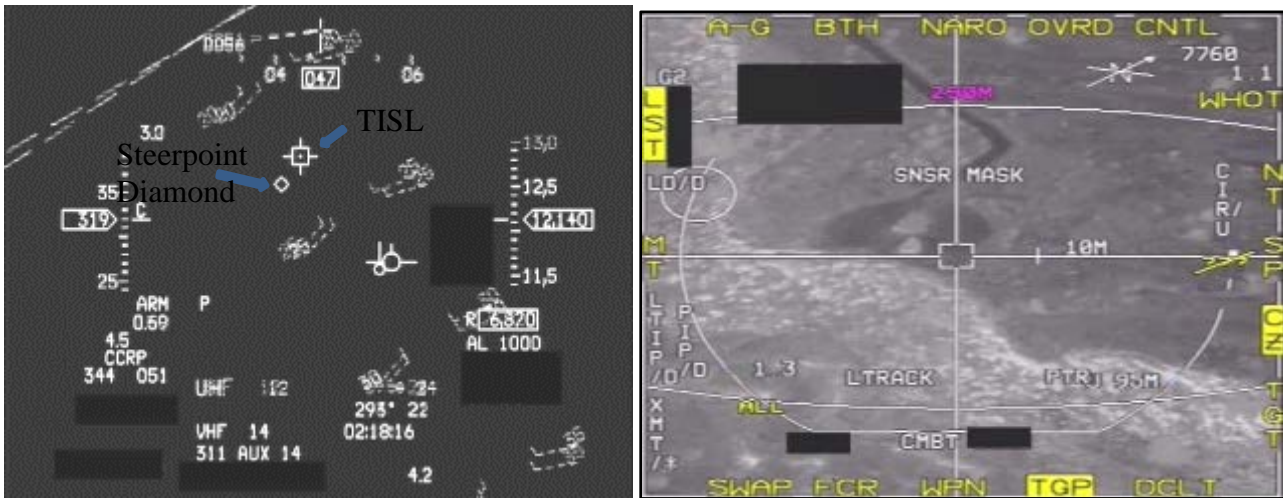


Figure 11: MP's heads up display and TGP sensor/third strafe pass 19:18:16 hours L (Tab Z-7 and Z-18)

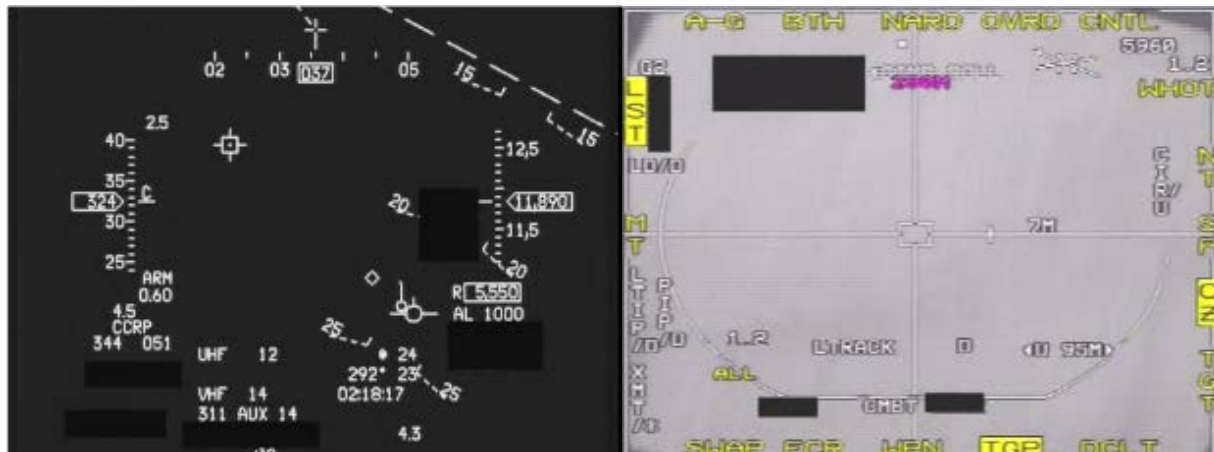


Figure 12: MP's heads-up-display and TGP sensor/third strafe pass 19:18:17 hours L (Tab Z-19 and Z-33)

At 19:18:04 hours L, the MIP asked *Windmill* for terminal attack control of *Biggy 2*, noted *Bolt's* position and requested *Windmill* to begin working additional 9-lines in the objective area (Tabs N-7 and BB-55). Voice data recordings revealed no response from any of the ground element granting the MIP terminal control of MP (Tabs N-7 and BB-55). Testimony from the ground element, however, indicated that they believed the MIP did have terminal control of the MP for this strafe attack (Tabs R-30, V-21.4 and V-21.5).

At 19:18:15 hours L, the MP initiated the high-angle strafe attempt on the SA-8 training target and called that he was “in [heading] 045;” the MIP responded with “Biggie 2 cleared hot” (Tabs N-7 and BB-55). As the MP rolled-in for the attack, his TGP “gimbal rolled” (Figure 12) (Tabs Z-19 to Z-33 and BB-55). A “gimbal roll” is a normal and common occurrence where the TGP can no longer maintain focus or “stare” at a target because the TGP can only turn in one direction so far

before it reaches its rotational limit and needs to, momentarily, reset back to center (Tab BB-47 to BB-48). Once the MP straightened-out of his roll, pointing at the ground, the TGP automatically re-acquired the SA-8 training target (Figure 14) (Tabs Z-25 and BB-55). At 19:18:16 hours L, both the TISL and steer point diamond symbology, denoting the location of the SA-8 training target, were showing in the MP's HUD (Figure 11) (Tabs Z-7 and BB-55).

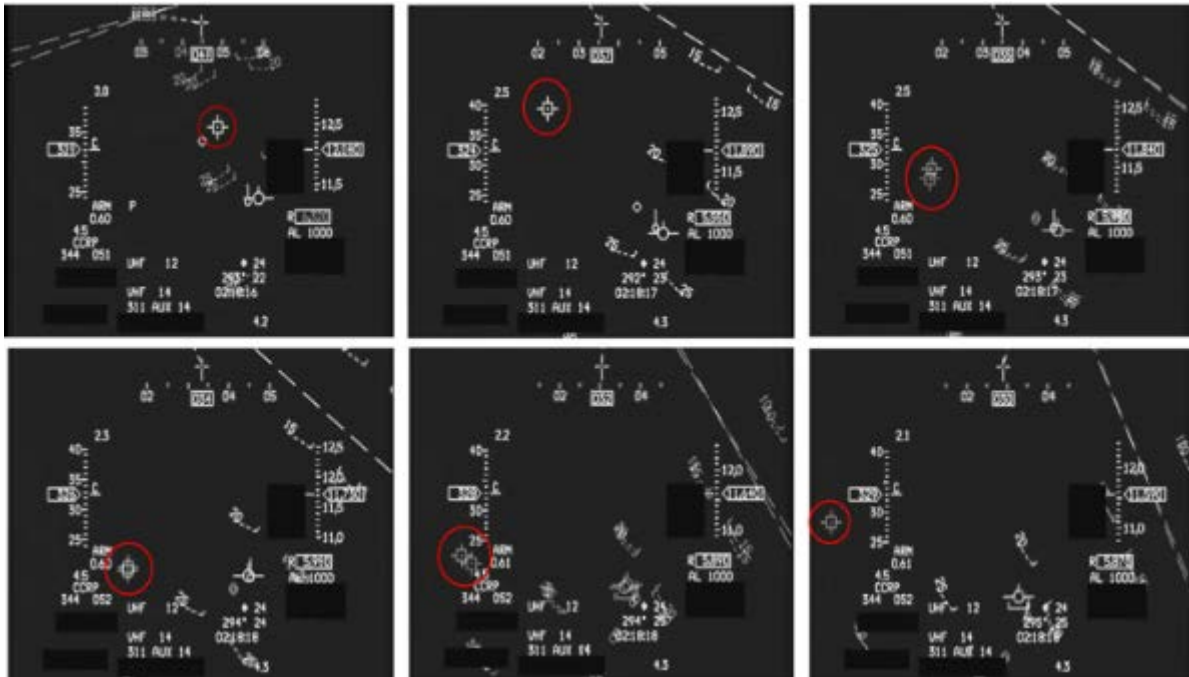


Figure 13: MP's targeting pod sensor showing TISL symbology moving (figure reads left to right, top to bottom) (Tab Z-5)

At 19:18:17 hours L, the TISL symbology in the MP's HUD moved up, then down to the left (Figure 13) (Tabs Z-5 and BB-55). At 19:18:18 hours L, the TISL symbology was no longer visible in the MP's HUD (Figure 14) (Tabs Z-20 and BB-55). Data from the MIP's targeting sensor showed that the MIP's laser target designator and IR pointer drifted away from the SA-8 training target (Tab BB-55). Data from the MP's TGP sensor showed the MIP's laser spot track moved approximately 15 meters east and 4 meters north of the SA-8 training target (Figure 14); at which time, the MP then maneuvered his aircraft further to the left to then point at the OP (Tabs Z-20 and BB-55). At 19:18:19 hours L, when the MP's heads up display no longer had the TISL container or the SA-8 training target steerpoint visible, the MP's TGP then reacquired the MIP's laser, at 19:18:25 hours L (Figure 15) (Tabs Z-21, Z-32 and BB-55).



Figure 14: MP's head up display and targeting pod sensor at 19:18:18 hours L (Tab Z-20 and Z-25)



Figure 15: MP's heads up display and targeting pod sensor at 19:18:25 hours L (Tab Z-21 and Z-32)

At 19:18:25 hours L, the MP put his aircraft into air-to-ground strafe mode, causing strafe symbology to appear in his HUD (Figure 15) (Tabs Z-21 and BB-55). The AIB was unable to determine what the MP was looking at to aim his F-16 toward his intended target as the SA-8 training target was no longer in the MP's HUD; however, the SA-8 training target is in the field of view of the MP's TGP sensor (Figure 16) (Tabs Z-21, Z-32 and BB-55). At 19:18:30 hours L, the MP squeezed the trigger, firing 155 rounds of 20mm TP (Figure 16) (Tabs Z-22, Z-24, AA-46 and BB-55). The MP released the trigger at 19:18:32 hours L (Tab BB-55).

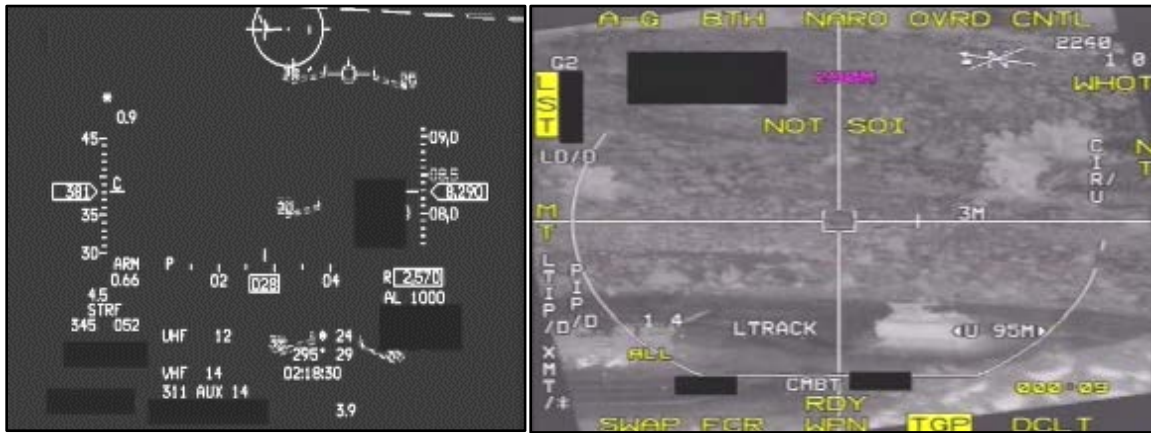


Figure 16: MP's heads-up-display and TGP sensor at 19:18:30 hours L (Tabs L-3, Z-22, and Z-24)



Figure 17: Digital Reconstruction of the mishap strafe pass at 19:18:31 hours L (Tab Z-16)

e. Weapons Impact

At 19:18:33 hours L, 155 rounds of 20mm TP impacted the ground element's location on the Red Rio OP (Tabs R-8 to R-9, R-30 and AA-46). The final attack heading was between 027-028 degrees magnetic from the time the MP squeezed the trigger until he released the trigger two seconds later (Figure 18) (Tabs S-10 and BB-55). An unknown number of 20mm rounds impacted the three vehicles (V1, V2, V3) parked on the OP (Figure 19) (Tab S-3). V2 subsequently caught fire and burned (Figure 19) (Tab S-5). Bullet fragments hit MJ1 in the upper left leg, left buttock, and left lower back (Tabs X-2 and V-22.6). Fragments also hit a Dutch JTAC (DJ2) who was standing behind V2, but he was not injured as the fragments hit him in an area protected by his body armor (Tab V-7.2). The MC, who was not wearing his body armor or helmet, suffered a wound to the back of his head (Tab X-1).



Figure 18: Overhead view of mishap attack direction on friendly OP and SA-8 training target (Tab S-10)



Figure 19: From left to right, V1, V2 and V3 the day after the mishap (Tab S-3 and S-5)

f. Egress and Aircrew Flight Equipment (AFE)

(1) AFE

On 27 March 2017, the 311 FS AFE technician performed a full test on MP's night vision goggles (NVGs) and assessed the NVGs had an emission point failure (Tab U-5). The AFE technician found no other failures with the NVGs (Tab U-5). AFE technicians performed routine inspections on the NVGs every 180 days, and the most recent inspection for these NVGs was on 29 Dec 2016 (Tab U-6). While a test performed on 22 March 2017 showed an emission point failure, on the night of the mishap, the MP reported no NVG discrepancies after landing; the MP also provided a written statement to the AIB stating that "there were no issues with the NVGs" during the mishap sortie (Tab V-29.1).

(2) Egress

Not applicable (Tab H-2).

g. Search and Rescue (SAR)

The ground element and aircrew coordinated rescue efforts for the injured personnel (Tabs R-9 to R-10 and R-31 to R-33).

(1) Ground Search and Rescue (SAR)

Immediately following the strafing incident, MJI1 instructed MJI2 and DJ3 to identify any injured personnel (Tab R-9). MJI1 checked the area and found the mishap contractor (MC) lying on his back unconscious and unresponsive with a head wound (Tab R-9). MJI1 applied compression bandages to the MC's wound, using the ground element's available first aid kits (Tab R-9). GLO1, who was combat aid trained, checked the MC for any other injuries but found none (Tab V-6.3 and V-32.13). The ground element decided to move the MC a short distance away from the burning vehicle for safety (Tab R-9 and R-30). The ground element moved the MC again to a location further from the burning vehicle for fear of the vehicle exploding (Tab R-9 and R-31). MJI1 stayed with the MC, who continued to breathe, but was unresponsive (Tabs R-9 to R-10 and V-32.13). At

some point prior to the arrival of the medevac UH-60 military helicopter (*Skull 91*), MJ1 noticed that the back of his left leg and buttock were painful and bleeding (Tabs V-5.7 and V-22.6). GLO1 checked MJ1's leg and found some blood, but since the injuries did not seem severe, no further first aid was performed (Tab V-5.7 and V-22.6). When the UH-60 arrived, the ground element moved the MC into back of the rented Toyota 4Runner (V1) and transported him to the aircraft (Tab R-10). The ground element, with help from the UH-60 crew, loaded the MC onto the UH-60; the injured military member (MJ1), GLO1, and MJ11 also boarded the UH-60 (Tabs R-10, V-2.4, V-5.9, V-7.3 and V-39.4). *Skull 91* departed the mishap site at 19:59:39 hours L (Tab DD-25). MJ11, GLO1 and a *Skull 91* crewmember (S92) continued providing first aid and support to the MC during the flight to the local hospital (Tab V-5.9 to V-5.11 and V-39.4 to V-39.6).

(2) Air SAR

Immediately after the mishap, the MIP notified the Supervisor of Flying (SOF) in the control tower of the strafing incident and informed the SOF of the possible need for medevac (Tabs V-19.5 to V-19.6 and DD-18). NMF1 became the on-scene commander (Tabs V-10.3 and V-13.9). Running low on fuel, the MIP and MP returned to base (Tab DD-18 to DD-19). In his role as on scene commander, NMF1 coordinated with DJ1 on the OP regarding the need for medical evacuation and fire response (Tab V-3.19). NMF1 relayed DJ1's request for medevac to the SOF (Tab DD-19). With the help of tower personnel, the SOF coordinated with range operators and the Holloman AFB's Command Post for local emergency response (Tab V-19.2 to V-19.7).

At this time, *Skull 91*, was heading toward the Red Rio range for a routine gun training sortie (Tab V-9.2). Range control (*Cherokee*) radioed *Skull 91* and asked if they had medevac capabilities (Tab N-30). *Skull 91*'s pilot (S91) confirmed they had medevac capability (Tab N-30). *Cherokee* directed *Skull 91* onto Red Rio, and provided the correct frequency to contact DJ1 and NMF1 on the OP (Tab N-31). NMF1 directed S91 to the location of the mishap (Tab V-9.3). Arriving at the mishap location around 19:51:00 hours L, *Skull 91* coordinated a place to land with DJ1 (Tabs V-9.8, DD-39 to DD-40, and DD-50 to DD-51). The ground element and crewmembers of *Skull 91* loaded the injured, and *Skull 91* took off at 19:59:39 hours L (Tabs V-2.4, V-5.9, V-7.3, V-39.4 and DD-25).

Based on the critical nature of the MC's injuries, *Skull 91* flew directly to the Gerald Champion Regional Medical Center, Alamogordo, NM (Tabs V-9.4 to V-9.5 and V-39.4). En route to the hospital, the MC stopped breathing (Tab V-5.9 to V-5.11 and V-39.4 to V-39.5). GLO1 began performing cardiopulmonary resuscitation (CPR) with chest compressions, assisted by S92 (Tabs V-5.9 to V-5.11 and V-39.4 to V-39.5). At 20:21 hours L, *Skull 91* arrived at Gerald Champion, landing in a field just northeast of the hospital (Tab V-9.8). Local emergency medical services personnel assisted with the movement of the MC into the hospital emergency department (Tab V-5.11 to V-5.13 and V-39.6). Gerald Champion Emergency Department personnel provided advanced cardiac life support (ACLS) care to the MC starting at 20:32 hours L (Tab X-2). The ACLS was unsuccessful and the emergency physician pronounced the mishap contractor dead at 21:01 hours L (Tab X-2).

The hospital staff also treated MJ1 for the minor wounds in his left leg, buttock, and back (Tab X-3). A few hours later, the medical providers discharged MJ1 from the hospital in stable condition (Tab X-3).

h. Recovery of Remains

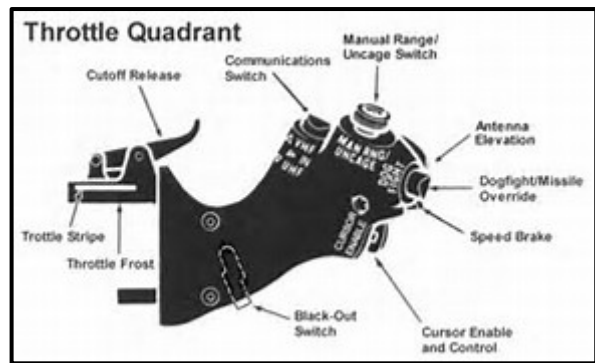
Not applicable.

5. MAINTENANCE

a. Forms Documentation

The AIB concluded that the 311 AMU documented all required maintenance actions IAW Air Force Technical Order 00-20-1, *Aerospace Equipment Maintenance Inspection, Documentation, Policies, and Procedures* (Tab U-2).

After the mishap sortie the MP documented on AFTO form 781A, “Hog knob broken, spins continuously in both directions” (Tab D-8). The “hog knob” is the manual range/uncage pushbutton switch located on the throttle quadrant housing (Tab J-30). The MP described the hog knob’s impact as causing limited zoom-in/zoom-out functionality for the TGP (Tabs V-29.1). The MP also noted that his first press on the hog knob during the fatal strafing attack failed to put his aircraft in strafe mode as it should; it took a subsequent long press on the hog knob to put the jet successfully into strafe mode (Tab V-29.1). The MP did not indicate that the hog knob caused or contributed to the mishap (Tab V-29.1). The AIB concluded that the hog knob did not contribute to the mishap.



Tab J-36.

b. Inspections

The AIB determined that the 311 AMU completed the following scheduled preflight inspections on 31 January 2017, prior to the MS, IAW AF TO 1F-16CG-6WC-1, *Combined Preflight/Postflight, End-of-Runway, Thruflight, Launch and Recovery, Alert Inspections, Quick Turnaround, Basic Postflight, and Walkaround Before First Flight of Day Inspection Workcards*, card numbers 1-001 thru 1-079:

- a. A qualified crew chief completed the BPO/PR inspection with no discrepancies noted (Tab D-11).
- b. A qualified weapons technician completed the weapons postload inspection with no discrepancies noted (Tab D-6).
- c. A qualified ground crew completed preflight nitrogen servicing, tire pressure, and aircraft power on checks with no discrepancies noted (Tab D-6 and D-7).

A 311 AMU avionics technician completed the 50-hour throttle quadrant inspection, on 30 December 2016, with no discrepancies noted (Tab U-3). At the time of inspection, the aircraft had

6317.1 flight hours with 8.5 flight hours between the time of inspection and the mishap sortie. (Tabs U-4 and D-15). The AIB determined that all scheduled inspections were satisfactorily completed and documented IAW applicable technical data (Tab U-2).

c. Maintenance Procedures

The AIB found no evidence to indicate that maintenance procedures were a factor in the mishap.

d. Maintenance Personnel and Supervision

The AIB found no evidence to indicate that maintenance personnel or supervision were a factor in the mishap.

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

The AIB's review of fuel, hydraulic, oil, and oxygen inspection analysis from the MA revealed no abnormalities relevant to the accident (Tab U-2).

f. Unscheduled Maintenance

The AIB reviewed both active and historical data and discovered no unscheduled maintenance problems relevant with the MA (Tab U-2).

6. AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Structures and Systems

The AIB found no evidence to indicate that structures and systems were a factor in the mishap.

b. Evaluation and Analysis

The AIB found no evidence to indicate that evaluation and analysis were a factor in the mishap.

7. WEATHER

a. Forecast Weather

Holloman AFB's weather forecast at the time the mishap flight's takeoff was a few clouds at 21,000 feet mean sea level (MSL), variable winds at 06 knots, 07 statute miles visibility and no significant weather (Tab F-2). Official sunset was at 1737hrs Local, 31 minutes prior to takeoff (Tab F-2). The Lava/Mesa/Red Rio forecast was few clouds from 26,000 feet MSL to 27,000 feet MSL, surface winds from 270 degrees at 15 knots gusting to 26 knots, 7 statute miles visibility and no significant weather (Tab AA-35).

The illumination level for the scheduled mission time was forecast to be “High” (Ground Illumination greater than or equal to 2.2 mlux) until 21:00:00 hours L (Figure 20)(Tabs Z-13 and BB-46).

Date/Time: 31 Jan 2017						
Time (Local)	Solar Elevation	Solar Azimuth	Lunar Elevation	Lunar Azimuth	Lunar Phase (%)	Ground Illumination (mlux)
1700	6	245	48	217	17	7837620.5
1730	1	249	44	226	17	1210225.13
1800	-6	253	40	233	18	5501.24
1830	-12	257	35	240	18	16.14
1900	-18	261	29	246	18	4.82
1930	-24	265	24	251	18	3.54
2000	-30	268	18	256	18	3
2030	-37	273	12	260	19	2.47
2100	-43	277	6	264	19	1.99

Figure 20: Illumination Level (Tab Z-13)

b. Observed Weather

On 31 January 2017, the observed weather was as follows:

- (1) At 17:58:00 hours L, the Holloman (KHMN) meteorological aviation report (METAR) reported no wind, 10 statute miles visibility and clear skies (Figure 21) (Tab F-4).
- (2) NMF1 testified that there were no clouds in the airspace and that it was “low illumination” during the mission (Tab V-3.17).
- (3) At the time of the mishap, the airspace was clear with no weather hazards (Figure 21) (Tab F-4).

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TKHMN 010358Z AUTO 07008KT 10SM CLR 06/M05 A3009 RMK AO2 SLP170 T00551046 $
KHMN 010258Z AUTO 07008KT 10SM CLR 07/M04 A3009 RMK AO2 SLP177 T00691043 50002 $
KHMN 010158Z AUTO 07004KT 10SM CLR 09/M05 A3009 RMK AO2 SLP177 T00871047 $
KHMN 010058Z AUTO 00000KT 10SM CLR 15/M08 A3009 RMK AO2 SLP164 T01481076 $
KHMN 312358Z AUTO 00000KT 10SM CLR 17/M08 A3009 RMK AO2 SLP161 T01691080 10173
20135 55005 $
```

Figure 21: Automated Weather Observations (Tab F-4)

c. Space Environment

Not Applicable.

d. Operations

Weather at the time and location of the mishap was within F-16 operational limits (Tab BB-48).

8. CREW QUALIFICATIONS

a. Mishap Pilot

The MP had 60.9 hours in the F-16 and 86 total primary pilot hours, at the time of the mishap (Tab G-2). The MP's first sortie in the F-16 was on 20 July 2016. The MP's first night sortie in the F-16 was 11 January 2017 (Tab T-9). The MP accumulated 6.2 hours flying with night vision goggles (NVGs) and 5 total night sorties prior to the mishap (Tab G-4). The squadron commander, director of operations and the MP's flight commander testified that the MP was an average to slightly-above average student up to the night of the mishap (Tab V-10.7, V-12.3 and V-30.5).

The MP's first CAS sortie was a daylight mission, on 14 December 2016, and his overall grade was "average" (Tab T-20). The MP conducted high-angle strafe to a proficiency level "2" on the CAS-1 sortie (Tab T-20). A grade of proficiency level of "2" means, "performance is almost correct. Makes errors that impact mission/task effectiveness but recognizes and corrects them" (Tab BB-14). The MP's second daylight CAS sortie was on 30 December 2016, and his overall grade was "average" (Tab T-23). The MP did not conduct high-angle strafe on this sortie (Tab T-23). The MP's first time executing high-angle strafe at night using NVGs was on 25 January 2017 (Tab T-2). The MP received a grade of "1" for NVG high-angle strafe on this sortie (Tab T-2). A grade of "1" means, "performance is safe, but indicates limited proficiency. Needs IP assistance to correct errors" (Tab BB-14). The MP's gradebook verified that the MP was eligible to fly the night CAS mission on 31 January 2017 (Tab T-19).

The MP's recent flight time was as follows (Tab G-2):

Table 1: MP's Recent Flying Hours (Tab G-2)

	Hours	Sorties
30 days	8.6	6
60 days	14.3	10
90 days	23.4	18

b. Mishap Instructor Pilot

The MIP had 857 hours in the F-16, 887.8 primary pilot hours, 107.5 instructor hours, 260.2 NVG hours, and 14.4 evaluator hours at the time of the mishap (Tab G-21 and G-22). The MIP's first sortie in the F-16 was on 22 April 2011 (Tab G-21 and G-22). The MIP arrived at his first operational unit, on 26 March 2011, and achieved his initial mission qualification, on 13 June 2012 (Tab G-23). The MIP obtained his initial instructor pilot qualification, on 26 May 2015 (Tab G-23). The MIP had a current Form 8 instrument flying evaluation, dated 28 October 2016 (Tab G-28). The MIP had a current Form 8 mission qualification evaluation, dated 17 June 2016 (Tab G-23). The MIP was current and qualified in all aspects of the mission, on the night of the mishap (Tab EE-3).

The MIP's recent flight time was as follows (Tab G-17):

Table 2: MIP's Recent Flying Hours (Tab G-17)

	Hours	Sorties
30 days	11.2	8
60 days	22.6	16
90 days	32	24

9. MEDICAL

The AIB reviewed the medical records of the aircrew and JTAC members to assess overall health and determine whether any duty limiting conditions were present (Tab X-3). Additionally, the AIB reviewed available 72 hour/14 day histories (Tab X-3).

a. Qualifications

(1) Mishap Pilot (MP)

The MP was medically qualified for flying duties at the time of the mishap (Tab X-3).

(2) Mishap Instructor Pilot (MIP)

The MIP was medically qualified for flying duties at the time of the mishap (Tab X-3).

(3) Mishap JTAC Instructor 1 (MJ11)

The MJ11 was medically qualified for duties at the time of the mishap (Tab X-3).

(4) Mishap JTAC Instructor 2 (MJ12)

The MJ12 was medically qualified for duties at the time of the mishap (Tab X-3).

(5) Mishap JTAC (MJ1)

The MJ1 was medically qualified for duties at the time of the mishap (Tab X-3).

b. Health

The MJ1 received injuries related to the mishap, including three puncture wounds located in the left upper leg, left buttock, and left lower back with retained metallic fragments (Tab X-3). The MJ1 completed follow-up care for his wounds and returned to controlling status (Tab X-3).

The GLO1 suffered a strained right hamstring related to the mishap (Tab X-3).

c. Pathology

According to the autopsy report, the MC died from a gunshot wound to the head from a distant range with a 646-grain projectile (Tab X-2).

The autopsy toxicology reports regarding the MC were negative for illegal substances (Tab X-2).

Holloman AFB flight medicine collected blood and urine samples from the MP, MIP, MSO, MJ11, MJ12, MJ1, JT1, GLO1, and GLO2 (Tab X-3). The Forensic Toxicology Laboratory of the Armed Forces Medical Examiner System, the Department of Defense's (DOD) primary forensic laboratory performed full spectrum toxicological analysis on the specimens (Tab X-3). All samples tested negative (Tab X-3).

d. Lifestyle

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

e. Crew Rest and Crew Duty Time

AFI 11-202, Volume 3, *General Flight Rules*, dated 10 August 2016 requires aircrew members have at least 12 non-duty hours before the Flight Duty Period and will include an opportunity for at least 8 hours of uninterrupted sleep. The MP and MIP did not have any scheduled formal training or duty training for the 12 hours prior to arriving at the squadron on the day of the mishap (Tabs AA-20 to AA-34 and EE-10 to EE-19). There is no evidence to indicate that the MP or MIP had insufficient crew rest (Tab X-3). The AIB reviewed 72 hour and 14 day histories for MSO, MJ11, MJ1, and MJ12 and found no violations of crew rest or duty time requirements (Tab X-3). The MSO, MJ11, MJ1, or MJ12 did not take any medications on the day of the mishap (Tab X-3).

10. OPERATIONS AND SUPERVISION

a. Operations

The 54 Fighter Group (FG) is a geographically separated unit under the 56 Fighter Wing at Luke AFB, Arizona (Tab CC-3). Located at Holloman AFB, NM, the 54 FG conducts the graduate-level F-16 FTU program (Tab CC-3). Two fighter squadrons, two maintenance squadrons, an operations support squadron, and an active associate Air Force Reserve detachment comprise the 54 FG (Tab CC-3).

The MP completed Undergraduate Pilot Training in the T-6 and T-38C, in December 2015, at Sheppard AFB, Texas (Tab T-12). The MP completed Introduction to Fighter Fundamentals in the T-38C, in April 2016 (Tab T-12). In June 2016, the MP started the F-16 FTU program (Tab T-15). The MP completed an Initial Instrument Qualification, on 22 July 2016 (Tab G-6). The CC311, DO311 and FCC all testified that the MP was an average to slightly above average student in his FTU class (Tabs 10.7 V-12.3 and V-30.5).

The MIP started undergraduate pilot training (UPT) in the T-34 at Whiting Field, Florida (Tab T-7). The MIP completed UPT in the T-38C, in October 2010, at Vance AFB, Oklahoma (Tab T-8). The MIP completed Introduction to Fighter Fundamentals in the T-38C, in February 2011, at

Vance AFB, Oklahoma (Tab T-7). The MIP completed the F-16 B-Course, in 2012, at Luke AFB, Arizona (Tab T-14). Squadron leadership testified that the MIP was one of the squadron's top instructors, the Company Grade Officer of the Year, and was the squadron's top candidate for the Air Force Weapons School (Tab V-10.8 and V-30.5).

b. Supervision

The 54 FG has a Supervisor of Flying (SOF), and a Responsible Officer (RO) during flying operations (Tab V-30.3). The 311 FS has an Operations Supervisor (referred to as "Top 3") during flying operations (Tab V-30.6).

The AIB's review found elements of the authorized mission that, while not prohibited at the time, were not necessary. The squadron supervision authorized mission elements, beyond syllabus requirements, such as: 1) allowing an instructor pilot to perform FAC(A) duties and instruct a student pilot at the same time (Tab V-11.1 to 11.3); 2) creating an expectation that students perform high-angle strafe during SAN-3, although, it is not a syllabus requirement of SAN-3 (Tab V-30.9, V-31.2 and BB-20); 3) interpreting syllabus requirements liberally allowing low altitude NVG qualification to occur utilizing two F-16Cs instead of one two-seat F-16D with an instructor pilot in the rear cockpit (Tabs V-31.3 to V-31.4 and BB-19); and 4) authorizing four aircraft in two, two-ship flights during a single night CAS training sortie (Tab V-11.1 to V-11.2).

11. HUMAN FACTORS ANALYSIS

a. Introduction

The AIB evaluated human factors relevant to the mishap using the analysis and classification system model established by the DoD Human Factors Analysis and Classification System (HFACS) guide, implemented by AFI 91-204, USAF Safety Investigations and Reports, dated 19 January 2017 (Tab BB-29). Human Factors are divided into four main categories: Organizational Influences, Supervision, Preconditions, and Acts (Tab BB-31). Each category is further subdivided into related specific human factors and assigned a DoD nanocode (Tab BB-31). This AIB reviewed multiple sources of data, including but not limited to witness testimony, medical records, toxicology results, video and audio recordings, and flight reconstructions. Described below are the human factors relevant to this mishap.

b. AE 301 Error due to Misperception

The AIB found evidence that misperception was a factor in this mishap. Error due to misperception is a factor when an individual acts or fails to act based on an illusion; misperception or disorientation state and this act or failure to act creates an unsafe situation (Tab BB-32). During the course of the MP's strafing runs on the SA-8 training target, the evidence supports finding that the MP targeted the ground element's position on the OP three times; and the one time that the MP correctly targeted the SA-8, he convinced himself that it was not the intended target and chose not to fire.

First error in perception: In preparation to prosecute a high-angle strafing attack on the SA-8 training target, the MIP used his TGP to laser spot and to IR mark the SA-8 training target for the MP and called “1 is lasing, sparkling the target” (Tab N-2). The MP responded, “2 is capture the target” (Tab N-2). At the time of his capture call, the MP’s TGP was not focused on the SA-8 training target but was focused at the friendly OP (Figure 22) (Tab Z-3). This was the only time the MP’s TGP was actually looking at the friendly OP during the mishap sortie (Tab BB-53). The MP never verbally acknowledged that his TGP was looking at the OP when he called capture (Tab N-2 to N-7). The MP chose not to provide testimony about this event, so the AIB does not know whether the MP realized he was looking at the OP (Tab V-28.2 and V-29.1). The MIP aborted the MP before the MP could begin this strafing attack, because MIP wanted to allow *Bolt flight* to make their initial attack on the SA-8 training target (Tab N-3).



Figure 22: MP’s TGP sensor viewing the OP when he initially called “2 is capture the target” (Tab Z-6)

Second error in perception: Subsequent to the NMF’s attempted attack on the SA-8, the MIP gave terminal attack control of the MP to MJ1 to execute a high-angle strafing attack (Tab N-3). The MP called “2 is ready, capture target” (Tab N-4), at which point the MP’s TGP sensor was viewing the SA-8 training target (Figure 23) (Tab Z-3). The MJ1 cleared the MP to engage on the SA-8 training target (Tab N-4). However, the MP then pointed his F-16 at the friendly OP rather than the SA-8 training target and squeezed the trigger (Tab BB-53). The only reason that the MP did not fire on the ground element during this strafing attack was that the MP’s gun failed to fire; the MP failed to move the Master Arm switch from SIM to ARM (from simulation mode to armament mode) (Tabs N-4 and BB-53). After this failure to fire, the MP called “Biggy 2 is off dry, avionics” (Tab N-4). The MP expressed frustration with himself into his internal microphone (the MP was flying with a “hot” mic, which captured all his vocalized comments, but not all comments were transmitted over the inter-flight radio to the MIP or over the main radio to all the mission participants) and immediately moved the Master Arm switch to ARM (Tab N-4). The MP never verbally acknowledged to anyone that he had just pointed at the friendly OP during this strafing attack (Tab N-2 to N-7).



Figure 23: MP's TGP sensor viewing the SA-8 training target prior to his first strafe pass (Tab Z-6)

Third error in perception: After this “failed” attempt, the MIP then told the MP to set up for a reattack and the MJ1, who still had terminal control of the MP, approved the MP for a reattack of the SA-8 training target (Tab N-4). The MP stated “2’s ready” (Tab N-5). The MIP stated “1 is lasing 1511” (Tab N-5). The MP called “2 is in 220” and the MJ1 cleared the MP for the attack (Tab N-5). His aircraft now in ARM mode, the MP then correctly rolled in on the SA-8 training target, but the MP chose not to fire (Tabs N-5 and BB-54). The MP stated “off-dry” (Tab N-5). The MIP requested, “say reason” (Tab N-5). The MP then explained, “The sparkle just looked different so I did not want to shoot, I wasn’t uhh, it wasn’t as circular as I thought I saw, it looked like a light maybe on top of a building, I was wrong” (Tab N-6).

Fourth error in perception: Just prior to the MP’s final strafe attack, the *Bolt flight* successfully prosecuted an inert GBU-12 attack on the SA-8 training target (Tabs N-6 and BB-54). The MIP requested approval for the MP to do a high-angle strafe re-attack on any simulated enemy troops (squirters) leaving the area and received approval from MJ1 (Tab N-6 to N-7). The MIP told the MP, “1 is lasing, this is going to be TISL strafe” (Tab N-7). The MP replied, “2 is spot SA-8” (Tab N-7). At this point, the MP’s TGP was on the SA-8 training target (Figure 24) (Tab Z-7).



Figure 24: MP's TGP sensor viewing the SA-8 training target prior to the mishap strafe (Tab Z-7)

The MP transmitted “2 is in 045” and the MIP cleared the MP hot for the attack (Tab N-7). The MP then performed the mishap strafe, striking the friendly OP (Tabs V-22.3, V-25.3 and BB-55 to BB-56).

The AIB noted that the SA-8 training target and the OP are on similar geographical semicircular ridges with similar cleared out areas (Tab S-9 to S-10). The images from the TGP were similar in appearance between the friendly OP and SA-8 training target (Tab Z-5). The friendly OP and SA-8 training target area were 897 meters apart (Tab S-9).

c. PC 505 Misinterpreted/Misread Instrument

Misinterpreted/Misread Instrument is a factor when the individual is presented with a correct instrument reading but its significance is not recognized, it is misread or is misinterpreted. (Tab BB-34). The MP’s avionics were correctly directing the MP to the SA-8 training target during each strafing pass, but the MP incorrectly targeted the friendly OP twice, including the fatal mishap strafe pass (Tab BB-53 to BB-56).

The MP’s HUD displayed different target cueing information on each strafe pass (Tab BB-52 to BB-56). On the first strafe pass, the MP’s HUD did not display the TISL symbology or inertial navigation system steer point (the steer point “diamond”); however, the MP had the correct steer point selected (steer point 24) and the MP’s TGP was tracking the SA-8 training target (Tab BB-53). However, the MP pointed his aircraft at the friendly OP and attempted to fire, squeezing the trigger (Tab BB-53). The aircraft did not fire, since the MP had failed to arm the gun (Tab BB-53). On the second strafe pass, the MP’s HUD displayed the steer point diamond after he pointed the aircraft at the SA-8 training target, but he chose not to fire the gun (Tab BB-54).

On the fatal mishap strafe pass, the MP’s HUD displayed the TISL symbology initially, but once the aircraft had rolled out and was pointed at the friendly OP, the MP’s HUD did not display the TISL symbology nor the steer point diamond, as they were out of the HUD’s field-of-view (Tab BB-55). The MP, in his written statement to the AIB, stated that when he rolled out on the mishap strafing attack, “The gimbal roll caused the TGP to lose the laser spot track (LST)” (Tab V-29.1). The MP asserted to the AIB that, “In the HUD, when a laser spot track is lost, the TISL (Target Identification Set, Laser) should begin flashing for as long as the TGP attempts laser reacquisition On the mishap strafe pass, the TISL should have begun to flash as soon as the TGP lost the laser spot track, but it did not. Instead, the TISL moves to the left in the direction of the OP and out of the HUD, leading me off the intended target” (Tab V-29.1). Figure 25 shows the MP’s described TISL movement (Tab Z-5).

However, the AIB conducted a close review of the MP’s HUD DVR and found that, while the gimbal roll caused the TISL to move as shown in Figure 25, (Tabs Z-5 and BB-55) the aircraft was no longer pointing at the SA-8 training target once the MP had rolled out and pointed his jet at the friendly OP (Tab BB-55). Because the TISL symbology was no longer in the MP’s HUD field-of-view, the flashing TISL container would not have been visible when the laser spot track was momentarily lost (Tab BB-55). The steer point diamond was also not in the HUD for the same reason—the MP’s aircraft was no longer pointing at the correct target (Tab BB-55). The mishap aircraft presented the MP with correct symbology regarding inertial navigation steer point data and

laser target track symbology on each high-angle strafe pass (Tab BB-53 to BB-56). The only anomalies that the MP witnessed during the mishap strafe attack were normal TGT pod and aircraft operations. (Tab BB-40 to BB-44) The MP either did not recognize or misinterpreted this significant information as the MP failed to abort the mishap strafe and incorrectly fired upon the friendly OP (Tab BB-56). All video and audio data recordings suggest the avionics and TGP system were working appropriately (Tab BB-40 to B-44).

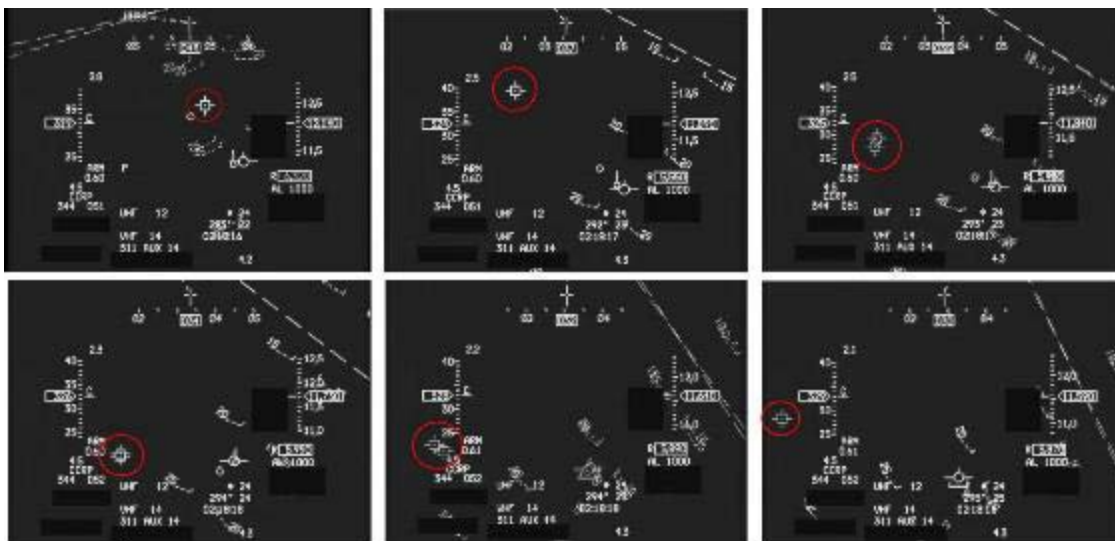


Figure 25: TISL symbol is circled in red. The images flow from left to right and top to bottom showing the TISL symbol moving up in the HUD and then down and to the left. (Tab Z-5)

d. AE 202 Task Misprioritization

Task Misprioritization is a factor when the individual does not organize, based on accepted prioritization techniques, the tasks needed to manage the immediate situation (Tab BB-32). The AIB found evidence that the mishap instructor pilot MIP misprioritized between his responsibilities to his student pilot as an instructor pilot and the duties he was also performing during the training mission as an FAC(A) (Tabs N-2 to N-7 and DD-72 to DD-78).

According to AETC Basic Course syllabus F16C0B00PL (56 Fighter Wing), the primary duty of instructor pilots is to facilitate instruction for the student pilots (Tab BB-48). For the mishap sortie, the MIP was performing FAC(A) duties in addition to his duties as an instructor pilot (Tab V-3.2, V-3.16 and V-21.3).

Shortly after entering the range, the MP and the MIP, controlled by MJ11, completed two successful attacks on simulated training targets and performed a threat response action (Tab DD-73 to DD-74). The MIP then instructed the MP to fly his aircraft to a separate holding location approximately 14 nautical miles away, while the MIP performed a solo attack controlled by the MJ1 (Tab DD-74 to DD-75). The MIP then received the 9-line coordinates for the next target, the SA-8 training target (Tab DD-75).

At this point, the NMF1 checked in with the MIP in his FAC(A) role; NMF1 stated their position as twenty miles north of the objective (Tab DD-76). The MIP requested MJ1 approve the MP prosecuting a high-angle strafe on the SA-8 training target, prior to *Bolt Flight's* (NMF) arrival to conduct an attack on the same target (Tab DD-77). The MJ1 approved the high-angle strafe attack (Tab DD-77). Before the MP could perform the high-angle strafe, the NMF entered the range, and the MIP as FAC(A) communicated SA-8 training target coordinates to the NMF (Tab DD-77). The MIP then chose to abort the MP's high-angle strafe pass to allow the NMF to attempt a GBU attack (Tabs N-2, N-3 and DD-77). The MIP told the MP to set up for his attack so he could stop "doing circles" (Tab N-3). The MIP then turned back to performing FAC(A) duties and communicated with NMF1, providing terminal attack control for another NMF attempted GBU attack (Tab N-3).

After NMF's bombing attempt, the MIP told the MP "2 set-up for your attack" and the MP acknowledged (Tab N-3). The MIP again went back to FAC(A) duties, directing the NMF to hold 10 miles north of the target area and to set up for a re-attack (Tab N-3). The MIP requested MJ1 to control for the MP's high-angle strafe on SA-8 (Tab N-3). The MP called "2 is in, 035" and the MJ1 cleared the MP hot (Tab N-4). After the MP failed to fire (which would have been on the friendly OP, had the Master Switch been set to ARM), the MP called "off, dry avionics" (Tab N-4). Apparently unaware the MP had erroneously targeted the friendly OP, the MIP did not provide any feedback or clarification of the target to his student pilot but simply told the MP "2 set up for immediate re-attack" and reminded the MP "2 check Master Arm, green 'em up" (Tab N-4). The MIP then turned back to his FAC(A) duties to clarify the SA-8 training target's coordinates with *Bolt Flight*, including a physical description of what the NMF was seeing of the target (Tab N-5).

The MP later called "2's ready" and the MIP replied "get out of [after burner] dude" and told the MP to "set-up for your attack, probably go back to the south where you are, so you can roll-in from the north on final" and "1 is lasing 1511" (Tab N-5). The MP then called "2 is in 220," but the MP's next call was "2 is off dry," to which the MIP said, "say reason" (Tab N-5). The MP then explained "the sparkle just looked different so I did not want to shoot, I wasn't uhh, it wasn't as circular as I thought I saw, it looked like a light maybe on top of a building, I was wrong" (Tab N-6). The MIP again did not provide feedback or clarification to his student pilot in response to the MP's explanation, but turned to FAC(A) duties, controlling the NMF through a successful GBU 12 attack on the SA-8 training target (Tab N-6).

The MIP then requested a high-angle strafe from the MJ1 for the MP on any simulated "squirters" which the MJ1 approved (Tab N-6). The MIP, told the MP to "set-up for your attack" (Tab N-7). The MIP, back in his FAC(A) role, then coordinated with NMF1 regarding *Bolt Flight's* next objective and position (Tab N-7). The MIP warned the JTAC that the MF had "about 5 mike playtime remaining" and then told the MP "1 is lasing, this is going to be TISL strafe" (Tab N-7). The MP called "2 is spot SA-8" (Tab N-7). The MIP then requested terminal attack control for the MP's strafe reattack on the SA-8 training target, and relayed to the JTAC the location of the NMF (Tab N-7). MIP continued as FAC(A), requesting new 9-lines targets in the objective area (Tab N-7). There was no response from the JTAC acknowledging transfer of control to the MIP (Tabs N-7 and V-20.13). The MP called "2 is in, 045" and the MIP responded, "2 cleared hot" (Tab N-7). During the mishap strafe, the MIP failed to keep his TGP laser and IR pointer squarely on the SA-8 training target, allowing his laser spot to drift north, approximately 4 meters and east

15 meters (Tab BB-55). The MIP next asked the JTAC “did you copy” with no response from the ground element (Tab N-7). The MP then fired his gun on the friendly OP (Tab V-22.3, V-25.3 and BB-56).

In general, the AIB found that during the multiple attacks on the SA-8 training target, the MIP provided little feedback or guidance to his student on the MP’s failed strafe attempts; the predominance of the MIP’s communications were regarding FAC(A) duties and coordinating attacks with the NMF and the ground element (Tab N-2 to N-7).

e. PC 206 Overconfidence

Overconfidence is a factor when the individual overvalues or overestimates personal capability, the capability of others or the capability of aircraft/vehicles or equipment and this creates an unsafe situation (Tab BB-33).

Evidence obtained from testimony and in-flight communications indicate the MIP showed an overconfidence in the MP (Tabs N-2 to N-7, V-3.4, V-3.6 to V-3.7, and V-3.9 to V-3.11). The MIP planned a complex mission with both actual friendlies on the OP and notional friendlies that were going to be “moving” in the area throughout the mission, leaving the other instructor pilot, NMF1, after hearing the MIP’s mission pre-brief, feeling confused (Tab V-3.4 and V-3.9). The MIP’s plan required the MIP to act as both instructor pilot for the MP and FAC(A) during a night CAS training sortie involving two student pilots and two instructor pilots in four aircraft (Tabs K-3, V-3.4 and V-30.12).

The MIP also failed to appreciate the following challenges, showing an overconfidence in the MP’s abilities: 1) the MIP acting as a FAC(A) in addition to instructor pilot, thereby taking his attention and focus away from his instructor duties; 2) this was the MP’s first CAS mission at night; 3) this was only the MP’s second time performing high-angle strafe at night – and the previous high-angle strafe was on a lit range with clearly identified targets; 4) the MIP planned to perform low altitude NVG qualifications for both the MP and the NMF2 so they could both strafe below the minimum safe altitude (MSA); and 5) the MP previously achieved a grade of 1 for high-angle strafe, indicating the MP needed instructor guidance on subsequent high-angle strafe attempts to be proficient (Tabs K-3, T-2, V-3.4, V-3.6 to V-3.7, V-3.9 to V-3.11, V-30.12, and AA-19 to AA-26).

After two successful attacks with GBU 12’s on training targets armory A and armory B, rather than providing mutual support, the MIP directed the MP to a separate holding point on his own (Tab DD-74). Throughout the sortie, the MIP gave non-specific directions to the MP regarding attack procedures, such as “just do a right hand turn or a left hand turn, whatever ever makes sense to get yourself in that window,” “maintain...just set up for your attack so you don’t have to ... keep doing circles,” and “set-up for your attack, probably go back to the south where you are, so you can roll-in from the north on final” (Tab N-2 to N-3, and N-5). These non-specific directions required significantly greater autonomy and ability on the part of the MP.

f. PC 208 Complacency of the MIP

Complacency is a factor when the individual's state of reduced conscious attention due to an attitude of overconfidence, undermotivation or the sense that others "have the situation under control" leads to an unsafe situation (Tab BB-33).

In addition to the overconfidence the MIP showed in the MP, evidence revealed the MIP showed a state of reduced conscious attention to the MP during the course of the night (Tabs N-2 to N-7, BB-50 to BB-56 and DD-72 to DD-78). The MIP's attention to the MP deteriorated as the MIP sent the MP to separate holding locations and provided minimal instruction during the MP's attacks (Tab N-2 to N-3, N-5 and DD-74). The MP had two failed strafing passes prior to the third mishap strafe, but the MIP did not instruct the MP about how to improve his strafing passes (Tabs N-4 to N-7 and BB-53 to BB-56). The MIP only asked the MP once to say the reason he was "off dry" after his second strafe attempt (Tab N-5). When the MP responded that the target looked different to him, but he "was wrong," the MIP did not provide instruction or clarification to his inexperienced student pilot about what the MP was seeing in regards to the SA-8 training target, but instead told the MP to "set up for your attack" (Tab N-6 to N-7).

g. PC 208 Complacency of the Mishap Contractor

Evidence suggests the mishap contractor displayed a level of complacency in not wearing personal protective equipment while on the Red Rio OP during a live-fire training event (Tabs R-12, R-35, and V-40.4). The MC was on the OP with the JTACs when MJ11 briefed the night's targeting events (Tab V-32.5 to V-32.9). The MC specifically coordinated with the Dutch JTACs so he could participate in a CAS training event to show the capabilities of his company's SWIR equipment (Tabs R-12 and V-27.9 to V-27.15). The MC was a former JTAC, familiar with protocols for personal protective equipment requirements when near live-fire (Tabs R-52 and V-32.6). The MC attended the range briefing with the Dutch JTACS where RM2 discussed Weapon Danger Zones and Minimum Safe Distances (Tab R-47). According to AFI 13-112 V1 *Joint Terminal Attack Controller (JTAC) Training Program*, section 1.2.14.2, "JTACs and personnel collocated with JTACs will wear helmets, body armor and any additional personal protective equipment (PPE) as required by range procedures and OIs when conducting live terminal attack controls" (Tab BB-37). The fact that the MC had personal protective equipment with him, including a level 3A helmet and level 3 body armor without plates, supports a finding that the MC was aware of the inherent dangers of CAS live-fire training (Tabs CC-11 to CC-12 and Z-34 to Z-35). However, for some unknown reason, the MC chose not to wear his body armor or helmet (Tabs R-12, R-35, and V-5.15). The MC was only wearing a coat and laser eye protection (Tab R-35). Based on the evidence before the AIB, while there is a possibility, the AIB could not determine the probability of whether the MC's injury was preventable or the severity reduced had the MC been wearing his helmet at the time of the mishap (Tabs CC-11 to CC-12 and X-2).

h. PC 211 Overaggressive

Overaggressive is a factor when an individual or crew is excessive in the manner in which they conduct a mission (Tab BB-33).

The AIB's review showed the MIP had an overaggressive mission plan (Tabs V-3.4, V-3.6, and V-5.5 to V-5.6). The MIP planned a complex mission for that night's training event which left the other instructor pilot, the NMF1, confused at the end of the brief (Tab V-3.4, V-3.6, and V-3.7). The planned mission had multiple elements that are not required by the 56 FW combined wingman syllabus for the SAN-3 sortie such as: 1) using a FAC(A) is not required—the mission is accomplishable using just a JTAC, both are not required, 2) two separate two ships are not required, 3) NVG high-angle strafe is not required, and 4) NVG low altitude qualification is only needed if going below the minimum safe altitude (Tabs V-3.7 to V-3.8, V-3.9 to V3.11, V-10.10 to V-10.4, V-31.1 to V-31.4, and BB-20). The MIP also planned to perform low altitude qualification for both the MP and NMF2, requiring a complicated flight instructor switch between the MP and NMF2 in flight (Tab V-3.9 to V3.11). The NMF1 stated he felt relieved when, due to the late start of *Bolt Flight*, they avoided the low altitude qualification portion of the mission for NMF2 (Tab V-3.11). The MIP was also aggressive in taking terminal attack control during the mishap strafe without receiving confirmation from the ground element (Tab N-7). Through the SA-8 training target attacks, the MIP continued to push high-angle strafe attacks for the MP to perform without providing instruction or guidance after MP's failed attempts (Tabs N-4 to N-7). The MIP also never verified that the MP was looking at the right target (Tabs N-4 to N-7).

i. PP 102 Cross-Monitoring Performance

Cross-monitoring performance is a factor when crew or team members failed to monitor, assist or back-up each other's actions and decisions (Tab BB-35).

The evidence showed little monitoring, assistance and back up between members during the mishap night training events (Tab N-2 to N-7 and BB-53 to BB-57). The MP failed to fire during two attacks prior to the mishap strafe attack (Tab BB-53 to BB-56). On the first strafe attack, the MP targeted the friendly OP, squeezing the trigger, but not firing only because his Master Arm Switch was on SIM (Tab BB-53). The MP explained why he did not fire as "off dry, avionics" (Tab N-4). Even though the MP had erroneously targeted the friendly OP, the MIP's feedback did not address that aspect of the pass (Tab N-4).

The MP setup and rolled-in on the correct target on the second pass but chose not to fire (Tab BB-54). The MP stated "off dry" (Tab N-5). The MIP asked the MP for the reason he did not fire and the MP explained the IR marker on the target looked different from what he was expecting, but that he "was wrong" (Tab N-5 to N-6). Instead of providing feedback and making sure the MP was on the right target, the MIP coordinated as the FAC(A) for the NMF to attempt another GBU-12 attack on the SA-8 training target (Tab N-6). The MP's next strafe attempt was the fatal strafing run on the friendly OP (Tab BB-56).

Members of the ground element stated that it seemed like one of the aircraft flew over the OP during one attack which the pilot aborted (Tabs R-8 and V-32.12). The MJ11 noted this concerned him, but he thought that the MIP, as FAC(A), still had situational awareness of where the aircraft he was controlling were (Tab R-8). None of the members from the ground element queried the MIP or MP regarding this aircraft's position, or whether the pilot of the aircraft was visual friendlies (Tab N-2 to N-7).

Further determination of Human Factors causal or contributing to the mishap was not possible because the MIP declined to provide a statement and the MP provided only a limited written response to the AIB (Tab V-1.1 to V-1.3 and V-28.1 to V-29.1).

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Publically Available Directives and Publications Relevant to the Mishap

- (1) AFI 11-2F-16, Volume 1, *F-16 Pilot Training*, Dated 20 April 2015
- (2) AFI 11-2F-19, Volume 1, *Air Education and Training Command Supplement, F-16-Pilot Training*, Dated 8 January 2016
- (3) AFI 11-2F-16, Volume 3, *F-16 Operations Procedures*, Dated 13 July 2016
- (4) AFI 11-214, *Flying Operation Rules and Procedures, Incorporating Change 1, 23 March 2016*, Dated 23 March 2016
- (5) AFI 11-214, *Air Education and Training Command Supplement Flying Operation Rules and Procedures, Incorporating Change 1, 23 March 2016*, Dated 15 July 2016
- (6) AFI 13-112 Volume 1, *Space, Missile, Command and Control, Joint Terminal Attack Controller (JTAC) Training Program, Incorporating Through Change 3, 21 August 2014*, Dated 15 February 2008
- (7) AFI 13-212, *Holloman Air Force Base, Addenda-A, Space, Missile, Command, and Control, Holloman Primary Training Ranges*, Dated 15 March 2011
- (8) AFI 13-212, Volume 1, *Nuclear, Space, Missile, Command and Control Operations, Range Planning and Operations*, dated 23 April 2015
- (9) Air Force Tactics, Techniques, and Procedures 3-3.F.F-16, *Combat Aircraft Fundamentals F-16*, Dated 12 July 2016
- (10) AFI 44-170, *Certified Current 19 January 2016, Preventive Health Assessment*, Dated 30 January 2014
- (11) Holloman Air Force Base Instruction 11-250, *Flying Operations, Air Field Operations Instruction*, Dated 27 June 2014
- (12) AFI 91-204, *Safety Investigations and Reports*, dated 19 January 2017

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

b. Other Directives and Publications Relevant to the Mishap

- (1) F-16 Pilot Training Course Lesson Guide, *NVG Considerations – L-824*, Dated 17 July 2015
- (2) F-16 Pilot Training Course Lesson Guide, *Principles and Techniques of Instruction – L0919*, Dated 23 July 2016
- (3) TO 1F-16CG-6WC-1, *Combined Preflight/Postflight, End-of-Runway, Thruflight, Launch and Recovery, Alert Inspections, Quick Turnaround, Basic Postflight, and Walkaround Before First Flight of Day Inspection Workcards*, Dated 1 November 2013
- (4) Air Force Technical Order 00-20-1, *Aerospace Equipment Maintenance Inspection, Documentation, Policies, and Procedures*, Dated 1 April 2016

- (5) AETC Syllabus F16C0B00PL (56 FW), F16C0TX0PL (56 FW), F16C0SOCPL (56 FW), F-16C/D Initial Qualification (56 FW), dated September 2015
- (6) ATP 1-02.1, MCRP 3-30B.1 [MCRP 3-25B], NTTP 6-02.1, AFTTP 3-2.5, *Brevity, Multi-Service Tactics, Techniques, and Procedures For Multi-Service Brevity Codes*, Dated July 2016

26 September 2017



PATRICK M. WADE,
Major General, USAF
President, Accident Investigation Board

STATEMENT OF OPINION

F-16C, T/N 88-0496 WHITE SANDS MISSILE RANGE, NEW MEXICO 31 JANUARY 2017

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

1. OPINION SUMMARY

On the night of 31 January 2017, at 19:18:31 hours local, an F-16 mistakenly fired 155 rounds of 20mm training projectile (TP) bullets at the supporting Joint terminal attack controllers' (JTAC) position on the observation point (OP) in the Red Rio bombing range, injuring one person and killing another. The mishap pilot (MP) was assigned to the 311th fighter squadron, Holloman Air Force Base, New Mexico, and enrolled in the F-16 Formal Training Unit program, where he was learning to fly and employ the F-16. On 31 January 2017, the MP was flying a night, close-air support (CAS) training sortie under the supervision of the mishap instructor pilot (MIP) in a second F-16. After 57 minutes working with the JTACs during which the MP had a successful inert laser-guided bomb attack and two failed strafing attempts, the MP pointed his aircraft at the OP and fired his gun. One 20mm TP bullet fragment struck the mishap contractor (MC) in the back of the head. The MC was not wearing his Kevlar helmet or body armor. The ground element subsequently administered the MC urgent care. Cherokee Range Control contacted a nearby UH-60 Air Force helicopter, which expeditiously extracted the MC, continued to administer him urgent care in-flight and transported him to Gerald Champion Regional Medical Center in Alamogordo, NM. The mishap contractor died at the hospital, at 21:01 hours L. Bullet fragments from the strafing pass caused the mishap JTAC minor injuries. The 20mm TP rounds additionally struck three vehicles, one of which eventually ignited in flames and burned.

I find, by the preponderance of the evidence, the cause of the mishap were two pilot errors that led to the errant firing upon the ground element's location. The MP misperceived that the ground element's location was the intended simulated SA-8 training target. Additionally, the MP misinterpreted his instruments as he failed to follow his on-board systems that were directing him to the proper target. The MP erroneously aimed his F-16 at the ground element's location, and fired his gun.

I also find, by the preponderance of evidence, the MIP's failure to provide adequate supervision and instruction significantly contributed to the mishap. The MIP failed to cross-monitor the MP's performance prior to and during the MP's fatal strafing attack. The MIP exhibited task misprioritization as he focused his attention on Forward Air Controller (Airborne) (FAC(A)) duties while his student, the MP, was performing his strafing attacks. The MIP displayed overconfidence, complacency and overaggressiveness during the mishap sortie; the MIP failed to verify that the MP

correctly saw the intended target, and did not properly monitor the MP before the MP commenced the strafe attacks. The MIP also aggressively cleared the MP on the final strafing attack without the JTAC transferring terminal attack control to the MIP as FAC(A).

A possible contributing factor to the MC's death was his failure to wear his required personal protective equipment during the strafing attack. Based on the evidence, the board could not determine by a preponderance of the evidence the probability of whether the MC's injury was preventable or the severity reduced had the MC been wearing his helmet at the time of the mishap.

I developed my opinion by analyzing factual data based on witness testimony, flight records, video and audio recordings, Air Force directives and Technical Orders.

2. CAUSE

The cause of the mishap was pilot error. Specifically, the mishap pilot misidentified the OP, where the ground party was located, as the intended SA-8 training target. The MP also misinterpreted his instruments and failed to follow his on-board systems that were directing him to the proper target.

The MP was performing his first night, CAS mission training sortie. During the sortie (11 minutes prior to the mishap), the MIP told the MP to set up for his attack, and the MIP used his targeting pod (TGP) to mark the SA-8 training target. The MP erroneously moved his TGP onto the ground element's location at the OP and stated, "two's capture the target." The MP did not attempt to employ ordinance as the MIP aborted this strafing attack, while performing FAC(A) duties, to allow for the other two-ship flight (Bolt-flight) participating in the training sortie to attempt a bombing attack on the SA-8 training target. The MP never again aimed his TGP at the ground element's location. For the remainder of the sortie, up until the mishap, all sensor information, including the MIP's data-linked target information, the MP's own target data and all information in the MP's heads-up-display (HUD), directed the MP to the correct target.

In two of three intended strafing passes, however, the MP pointed his F-16 at the OP. During the first strafing pass, while under the Mishap JTAC one's (MJ1) terminal attack control, the MP did not follow his own inertial navigation system (INS) data. The MP instead aimed at the OP and squeezed the gun's trigger. The mishap aircraft did not fire as the MP failed to arm the gun. During the second strafing pass, again under MJ1's terminal attack control, the MP's INS data was on the proper target. This time, the MP pointed his aircraft at the correct target but aborted his pass. The MP explained that he did not fire because he was confused about what he saw looking outside his cockpit. At 19:18:17 hours L, the MIP cleared the MP for the final strafing attack. The MP momentarily pointed his F-16 at the intended target (INS and TISL data both pointed to the correct target). The TISL data in the HUD rapidly moved up, then down and out of view due to the mishap aircraft's TGP performing a "gimbal roll" (this was untimely, but a routine and normal occurrence). The MP moved the mishap aircraft 15 heading degrees to the left, pointed at the OP (INS data was on the proper target, but the HUD symbolology was out of view), and fired his gun.

I find, by the preponderance of the evidence, the MP misperceived that the ground element's location was the intended simulated SA-8 training target. Additionally, the MP misinterpreted

his instruments as he failed to follow his on-board systems that were directing him to the proper target.

3. SUBSTANTIALLY CONTRIBUTING FACTORS

A significantly contributing factor to the mishap was the MIP's failure to provide adequate supervision and instruction.

a. Cross-Monitoring Performance

The MIP provided inadequate monitoring and very limited assistance to the MP during the mishap night training events. The MP had two failed strafing attempts prior to the third, fatal attack. The MIP failed to realize that the MP erroneously aimed his F-16 at the OP twice. The MIP coordinated for *Bolt-flight* to conduct a bombing attack without providing feedback to the MP and repositioned him throughout the airspace haphazardly. After the MP verbalized confusion over the target during his second strafing attempt, the MIP did not try to provide any additional guidance to ensure the MP was on the correct target, but instead directed the MP to prepare for his attack and subsequently cleared him to prosecute the attack. The MP then performed the mishap strafe on the OP.

I find by a preponderance of the evidence that the MIP failed to effectively cross-monitor the MP's performance.

b. Task Misprioritization

The MIP misprioritized his duties between acting as an instructor pilot and as a FAC(A). The MIP was primarily performing FAC(A) duties prior to and during the mishap. During the sortie, the MIP directed the MP to fly his aircraft to a separate holding location approximately 14 nautical miles away, while the MIP performed a solo-attack. The MIP continued his attention on controlling *Bolt-flight*, and intermittently directed the MP to attack the target. As the MP failed to successfully identify and attack the proper target, the MIP only provided vague direction and no instruction. During the MP's fatal strafe attack, the MIP asked for another target in the objective area, attempted communications with the JTAC and failed to effectively monitor the MP.

I find by a preponderance of the evidence that the MIP misprioritized his tasks between acting as an instructor pilot and as a FAC(A).

c. Overconfidence

The MIP planned and briefed a complex mission that required the MIP to act as both instructor for the MP and as FAC(A) during a night CAS training sortie for four total F-16s (two flights of two aircraft). The MIP showed overconfidence in the MP's ability to handle this complex mission as this was the MP's first close air support mission at night and only the MP's second time performing high-angle strafe at night. The MP previously achieved only a grade of "1" for night high-angle strafe on a lit range, meaning the MP needed instructor guidance on subsequent night high-angle strafe passes. The MIP directed the MP to a separate holding point on his own rather than providing adequate mutual support. The MIP directed the MP away from the target, back on it, away, and back again while he tried to work with *Bolt-flight*. Throughout the sortie, the MIP gave

non-specific directions to the MP regarding attack geometry, which required greater autonomy on the part of the MP.

I find by a preponderance of the evidence that the MIP demonstrated overconfidence with respect to the MP.

d. Complacency

The MIP showed a state of reduced conscious attention. The MIP sent the MP to separate holding locations and provided minimal instruction during the MP's attacks. After the MP's two failed strafe attempts, the MIP did not instruct the MP on how to improve his strafing passes and did not provide instruction or clarification to the MP on what the MP was seeing in regards to the SA-8 training target.

I find by a preponderance of the evidence that the MIP demonstrated complacency.

e. Overaggressive

The MIP orchestrated an overaggressive mission plan, which left the non-mishap flight instructor pilot confused at the end of the mission-brief. The planned mission had multiple elements that were not required by the 56th Fighter Wing's combined wingman syllabus for the sortie, such as two separate two ships, high-angle strafe, and NVG low altitude qualification requiring a complicated wingman shuffle during the night-flight. The MIP was also aggressive in assuming terminal attack control during the mishap strafe without receiving confirmation from the ground element. Throughout the SA-8 training target attacks, the MIP continued to push for high-angle strafe attacks without providing instruction. The MIP never verified that the MP was looking at the correct target.

I find by a preponderance of the evidence that the MIP was overaggressive in his scenario planning and execution.

4. CONCLUSION

I find, by the preponderance of the evidence, that the cause of the mishap was the MP's error. The MP's error was based on a misperception that the ground element's location was the intended SA-8 training target at Red Rio range. Additionally, the MP misinterpreted his instruments as he failed to follow his on-board systems that were directing him to the proper target. The MIP's failure to provide adequate supervision and instruction substantially contributed to the mishap. It is

ultimately the pilot-in-command's responsibility to positively identify the target before employing ordinance, regardless of external influences. The MP, as the qualified pilot-in-command of his F-16, was causal in this mishap.

A handwritten signature in black ink, appearing to read "Patrick M. Wade". The signature is fluid and cursive, with a large initial "P" and "M".

26 September 2017

PATRICK M. WADE,
Major General, USAF
President, Accident Investigation Board

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