

COMBINED INVESTIGATION BOARD REPORT



F/A-18 FRIENDLY FIRE INCIDENT

LOCATION: HELMAND PROVINCE, AFGHANISTAN

DATE OF INCIDENT: 5 DECEMBER 2006

BOARD PRESIDENT

SENIOR UK MEMBER

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**EXECUTIVE SUMMARY
COMBINED INVESTIGATION BOARD
FRIENDLY FIRE INCIDENT
HELMAND PROVINCE, AFGHANISTAN
5 December 2006**

On 5 December 2006, Z Company, 45 Commando, United Kingdom Royal Marines conducted a clearance operation in the vicinity of Helmand Province, Afghanistan. During this operation the Royal Marines came under enemy fire, declared a troops-in-contact situation and received coalition air support. After being sequentially supported by a section of U.S. Navy F/A-18C aircraft from , call signs , hereinafter referred to as Incident Pilot One and Incident Pilot Two respectively, provided close air support. Following three successful weapons deliveries, Incident Pilot One, the lead F/A-18C, was directed to strafe an area 50 meters south of a target he had just successfully engaged with a laser guided bomb. After accurately designating the intended target using onboard sensors, Incident Pilot One initiated a roll-in. During the roll-in, Incident Pilot One visually misidentified the target, was CLEARED HOT by the Joint Terminal Attack Controller, , hereinafter referred to as the JTAC, removed onboard sensors from the target and strafed the friendly position. Two members of 1 Troop/Z Company became casualties: Royal Marine , hereinafter referred to as Incident Royal Marine One, was fatally injured; and Royal Marine , hereinafter referred to as Incident Royal Marine Two was seriously injured.

After a thorough analysis, the Combined Investigation Board concluded the primary cause of this friendly fire incident was target misidentification by Incident Pilot One. The target assigned by the JTAC was a tree line from which he was receiving enemy fire. This tree line was 50 meters south of the target just prosecuted, which ran generally in an east-west direction and south of a compound with a crater to its west. Incident Pilot One correctly identified the target using the and refined the aim point on the Forward Looking Infrared while setting up for the attack. At initial roll-in, the aircraft sensors were still accurately depicting the intended target. During the strafing run, Incident Pilot One visually identified a different tree line also running east-west, south of a compound with a crater to its west, as his target. Incident Pilot One undesignated sensors and adjusted the strafing run based on the visual target identification. This was in fact the location of the JTAC and 13 members of 1 Troop. After being CLEARED HOT, Incident Pilot One expended approximately 213 rounds of 20 millimeter ammunition on the friendly position.

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COMMONLY USED ACRONYMS AND ABBREVIATIONS

AGL	Above Ground Level
AO	Area of Operations
ATO	Air Tasking Order
CAS	Close Air Support
CFC-A	Combined Forces Command - Afghanistan
CIB	Combined Investigation Board
CJTF-76	Combined Joint Task Force-76
CO	Commanding Officer
CVW-7	Carrier Air Wing SEVEN
DoD	Department of Defense
FLIR	Forward Looking Infrared
HEI	High Explosive Incendiary
HFACS	Human Factors Analysis and Classification System
HUD	Head Up Display
IR	Infrared
ISAF	International Security Assistance Force
JTAC	Joint Terminal Attack Controller
L	Local Time
MGRS	Military Grid Reference System
OEF	Operation ENDURING FREEDOM
PGU	Projectile Gun Unit
RC-S	Regional Command South
ROE	Rules of Engagement
SAPHEI	Semi-Armor Piercing High Explosive Incendiary
SPINS	Special Instructions
STANAG	Standard NATO Agreement
TIC	Troops-In-Contact

TP	Target Practice
TTP	Tactics, Techniques and Procedures
UK	United Kingdom
U.S.	United States
XO	Executive Officer
Z	Zulu Time (GMT)

1. CIRCUMSTANCES, PURPOSE AND AUTHORITY

a. Circumstances

On 5 December 2006, a company of Royal Marines conducted a clearance operation in Helmand Province, Afghanistan. During this operation, the Royal Marines came under enemy fire and received coalition air support. After being supported by other coalition aircraft, two U.S. Navy F/A-18C aircraft provided close air support. Following three successful weapons deliveries, the lead aircraft was directed to strafe an area 50 meters south of a target just engaged with a laser guided bomb. After accurately designating the intended target using onboard sensors, the pilot initiated a roll-in. During the roll-in, the pilot misidentified the target visually, was CLEARED HOT by the JTAC, undesignated the target and strafed the friendly position approximately 460 meters northwest of the intended target. Two Royal Marines were injured at the time of the strafing; one fatally and one seriously. (TAB A generally, TABs A-III-b and A-VI-a specifically)

b. Purpose

On 15 December 2006, Commander, U.S. Central Command Air Forces convened a Combined Investigation Board (CIB). The purpose of the CIB was to conduct a legal investigation into the facts and circumstances surrounding the suspected friendly fire incident. Board members were (TABs B-I and B-II):

<u>Rank</u>	<u>Name</u>	<u>Position</u>
RADM		Board President
WG CDR		Senior UK Member
CAPT		Senior Legal Advisor
CDR		Pilot/FAC(A)/F/A-18C
CDR		Naval Safety Center
Lt Col		Investigating Officer
Maj		Air Force Safety Center
LCDR		Flight Surgeon
SQN LDR		Legal Advisor
LT		Maintenance Officer
Capt		Recorder
MSgt		JTAC
YN1		Administration/ADP Support
TSgt		Administration/ADP Support
TSgt		Court Reporter

The CIB report includes findings of fact, opinions and recommendations, cause(s) of the incident and resulting death, injury and damage. Further, the CIB made an

assessment as to any fault or neglect, recommendations concerning corrective operational and training measures, as appropriate and administrative and disciplinary actions. Assessments as to fault or neglect and recommendations concerning administrative and disciplinary actions involving United States (U.S.) or United Kingdom (UK) personnel were only made through the respective national members of the CIB. (TAB B-I)

c. Authority

The authority for this investigation is contained in the 8 December 2006 Commander U.S. Central Command memorandum, 15 December 2006 Commander U.S. Central Command Air Forces memorandum and Department of Defense Instruction 6055.7, paragraphs E4.6 and E4.7. Where appropriate, general guidance on the conduct of this investigation was taken from Air Force Instruction 51-503, 16 July 2004. (TAB B-I and B-III)

2. INCIDENT SUMMARY

On 5 December 2006, near _____, Helmand Province, Afghanistan, while providing Close Air Support for UK Royal Marines, the lead aircraft of two U.S. Navy F/A-18C aircraft from Strike Fighter Squadron ONE THREE ONE flying from USS DWIGHT D. EISENHOWER, Incident Pilot One, misidentified and strafed a friendly position. Approximately 213 rounds of 20 millimeter ammunition were fired in the area of 1 Troop/Z Company 45 Commando and two Royal Marines were injured; one fatally and one seriously. Both were medically evacuated to Camp Bastion. (TABs C-I, I-I and I-3)

3. BACKGROUND

a. Operation Enduring Freedom

Operation Enduring Freedom (OEF) began on 7 October 2001 and is the official U.S. Government name for its global military response to the 11 September 2001 attacks against the United States. Operation Enduring Freedom - Afghanistan (OEF-A) is the official U.S. Government name of the subordinate operation being conducted in Afghanistan. Its military objectives, as outlined by President George W. Bush in his address to the U.S. Congress on 20 September 2001, include the destruction of terrorist training camps and infrastructure. The U.S. often conducts OEF-A operations jointly with coalition forces including the UK. The UK has been involved in Afghanistan since OEF's inception in 2001.

b. Combined Forces Command – Afghanistan

Combined Forces Command – Afghanistan (CFC-A) is the overall U.S.-led strategic command of coalition forces in Afghanistan at the time of the incident and reports directly to US Central Command (CENTCOM).

c. Combined Joint Task Force – 76

Combined Joint Task Force - 76 (CJTF-76), a subordinate unit of CFC-A, is the operational headquarters for the southern and eastern regional commands in Afghanistan. The mission of CJTF-76 is to conduct a full spectrum of operations throughout its area of operations to defeat enemy extremist movement, establish an enduring security and reshape its posture for the long war in order to set conditions for long-term stability in Afghanistan. Six major task forces (TF) comprise CJTF-76, including the multinational TF AEGIS, which encompass the United Kingdom's TF Helmand and is assigned to the southern area.

d. Carrier Strike Group EIGHT

Carrier Strike Group EIGHT was operating in the Northern Arabian Sea in support of Operation ENDURING FREEDOM. Some of the units assigned to Carrier Strike Group EIGHT are: USS DWIGHT D. EISENHOWER, Carrier Air Wing SEVEN, and among other squadrons, Strike Fighter Squadron ONE THREE ONE.

e. USS DWIGHT D. EISENHOWER

USS DWIGHT D. EISENHOWER was operating in the Northern Arabian Sea providing a wide range of flexible mission capabilities, to include maritime security operations, forward naval presence, sea control, launch and recovery of air wing aircraft and intermediate maintenance support for the embarked air wing.

f. Carrier Air Wing SEVEN

Carrier Air Wing SEVEN (CVW-7) was operating aircraft from USS DWIGHT D. EISENHOWER in support of coalition ground forces operating in Afghanistan.

g. Strike Fighter Squadron ONE THREE ONE

Strike Fighter Squadron ONE THREE ONE was operating F/A-18C aircraft from USS DWIGHT D. EISENHOWER as part of CVW-7 providing close air support to coalition forces in Afghanistan.

h. International Security Assistance Force (ISAF)

ISAF is an international stabilization force in Afghanistan authorized by the United Nations Security Council (UNSCR 1386) on 20 December 2001. The ISAF mission was to secure Kabul and the surrounding areas from the Taliban, al Qaida and factional

warlords, in order to allow for the establishment and security of the Afghan Transitional Administration. The ISAF mandate did not go beyond Kabul for almost two years when the Security Council voted unanimously on 13 October 2003, to expand the ISAF mission to the entire country (Resolution 1510). Shortly thereafter, on 31 July 2006, the NATO-led ISAF assumed command of the southern part of the country, ISAF Stage 3, and also by 5 October 2006, the east of Afghanistan, ISAF Stage 4. The expansion created Regional Commands (RCs) in the north at Mazar-E Sharif, in the west at Herat and in the south at Kandahar. Further expansion of the ISAF geographic coverage area was through the formation of Provincial Reconstruction Teams (PRTs) and Forward Support Bases. The UK, together with Denmark and Estonia, conducts operations in the south as PRT Lashkar Gah, Helmand province.

i. Z Company, 45 Commando, Royal Marines

Number 3 Commando Brigade UK task force in Afghanistan. Number 3 Commando Brigade is assigned to RC-South under command of Commander ISAF (COMISAF) in Kabul, Afghanistan. Number 45 Commando, a size formation of Royal Marines, deployed to Helmand Province in

j. F/A-18C Aircraft

i. Aircraft Description

The F/A-18C is a single seat, twin engine, multi-mission fighter/attack aircraft that can operate from aircraft carriers or land bases. The F/A-18C conducts a variety of missions such as air superiority, fighter escort, suppression of enemy air defenses, reconnaissance, forward air control, close and deep air support and day/night strike missions. The aircraft's fly-by-wire technology provides reliable and relative ease of control allowing the pilot to concentrate on employment of weapons systems. The F/A-18C employs a variety of air-to-air and air-to-ground general purpose and precision guided ordnance. The weapons system cueing information is integrated into cockpit displays such as head up display (HUD), digital display indicators.

ii. M61A1 Vulcan Cannon

The F/A-18C gun system is the M61A1 20 millimeter and carries up to 578 rounds of ammunition (e.g., PGU-27 [Target Practice], PGU-28 [Semi-Armor Piercing High Explosive Incendiary]). The M61A1 gun system is capable of air-to-air and air-to-ground employment firing at a selectable rate of 4,000 or 6,000 rounds per minute.

iii. Guided Bomb Unit-12 (GBU-12)

The GBU-12 is a 500 pound general purpose bomb with a laser guidance kit installed. After weapon release, the bomb guides on reflected laser energy. The target

can be illuminated by the aircraft dropping the weapon, another airborne asset, or a ground based platform.

iv. Guided Bomb Unit-38 (GBU-38)

The GBU-38 is a 500 pound general purpose bomb with a Joint Direct Attack Munition (JDAM) kit installed. The JDAM kit is a tail section containing an inertial navigation system and Global Positioning System (GPS) guidance control unit. The GBU-38 will guide to an entered coordinate upon release.

vii. Buddy-Lasing

Buddy-lasing is a technique to deliver laser guided ordnance released by a pilot that does not have a laser / FLIR available. Buddy-lasing is accomplished by using a second airborne asset to guide the weapon. A common buddy-lasing technique is to have one aircraft laser a target while a second aircraft delivers a laser guided weapon. The weapon is then guided by reflected laser energy.

k. Joint Terminal Attack Controller (JTAC)

The JTAC is the forward ground forces commander's Close Air Support (CAS) expert. JTACs provide the ground forces commander recommendations on use of CAS and its integration with ground maneuver. The JTAC is a qualified service member who, from a forward position, directs the action of combat aircraft engaged in CAS and other air operations.

The primary duties of the JTAC are:

1. Know the enemy situation, selected targets and location of friendly units.
 2. Be familiar with the supported units' plans, positions and needs.
 3. Locate targets of opportunity.
 4. Advise the supported commander on proper air employment.
 5. Request and control CAS and report battle damage assessment.
- (TABs J-IV and J-XV)

A JTAC will be recognized as capable and authorized to perform terminal attack control using GPS, maps/imagery, day/night marking devices, night vision devices, laser designators, laser range finder and tactical radios to receive approval from ground commanders to employ airpower. (TABs J-IV and J-XV)

The JTAC will use a standardized CAS briefing known as the 9-Line Briefing. The 9-Line Briefing communicates critical targeting information rapidly in a standard format. The 9-Line Briefing is used with fixed- and rotary-wing aircraft when conducting CAS. When controlling airstrikes the JTAC will use Type 1, 2 or 3 control. (TABs J-IV, J-XV and J-XVI)

i. Type 1

Type 1 control is used when the JTAC must visually acquire the attacking aircraft and the target for each attack. Analysis of attacking aircraft geometry is required to reduce the risk of the attack affecting friendly forces. (TABs J-IV, J-XV and J-XVI)

ii. Type 2

Type 2 control is used when the JTAC requires control of individual attacks and any or all of the following conditions exist: (1) The JTAC is unable to visually acquire the attacking aircraft at weapons release; (2) The JTAC is unable to visually acquire the target; (3) the attacking aircraft is unable to acquire the mark/target prior to weapons release. Examples of when Type 2 control may be applicable are night, adverse weather and high altitude or standoff weapons employment. (TABs J-IV, J-XV and J-XVI)

iii. Type 3

Type 3 control is used when the JTAC requires the ability to provide clearance for multiple attacks within a single engagement subject to specific attack restrictions. Like Type 1 and 2, only a JTAC can provide Type 3 control. During Type 3 control, JTACs provide attacking aircraft targeting restrictions (e.g., time, geographic boundaries, final attack heading, specific target set, etc.) and then grant a "blanket" weapons release clearance ("CLEARED TO ENGAGE"). Type 3 control does not require the JTAC to visually acquire the aircraft or the target; however, all targeting data must be coordinated through the supported commander's battle staff. The JTAC will monitor radio transmissions and other available digital information to maintain control of the

engagement. The JTAC maintains abort authority. Observers may be utilized to provide targeting data and the target mark during Type 3 Control. (TABs J-IV, J-XV and J-XVI)

4. SEQUENCE OF EVENTS

a. Mission

On 5 December 2006, Z Company, 45 Commando, UK Royal Marines conducted a clearance operation in the vicinity of [redacted], Helmand Province, Afghanistan. This operation involved moving three Troops [redacted] through approximately 1.5 kilometers of terrain to the south of [redacted] (Figure 4.a.1). The JTAC, [redacted], embedded with 1 Troop of Z Company as the operation unfolded. The company came under enemy fire and declared a troops-in-contact (TIC) situation, labeled TIC-IA. Initial coalition air support was provided by [redacted] before the Incident Flight checked in. (TABs A-VII, A-XXII and TAB I-VIII)

[redacted] Air Tasking Order (ATO) [redacted] tasked a section of F/A-18C aircraft from USS DWIGHT D. EISENHOWER to provide close air support (CAS) in support of ground operations in northern Helmand province. The two aircraft were piloted by Incident Pilot One, [redacted] and Incident Pilot Two, [redacted]. After an uneventful launch, rendezvous, transit and aerial refueling, Incident Pilot One established initial communications with ground units. The Incident Flight was then directed to support TIC-IA in central Helmand province. (TABs A-III-a, A-III-b, A-III-c, I-III, I-IV, I-VI and I-VII)

Figure 4.a.1 (TAB A-XXII and D-II-c-3)

b. Planning

Incident Pilot One commenced planning for the mission the day prior to ATO receipt. He gathered applicable information, collated in-flight reference material and readied the brief for the expected mission. After briefing overall coordination with all air wing assets supporting OEF that day, Incident Pilot One conducted a flight specific brief with Incident Pilot Two. The Ground Liaison Officer (GLO) onboard USS DWIGHT D. EISENHOWER received word that TIC-IA was active and Incident Pilot One specifically covered that potential area of operations (AO). In addition to the expected AO, Incident Pilot One briefed all the anticipated weapons delivery profiles. Flight planning and briefing were adequate and not a factor in this incident. (TAB A-III-b)

c. Flight

The Incident Flight checked through two different ground controllers before being directed to support TIC-IA under the JTAC's control. Upon check in, the JTAC passed Military Grid Reference System (MGRS) coordinates of the friendly position to the Incident Flight. Incident Pilot One entered the coordinates and cued the FLIR to the position. A short talk-on to the specific position ensued and Incident Pilot One positively identified the position using the (TABS A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

The Incident Flight then performed Non-Traditional Intelligence Surveillance and Reconnaissance (NTISR) in an area of interest to the JTAC. Incident Pilot One received the coordinates and executed the tasking while talking Incident Pilot Two onto the target area. After several minutes, the JTAC informed the Incident Flight to standby to copy new target grid coordinates. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I, C-II and, I-VII)

The JTAC passed new tasking in eight digit MGRS format, calling for a GBU-12 on the target. Incident Pilot One communicated target confirmation with the JTAC and received permission to run in from the southeast onto the target. Incident Pilot One received "CLEARED HOT onto that target" from the JTAC about one minute prior to weapon release. The aircraft profile for delivering the GBU-12 was standard and uneventful. Apparent artillery impacts of an unknown origin are visible on the FLIR in the southwest corner of the same compound approximately 10 seconds prior to weapon release. Laser designation and support were within tactical standards, but the GBU-12 fell about 20 meters short of the intended target. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

The JTAC called for an immediate re-attack on a tower in the northwest corner of the same compound using the 20 millimeter gun. Incident Pilot One received a "CLEARED HOT on that target" almost immediately (approximately 1 1/2 minutes before roll-in) and received a second "CLEARED HOT on that target" 30 seconds prior to roll-in. Incident Pilot One began his roll-in from the east side of the target at

The briefed strafe delivery parameters were: roll-in at _____ The aircraft only achieved a _____ Incident Pilot One pulled the trigger passing _____ resulting in a slant range of _____ without an "IN RNG" HUD cue. The target designation diamond remained in the HUD until after rolling out, aligning the gunsight and firing on a tower in the northeast corner of the compound. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

The JTAC passed new target coordinates almost immediately using _____ MGRS. Incident Pilot Two had the only remaining GBU-12 and his FLIR was inoperable. Incident Pilot One directed the flight to join and use buddy-lasing to deliver ordnance from a generally west to east direction. For the first pass at the target, the flight joined _____ from the target with Incident Pilot One as the lead. The JTAC never actually gave a CLEARED HOT for this pass. The JTAC told Incident Pilot One to "target that position" almost 3 minutes prior. The JTAC asked for a "release call" about 1 minute prior to intended release. Incident Pilot One gave the standard "30 seconds" to release call, but never told Incident Pilot Two to initiate release because Incident Pilot One was unable to achieve target acquisition on the _____ FLIR. No ordnance dropped on this run. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

The Incident Flight set up for another generally west to east attempt. Incident Pilot One actually asked "Confirm we are CLEARED HOT on a 090 run in heading". The JTAC responded with a "CLEARED HOT" about 20 seconds prior to intended weapon

release. Incident Pilot One made the call to the JTAC "one away" to indicate a bomb had been dropped before Incident Pilot Two told him no ordnance was released because of a switch position error in his cockpit. No ordnance dropped on this run. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

As the flight set up for another generally west to east run, Incident Pilot One talked Incident Pilot Two through cockpit settings required to release a laser guided weapon with buddy-lasing. Incident Pilot One acquired the correct target, the JTAC gave the CLEARED HOT 30 seconds prior to release, Incident Pilot Two released the weapon, and Incident Pilot One successfully guided the GBU-12 to the intended impact point. Within eight seconds of impact, the JTAC indicated he had another target for Incident Flight to prosecute. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

d. Incident Sequence

The JTAC then directed Incident Pilot One to strafe the tree line 50 meters south of the target he just hit. After the talk-on by the JTAC, Incident Pilot One positively moved the target designation on the FLIR over the target described by the JTAC. After some discussion of fuel states, Incident Pilot One directed Incident Pilot Two to stay with him for this run and plan on executing a strafing run correcting off of his strafe hits. Incident Pilot One briefed the expected strafe pattern for Incident Pilot Two:

altitude roll-in, firing from

As Incident Pilot One continued to

set up for his strafe run, he maintained the target designation. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

Incident Pilot One performed a continuous descending turn prior to aggressively maneuvering for roll-in at

During the roll-in

maneuver, the target designator diamond was visible in the HUD, positioned on the correct target (Figure 4.d.1). Prior to rolling out, the JTAC said "CLEARED HOT on that target". As Incident Pilot One begins to roll out, he undesignated the target which removed the target designator diamond from the HUD (Figure 4.d.2). Incident Pilot One completed maneuvering the aircraft with the gun sight on the friendly position and fired approximately 213 ammunition rounds (Figure 4.d.3). During the off target maneuver, the JTAC made a "CHECK FIRE" call. The Incident Flight confirmed armament switches in the safe position and climbed to a medium altitude orbit over the target. After orbiting for a few minutes, and unclear as to the situation on the ground, the Incident Flight exited the AO to refuel. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, C-I and C-II)

Figure 4.d.1 – Rolling in with diamond present

(TAB H-II)

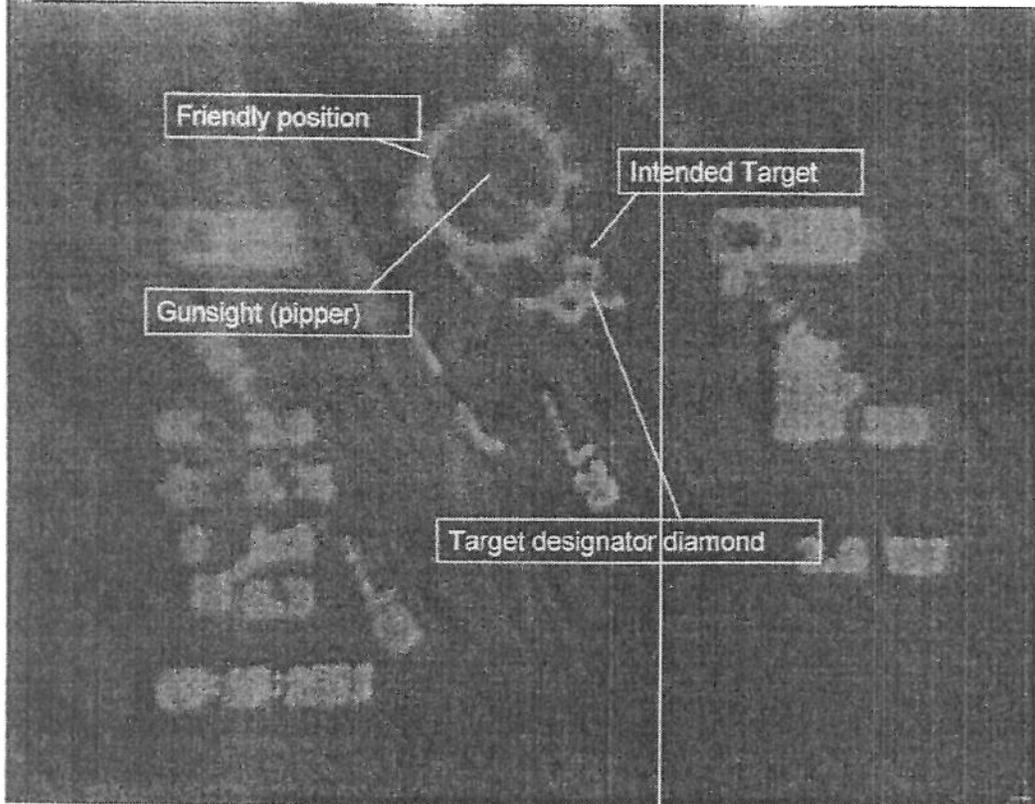


Figure 4.d.2 - Beginning of roll out, diamond absent

(TAB H-II)

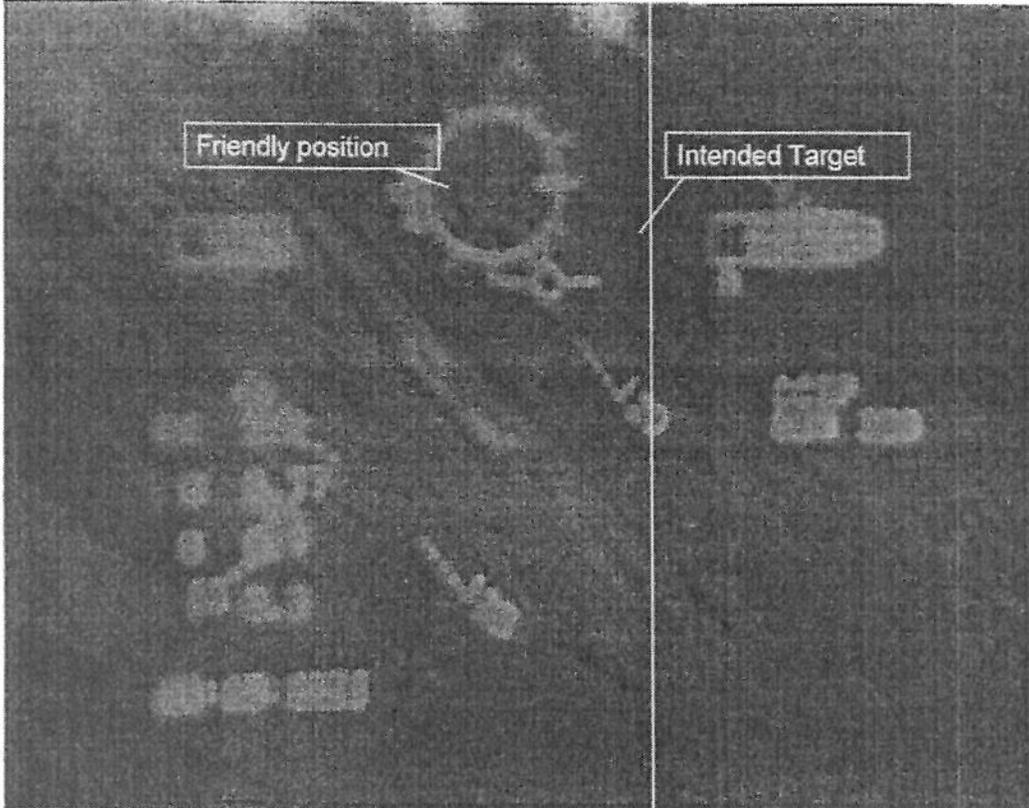
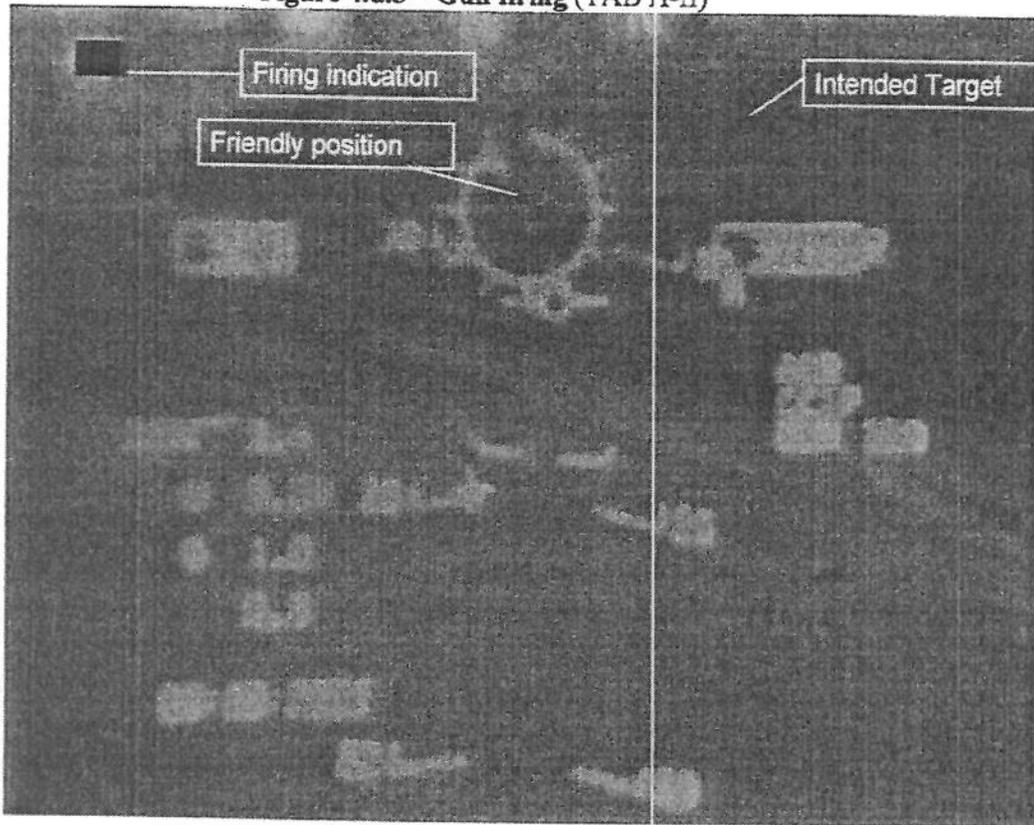


Figure 4.d.3 – Gun firing (TAB H-II)



Royal Marines were located in a trench at the point labeled friendly position (Figure 4.d.3) at the time of the incident strafe. Several of them witnessed rounds striking the earth along the trench as they took cover. After the strafe, Incident Royal Marine One was found lying on his back. Several Royal Marines moved to assist Incident Royal Marine Two

Royal Marines in the trench reported feeling something strike them and of the sustained damage to their equipment. No other injuries were found. (TABs A-I, A-II, A-IV, A-VI-a, A-VII, A-VIII, A-X, A-XIII-a, A-XIII-b, A-XIII-c, A-XV, A-XXI, A-XXIII-a and A-XXVI)

e. Medical Evacuation

Subsequent to the strafing attack on the friendly position several Royal Marines attended to Incident Royal Marine One

(TABs A-II, A-IV, A-VII, A-XIII-a, A-XIII-b, A-XIII-c, A-XV, A-XXVI, A-XXV, A-XXVII-a and A-XXVII-b)

Incident Royal Marine Two received transported to Camp Bastion where was required. He was released without apparent complication. (TABs A-VII, A-XXV, A-XXVII-a and A-XXVII-b)

Appropriate medical care was directed to each individual from the battlefield to the hospital at Camp Bastion. It does not appear that any additional actions could have changed the outcome for either casualty. (TABs A-II, A-IV, A-XIII-a, A-XIII-b, A-XIII-c, A-XV, A-XXVI A-XXVII-a and A-XXVII-b)

5. MAINTENANCE

a. Records Review

Aircraft maintenance records for U.S. Navy F/A-18C bureau number side (hereafter referred to as "aircraft ") flown by Incident Pilot One were reviewed. The period of interest was between 26 November and 11 December 2006 with special emphasis on navigational and weapons system discrepancies. A review of the Naval Aviation Logistics Command Operating Maintenance Information System revealed no discrepancies indicative of navigational or weapons system malfunctions and did not indicate any incipient problems with these systems. (TAB G-I)

Aircraft was physically inspected for any discrepancies which may have impaired the vision of the pilot. The windscreen and canopy were in good condition with no visual impairments detected. (TAB G-I)

Aircraft maintenance records for U.S. Navy F/A-18C bureau number side (hereafter referred to as "aircraft ") flown by Incident Pilot Two were also reviewed for the same period of interest as for aircraft Particular focus was placed on FLIR pod discrepancies. The FLIR was installed on 4 December 2006 and no discrepancies were noted until 12 December 2006. (TABs G-I and G-II)

b. Scheduled Maintenance

Logs and records were reviewed and indicate all scheduled maintenance and inspections were performed in accordance with current directives. Aircraft had a current boresight and compass swing. (TABs G-I and G-III)

c. Maintenance Procedures

Records indicate that aircraft was properly prepared for, subsequently released, and accepted for flight. The aircraft received a proper "release and control system check", which is required every seven days, on 1 December 2006. (TABs G-IV and G-V)

Records indicate that aircraft was properly loaded for the mission with the following ordnance:

(TABS G-IV, G-VIII and I-IV)

d. Personnel and Supervision

Personnel records for those who performed the weapons' stations release and control checks, daily and turnaround aircraft inspections were reviewed. Additionally, all records for ordnance personnel and maintenance control "safe-for-flight certification" personnel were reviewed. Personnel performing maintenance, inspection and administrative actions were qualified and current, with all required documentation and designations properly filed. (TAB G-I)

e. Pilot's Flight Gear

Incident Pilot One's aviation life support system and tactical gear were inspected for discrepancies that may have resulted in vision impairment or decision making capabilities. The visor used on the flight in question had some minor scratches with one noticeable scratch just below the viewing area for the left eye, but this scratch does not interfere with normal vision. There were no other unscheduled maintenance discrepancies on Incident Pilot One's flight gear. (TAB G-I)

f. Gun System Maintenance

All maintenance actions conducted on the M61A1 20 millimeter gun (serial number SQW007) installed in aircraft 165400 were reviewed from 2 September 2006, when the aircraft was boresighted, through 5 December 2006 (day of the incident) with no abnormalities. This maintenance review combined with a review of the "Rounds Fired Log" revealed three successful gun firings prior to the date of the incident as well as a documented successful firing on the date of the incident. (TAB A-III-b, G-VI, G-VII and H-II)

6. AIRCRAFT SYSTEMS

a. Sensor Integration

Target designating is the process of commanding aircraft sensors to track and display a specific point on the ground. This designation can be achieved using the radar, visually through the HUD, using the navigation system, or with the FLIR. Once the point has been selected and designated, it then is presented to the pilot on multiple displays including the HUD, The pilot can then use these displays to maintain situational awareness of the target location without continuous visual contact. During visual deliveries, such as daytime strafe, the

displays in the . . . and HUD are used to get the pilot's eyes on the target. Once the pilot confirms visual acquisition, it is normal to undesignate the target to remove the cueing information from the HUD, in that it may obscure the target and inhibit precise aiming of the gun. (TABs A-III-b, A-XVII, J-X)

b. Close Air Support (CAS) Format

The F/A-18C has a CAS format page in the mission computer. This capability is designed to support electronic transmission of complete 9-Line Briefings from the controller to the aircraft directly via a battlespace network. Currently, this network is not widely supported by ground controller equipment. The format allows the pilot to transfer the 9-Line Briefing information into the aircraft's computers and display the same. Among the displays provided is a friendly "rake" that will appear in the HUD and . . . to indicate the location of the friendly position. The 9-Line Briefing information also can be entered manually but is cumbersome and requires the friendly position to be given in terms of range and bearing from the target. Due to the significant time required to use the CAS format, it is rarely used by F/A-18 aircrew. (TABs A-XIV, J-III, J-IX and J-XII)

7. PGU SERIES 20 MILLIMETER AMMUNITION

Witness statements indicated that during the strafing of the friendly position, the 20 millimeter rounds did not exhibit the characteristics of Semi-Armor Piercing High Explosives Incendiary (SAPHEI) ordnance. One 20 millimeter round was recovered from the site at the time of the incident and present analysis indicates the round was not consistent with SAPHEI ammunition. There were several other rounds observed lying on the ground at the site post incident. There is no indication that any other 20 millimeter rounds were expended in the area since 20 November 2006. Finally, there was no evidence of corrosion on the round recovered to indicate it may have been at the site prior to 20 November 2006. (TABs A-VI-b, A-IV, A-VIII, A-XVI, A-XXII, B-IV, D-III and J-XVIII)

8. WEATHER, TERRAIN AND ENVIRONMENTAL FACTORS

a. Forecast Weather

Weather forecast for Kandahar, which is the closest forecast station to the target area for the period 0700Z 5 December to 0700Z 6 December 2006 was ceiling and visibility unrestricted, surface winds of 240 at 10 knots with gusts to 15 knots, sky clear and visibility in excess of 7 nautical miles. There were no weather hazards or advisories for this time period for the location identified. (TAB J-XIX)

b. Observed Weather

At . . . , 5 December 2006, the observed conditions at Kandahar were ceiling and visibility unrestricted with winds from southwest at 5 to 10 knots, on the surface to 5,000

feet MSL. Cockpit video from aircraft revealed no obscurations to visibility or other weather considerations that meteorologically affected the conduct of the flight in and around the target area, from 5 December 2006. From 2 December 2006 through 4 December 2006, Kandahar had a cumulative total of 0.18 inches of precipitation. (TABs C-II, H-I, J-XX, J-XXI and J-XXII)

c. Solar Position

Sun position was at or near the apex for the day and in the southern sky. Solar azimuth angle for the time period 5 December 2006 was from 178.9 degrees becoming 195.9 degrees. Solar elevation angle for the time period 5 December 2006 was from 36.5 degrees becoming 34.9 degrees. (TAB J-XXIII).

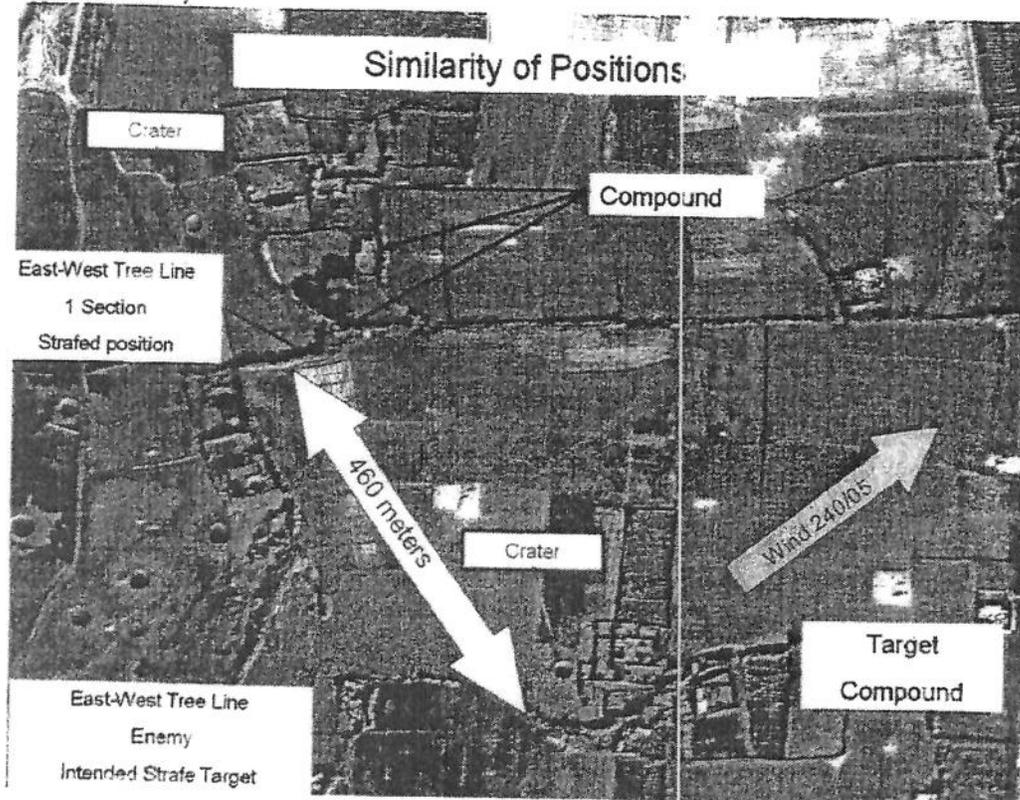
d. Topography

The target area is located in the Helmand River valley near . The topography consists primarily of arable fields interconnected and divided with irrigation trenches, walled compounds, hedgerows and tree lines. A view from above reveals a homogenous blend of walled compounds and fields bounded by walls, trenches and tree lines. Due to consecutive decades of combat, the area has a significant number of craters caused by exploded ordnance. (TAB D-I, D-II-d and H-I).

e. Terrain Similarities between Fighting Positions – Air Perspective

By 5 December 2006, the enemy was located in a walled compound and due to effective coalition fire was in the process of relocating into an east-west running tree line adjacent to the southwest corner of the enemy compound. There is a bomb crater just to the west of the enemy compound. Approximately 460 meters north of the enemy position, had taken up a fighting position in a trench sheltered by a tree line. The tree line is abutted to the northeast by a walled compound with a crater just to the west of the compound (Figure 8.e.1). (TABs D-I and H-I).

Figure 8.e.1 (TABs A-VI-a, A-VI-b, D-I-a, D-II-b, D-III-c, D-III-d I-II and J-XIX)



f. Terrain Similarities between Fighting Positions – Ground Perspective

The JTAC trained in the UK with similar terrain features replete with fields, walled compounds and hedgerows. He is an experienced JTAC with 240 controlled events and 43 combat controls in RC-South in the past three months in similar terrain to that of 5 December 2006. From the JTAC's ground perspective, with clear fields of view to the south and east, the enemy compound 460 meters to the south of his position was a clear target. The irrigation trench that the JTAC and [redacted] had taken cover in was three to four feet deep by three to four feet wide. The compound to the north of the JTAC's position was shielded from his view by a hedgerow and wall. (TABs A-VI-a, A-VI-b and D-I)

Weather conditions did not pose a hindrance to the conduct of the operation. In fact, the conditions could be described as ideal for the mission with the sun in the southern sky and light winds out of the southwest. The sun position did not conflict with the east-west orientation of the target runs. The light southwesterly winds at 5 to 10 knots would not have blown the smoke from the recently bombed enemy position onto the friendly position. The HUD tape revealed smoke from the ordnance hit five minutes prior had not drifted over the friendly position. Weather was not a factor in this incident. (TABs C-II, H-II, J-XIX, J-XX, J-XXI and J-XXII)

An overhead view from several thousand feet reveals similarities between the common features of the two fighting positions. The two fighting positions were separated by less than 500 meters. Both positions, consisting of a compound of buildings with a crater to the west and an east-west oriented tree line adjacent to the southwest corner, may have contributed to target misidentification by Incident Pilot One. The enemy position in the compound and adjacent tree line coupled with the clear line of sight would stand out as an unambiguous target to the JTAC. (TAB A-VI-a, A-VI-b, C-II and H-II)

9. TRAINING

a. Incident Pilot One

Incident Pilot One was a combat division lead. He had the following qualifications: air wing strike lead, NVG (High) instructor, functional check flight pilot and an instrument check pilot.

His performance in all of his qualification training indicated no deficiencies. Incident Pilot One's qualification training was not a factor in this incident. (TAB E-I)

Recent flight hours/sorties flown in the prior 30, 60, 90 days (TAB E-II):

	Hours	Sorties
30 days		
60 days		
90 days		

CAS sorties in the past 12 months as of 4 December 2006 (TAB E-III):

Type CAS	Sorties
Training	
OEF	

b. Incident Pilot Two

Incident Pilot Two was a combat wingman. Additionally, he was qualified as an NVG (High) pilot. Incident Pilot Two's training was not a factor in this incident. (TAB E-IV)

Recent flight hours/sorties flown in the prior 30, 60, 90 days (TAB E-II):

	Hours	Sorties
30 days		
60 days		
90 days		

CAS sorties in the past 12 months as of 4 December 2006 (TAB E-IV):

Type CAS	Sorties
Training	
Combat-OEF	

c. F/A-18C Strafe Training

Strike Fighter Squadron ONE THREE ONE, to which Incident Pilot One and Two were assigned, conducted dedicated air-to-ground strafe training in advance of deployment. This training included day and night strafing using both dive patterns conducted on scored targets in a sterile environment. Significant time was devoted on the limitations of the F/A-18C gun sight and its ability to accurately display an in-range cue under certain delivery parameters when employing PGU rounds. When employing the gun in air-to-ground strafe at night, it was common practice to leave the target designated with the diamond in the HUD through the entire evolution. During the day, the common technique was to undesignate the target as soon as the pilot gains visual confirmation of the target. (TABs A-XVII, A-XIV, E-XI and E-XII)

d. Close Air Support (CAS) Training

Before entering the USCENTCOM theater, Carrier Air Wing SEVEN and Strike Fighter Squadron ONE THREE ONE conducted multiple briefs on CAS procedures in general and specific to the expected missions, including an advanced CAS brief given by Incident Pilot One. During pre-deployment training, the squadron conducted CAS training on multiple target ranges as part of integrated air wing training. The squadron also included unit level urban and special forces CAS training. However, Incident Pilot One's CAS training did not stress TIC situations in close proximity to friendly positions. Incident Pilot One's CAS training may have been a factor in this incident. (TABs A-XVII, A-XIV, E-XI and E-XII)

e. Joint Terminal Attack Controller (JTAC) Training

The JTAC graduated on _____ from the Joint Forward Air Control Training and Standards Unit (JFACTSU), Royal Air Force Leeming, United Kingdom. He received 25 air strike controls and a Limited Combat Ready (LCR) status according to STANAG 3797. The JTAC completed six pre-deployment joint fires exercises in the 90 day period prior to arriving in theater. All exercises were conducted in the United Kingdom and United States. He controlled GR-7s, F-15Es, GR-1s and AH-64 helicopters in Day High/Low and Night High/Low controls. As of 6 December 2006, the JTAC controlled 240 air strikes. His last evaluation was conducted on 8 December 2005 in which he attained a Combat Ready (CR) status. His next evaluation was due in December 2006, but was automatically waived due to his deployment status

(STANAG 3797, para 22a). Review of the CAS control log shows the JTAC was qualified and current before his arrival to OEF in compliance of STANAG 3797. (TABs E-VI, E-V, E-VII and E-VIII, E-XIV)

All training and qualification requirements for coalition JTACs are derived from the Standard NATO Agreement (STANAG) 3797 (Edition 3), 17 August 2006. JTACs should be qualified and current before arriving to support OEF. JTAC training was not a factor in this incident. (TABs E-V, E-XIV and J-XVI)

10. MEDICAL

a. Qualifications

Incident Pilot One had a medical clearance for flight valid through including a flight waiver for a . He had 2761.8 total flight hours and 1,179 flight hours in the F/A-18 aircraft. (TABs A-XVII, F-II, F-VI, F-VIII and F-IX)

b. Physical Health

A review of Incident Pilot One's medical record indicated his last physical was performed on 28 April 2006. At that time,

Incident Pilot One's health was not a factor in this incident. (TAB F-II)

c. Lifestyle

Incident Pilot One stated he was and communicated with his family regularly. He had He had the and spent a lot of time working, which he enjoys. He denied any stressors with work. Overall, there were no factors at home or work that were distracting during this flight. Incident Pilot One's lifestyle was not a factor in this incident. (TABs A-III-c and F-III)

d. Crew Rest and Duty Time

Incident Pilot One had a somewhat regular routine, flying most days of the week with occasional OEF missions. He averaged 7 plus hours of sleep per night with a range of 6 hours 15 minutes to 9 hours 30 minutes. He stated he routinely required 6 hours 30 minutes to 7 hours to feel rested. During the 72 hours prior to the flight, he achieved his average of 7 hours of sleep. He was noted to have occasional excess flight time during the month prior as a result of single missions exceeding the OPNAV Instruction 3710.7T

recommended maximum of 6 hours 30 minutes per 24 hours. He was evaluated by his flight surgeon and found eligible for continued flight by his Commanding Officer. Incident Pilot One's crew rest and duty time was not a factor in this incident. (TABs A-III-c and F-III)

e. Toxicology

Blood from Incident Pilot One was sent to the Armed Forces Institute of Pathology (AFIP) for analysis. This sample has not yet been received or analyzed. Toxicology results for Incident Pilot One are still testable and will be processed once received. Incident Pilot One's toxicology report is not expected to be a factor in this incident. (TAB F-VII)

f. Pathology

) During the incident strafe pass, Royal Marines from 1 Section of 1 Troop, 45 Commando sustained injuries. One suffered a fatal injury and was pronounced killed in action prior to arrival at the hospital in Camp Bastion. The other sustained a serious wound which required surgical evaluation. There were 1 Royal Marines in the trench at the time of the incident strafe pass and no other injuries were noted. (TABs A-I, A-II, A-IV, A-VI-a, A-VII, A-VIII, A-X, A-XII, A-XIII-a, A-XIII-b, A-XIII-c, A-XV, A-XXI, A-XXIII-a, A-XXVI, A-XXVII-a and A-XXVII-b)

g. Incident Royal Marine One

) A Medical Examiner's (ME) report was not available to help the CIB determine the cause of death for Incident Royal Marine One. Other evidence has been provided to support the conclusions drawn by the board prior to the release of the ME report. (TABs A-IV, A-XII, A-XIII-a, A-XIII-b, A-XIII-c, A-XV, A-XXIII, A-XXVII-a and A-XXVII-b, F-I, F-VII, F-VIII and F-X)

) Incident Royal Marine One suffered a fatal wound coincident with the incident strafe attack by Incident Pilot One. The strafe attack was atypical since explosions usually associated with SAPHEI rounds were not observed. Several rounds were seen in the trench and one was recovered. Subsequent analysis shows this round was solid, unexploded ordnance. (TABs A-VI-a, A-VI-b, A-IV, A-VIII and A-XV)

) Incident Royal Marine One sustained wounds inconsistent with a small caliber bullet wound or typical fragment wound. His body armor was reported undamaged but was not retrieved. Analysis showed enough energy was delivered

The wound pattern suggests a large, solid object struck him

(TABs A-VI-a, A-VI-b, A-IV and A-XIII-a, A-XIII-b and A-XIII-c, F-VI and F-X)

) There does not appear to be any other weaponry (small arms fire, mortar, RPG) that could have provided the force or wound pattern suggested other than a solid, unexploded 20 millimeter round at the time of his injury. The preponderance of the evidence suggests Incident Royal Marine One died as a result of a friendly fire strafe attack by Incident Pilot One. (TABs A-XIII-a, A-XIII-b, A-XIII-c, F-VI and F-X)

h. Incident Royal Marine Two

Incident Royal Marine Two was in the corner of the trench during the strafing incident and sustained a wound to his left arm. Surgical evaluation showed a narrow tract, non-cavating wound. The surgeon evaluating his injuries stated that this was, "a low energy transfer wound but not necessarily low velocity." This is consistent with a shrapnel injury during the strafe attack and inconsistent with a gunshot wound from an assault rifle. Based on the evidence presented, the injuries to Incident Royal Marine Two are likely but not conclusively the result of the Incident strafe. (TAB A-X, A-XVII-a, A-XXVII-a, A-XXVII-b and TAB F-IV)

11. SUPERVISION AND OPERATIONS

a. Aircrew Supervision

) The Commanding Officer (CO), Strike Fighter Squadron ONE THREE ONE, assumed command prior to the Incident Flight. He served as the Executive Officer (XO) for Incident Pilot One was prior to assuming command. The current XO had served in that capacity since Incident Pilot One was Squadron supervision was stable and consistent up through the Incident Flight. The CO and XO implemented a comprehensive training program prior to deployment. The CO had a standing policy that inexperienced wingmen would fly with an experienced flight leader. The CO personally checked the daily schedule to ensure this policy was enforced. Additionally, he stressed to his inexperienced wingmen that positive identification of the target and friendly location was required for weapons release. The CO and XO both testified to the skill level, human factors and overall general assessments of the incident pilots. Finally, neither Incident Pilot indicated concern towards their supervision. Aircrew supervision was not a factor in this incident. (TABs A-XIV, A-XVII and E-XIII)

b. ROE/SPINS/Directives – Aircrew Compliance

Aircrew conduct CAS in accordance with OEF ROE/SPINS and Joint Publication 3-09.3, Joint Tactics, Techniques and Procedures for Close Air Support (CAS) with change 1 incorporated, 2 September 05. Both Incident Pilots were trained and briefed on the ROE and SPINS prior to their first OEF mission. Aircrew compliance was not a factor in this incident. (TABs E-IX, E-X, J-XV and J-XVI)

c. JTAC – Supervision

The JTAC was assigned to 45 Commando, Royal Marines as a Fire Support Team (FST) Commander. He arrived _____ and reported directly to _____. The nature of a JTAC's duties mean that he will operate unsupervised in the field for extended periods. Upon his return to UK, the JTAC will be _____

The JTAC arrived in theater on _____ and has controlled 43 sorties. The JTAC continues to conduct CAS operations with his unit. JTAC supervision was not a factor in this incident. (TAB A-XXIII-b)

d. ROE/SPINS/Directives – JTAC Compliance

When deployed to OEF, JTACs conduct CAS in accordance with OEF SPINS and Joint Publication 3-09.3, Joint Tactics, Techniques and Procedures for Close Air Support (CAS) with change 1 incorporated, 2 September 2005. (TABs J-XIV and J-XVI)

The JTAC did not give the Incident Flight the standard 9-Line Briefings for targets as directed by OEF SPINS (paragraph 6.5.7.3, page 59) and JP 3-09.3 (3e(1), page V-22). This deviation could be attributed to the friendly position being under heavy, persistent enemy fire. However, the JTAC did pass critical target information (elevation, target grid coordinate, target description, position of friendlies and attack restriction). The JTAC and Incident Pilot One felt confident in each other's situational awareness and were reinforced by the three previous successful air strikes using grid coordinates, elevation, restrictions and talk-ons. (TAB C-I and E-IX)

The JTAC did not mark target or friendly positions. Although preferred, marking positions is not mandatory. The JTAC stated that marking the friendly position could further highlight their position to heavy enemy fire. The JTAC elected not to carry a Laser Target Designator for this operation. The JTAC did not have any other friendly marking devices on hand. In addition, artillery was not used to mark targets. If either position were marked, it may have assisted Incident Pilot One in identifying either the target or friendly position. (TABs A-VI-a, A-VI-b and J-XV)

The JTAC passed his friendly position in MGRS coordinates to Incident Pilot One in an effort to expedite visual contact on the friendly position. The JTAC did this to expedite a visual on friendly position and not for the purpose of coordinating or deconflicting fires. This is not a violation of OEF/ISAF SPINS. OEF SPINS was not a factor in this incident. (TABs C-I and J-XIV)

In one instance, the JTAC did not give a CLEARED HOT call until Incident Pilot One asked for clearance. A violation of directives did not occur because ordnance was not released without clearance. Incident Pilot One exercised sound TTP discipline. (TAB C-1)

On the final attack run, during which Incident Pilot One strafed the friendly position, the JTAC passed a CLEARED HOT call approximately 9 seconds before firing. At that point, Type 1 control was in effect. The JTAC was unable to visually acquire the attacking aircraft because of trees behind his position and the level of the enemy fire that required him to crouch down on the floor of the trench. The JTAC was in technical violation of TTPs relating to Type 1 control which state that "the FAC will ensure [that the] attack will not affect friendlies by visual acquisition and analysis of attack aircraft geometry/nose position to determine weapon impact point." In his witness statement, the JTAC stated that in his own mind he was transitioning to Type 2 control at this stage but it is clear from the radio transcripts that the "contract" between pilot and the JTAC was still Type 1 control. (TAB J-IV, J-XV and J-XVI)

If the JTAC had aborted the attack, the desired weapon effects on target would have been delayed. If the JTAC had declared Type 2 control, it is highly likely that Incident Pilot One, already mistakenly convinced of the target position, would have strafed the same point. The JTAC was confident in Incident Pilot One's situational awareness because of the previous successful attacks. JTAC deviation from TTP was a factor in this incident. (TABs A-VI-a and A-VI-b)

e. Operations

The squadron's operational tasking was consistent with other strike fighter squadrons in Carrier Air Wing SEVEN and was not a factor in this incident. (TAB I-V).

1 November 2006 - 4 December 2006

		SCHEDULED SORTIES				HOURS			
		MON	TUE	WED	THUR	0600-0700	0700-0800	0800-0900	0900-1000
VFA-143									
VFA-103									
VFA-83									
VFA-131									

		SCHEDULED SORTIES				HOURS			
		MON	TUE	WED	THUR	0600-0700	0700-0800	0800-0900	0900-1000
VFA-143									
VFA-103									
VFA-83									
VFA-131									

f. Command and Control

Notification of the suspected friendly fire incident was not communicated throughout the command and control chain in an expeditious manner. The GLO initially reported the injuries were the result of enemy action. Carrier Air Wing SEVEN filed the MISREP

based on the GLO's information and removed any mention of the possible friendly fire incident. (TAB A-XIV, A-XVII, I-IX and I-X)

12. HUMAN FACTORS ANALYSIS¹

a. Misperception

The JTAC requested Incident Pilot One provide cannon fire to enemy positions in a tree line 50 meters south of the compound just attacked. Incident Pilot One made his sixth pass over the target area and employed ordnance for the third time. He believed he was lining up on the enemy position through the visual cues provided but incorrectly identified the friendly position as the target. (TABS A-III-a, A-III-b, A-III-c and H-II)

During the final strafing pass, Incident Pilot One was looking for a target that he had seen multiple times over several minutes. Incident Pilot One and the JTAC had identified an east-west running tree line with a compound to the north and a crater to the west. Incident Pilot One had established knowledge of target location through prior successful ordnance employment. Arriving from the north in a left hand turn, Incident Pilot One looked outside and found these features. He was confident of the identified position, kept his eyes on a tree line, immediately moved his gunsight to it and fired. Incident Pilot One misperceived the friendly area characteristics expecting to find the enemy position. He failed to recognize the friendly position was in close proximity and had the same features. (TABS A-III-a, A-III-b, A-III-c, A-VI-a and A-VI-b and H-II)

The similarity of terrain surrounding both enemy and friendly positions facilitated Incident Pilot One's misperception of the target. He had previously approached the target three times making right base turns from the south. These right turns from the south allowed him to clearly see the enemy position and a long-running east-west tree line, separate from the enemy compound. On the final pass, Incident Pilot One approached from the north on a left base and observed an east-west tree line, near a compound with a crater next to it. The similarity of terrain features made the friendly position appear like the enemy position. In addition, this approach to the target caused the friendly and enemy positions to align within two degrees of azimuth. From the Incident Pilot One's perspective at roll in, the two positions were similar and presented the friendly position as the more prominent target. This change in direction likely contributed to Incident Pilot One's misperception. (TABS D-I and H-II)

¹ This incident was analyzed using the Department of Defense Human Factors Analysis and Classification System (HFACS) version 6.2, current as of 11 January 2005 and agreed upon by the Department of Defense Service Safety Chiefs and the Coast Guard Director of Health and Safety in a Memorandum of Agreement dated May 2005. The purpose of this system is to help organize and categorize common human factors associated with accidents and is recommended for use by all who investigate, analyze and report on mishaps within the DOD.

DoD HFACS Codes

PC506 Expectancy –Incident Pilot One

Expectancy is a factor when the individual's expects to perceive a certain reality and those expectations are strong enough to create a *false perception* of the expectation.

AE301 Error due to Misperception –Incident Pilot One

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.

Related Factors

PC206 Overconfidence –Incident Pilot One

b. Channelized Attention

After the third attack, Incident Flight discussed fuel states and Incident Pilot One became aware that he had the lower fuel state. Incident Pilot One coordinated with Incident Pilot Two and directed him to follow for additional strafing. In the final turn, Incident Pilot One failed to acknowledge his aural "Bingo" warning; a common sign that a pilot has lost awareness or is tightly focused. This warning continued for more than two minutes. Incident Pilot One had channelized his attention and failed to acknowledge this warning. (TABs A-III-a, A-III-b, A-III-c, and H-II)

The JTAC requested a second strafe attack (incident pass) and gave reference to the target based on visual cues from the last successful run. Incident Pilot One utilized weapons system sensors during the prior three passes to develop a sight picture of the target. He was able to keep these weapons system sensors locked on target and then transitioned "eyes out" to find the visual cues described. Incident Pilot One approached from the north through a left hand turn which was opposite from his three prior passes. He became focused outside the cockpit on a tree line that matched the JTAC's description. HUD and FLIR correctly indicated the enemy positions, but Incident Pilot One did not cross-check either system. He deselected the target diamond while looking outside and prior to rolling wings level, which was his habit pattern during daytime strafing. Incident Pilot One had the ability to cross-check the target, but failed to do so for the Incident strafing pass. Incident Pilot One channelized all attention on visual cues and under utilized a key sensor which could have prevented this incident. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, and H-II)

DoD HFACS Codes

PC102 Channelized Attention –Incident Pilot One

Channelized Attention is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others of a subjectively equal or higher or more immediate priority, leading to an unsafe situation. May be described as a tight focus of attention that leads to the exclusion of comprehensive situational information.

Related Factors

AE104 Under control of systems –Incident Pilot One

PC105 Negative Transfer –Incident Pilot One

c. Incident Pilot Two Distraction

Incident Pilot One was a senior, experienced pilot. He is perceived to be "one of the best" in the squadron and is routinely tasked with training junior pilots. On this flight,

Incident Pilot Two was the wingman for his third OEF mission; the first of which he would employ ordnance. Incident Pilot Two progressed through his syllabus and was viewed as a competent and capable pilot equal to the level expected. The flight progressed smoothly through initial refueling and tasking in two different areas until called in to support combat operations. (TABs A-III-a, A-III-b, A-III-c, A-XIV and A-XVII)

Incident Pilot One communicated with the JTAC on the ground and effectively employed ordnance twice, supporting troops on the ground. Incident Pilot One was then re-tasked to deliver ordnance on new coordinates provided by the JTAC. Incident Pilot Two had to be coached to drop a bomb while Incident Pilot One was buddy-lasing. It took three passes, a significant time delay in relation to the prior passes, before the ordnance was successfully delivered. During the first attempt, Incident Pilot One had trouble acquiring the target. On the second attempt, Incident Pilot Two did not select the proper delivery mode to allow ordnance release. Incident Pilot Two repeatedly made reference to problems with the FLIR, indicating he was focused on that sensor. His

FLIR troubleshooting was likely the reason he had not adequately configured the weapon system. Incident Pilot One was patient and helpful while getting Incident Pilot Two ready for their third pass to deliver ordnance. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, A-XVIII-a, A-XVIII-b and C-I)

Incident Pilot Two did not demonstrate the expected level of proficiency during this portion of the flight due to his attention on an intermittently operating ATFLIR. As a result, Incident Pilot One spent considerable time during their third pass getting Incident Pilot Two configured while troops on the ground were under fire. Incident Pilot Two was a distraction during these aborted attempts and may have contributed to a loss of situational awareness for Incident Pilot One prior to the final pass. He further may have contributed to a mindset that necessary actions were needed more quickly on the subsequent attack. (TABs A-III-a, A-III-b, A-III-c, A-VI-a, A-VI-b, A-XVIII-a and A-XVIII-b and C-D)

DoD HFACS Codes

PC106 Distraction --Incident Pilot One

Distraction is a factor when the individual has an interruption of attention and/or inappropriate redirection of attention by an environmental cue or mental process that degrades performance.

PC102 Channelized Attention --Incident Pilot Two

Channelized Attention is a factor when the individual is focusing all conscious attention on a limited number of environmental cues to the exclusion of others of a subjectively equal or higher or more immediate priority, leading to an unsafe situation. May be described as a tight focus of attention that leads to the exclusion of comprehensive situational information

Related Factors

SP005 Proficiency --Incident Pilot Two

SP004 Limited total experience --Incident Pilot Two

d. JTAC Factors

The JTAC may have contributed to the accident with his own human factors. He was well-qualified and experienced in operations with many CAS controls. On that day, he

successfully controlled several other coalition aircraft prior to the arrival of the Incident Flight. He continued to receive incoming fire and requested continued CAS. Upon arrival of Incident Flight, the JTAC was perceived as having an "energized" voice. The JTAC used abbreviated CAS information throughout, without a full 9-Line Briefing. He also "CLEARED HOT" the pilot on each attack prior to the pilot rolling wings level before the JTAC could ascertain nose position. It is likely that he had developed a sense of overconfidence in himself through the earlier successful attacks or perhaps because of his own history as a successful controller. (TABs A-III-a, A-III-b, A-III-c, A-VI-a and A-VI-b)

During the final strafe, the JTAC and Incident Pilot One had an understanding they were using Type 1 control, i.e., no weapons would be released without the JTAC having visual contact with the Incident Flight. On the final pass, the JTAC did not have visual contact with Incident Pilot One because of the tree line to the north and taking cover while under accurate small arms fire. He stated that he was confident in Incident Pilot One since he had correctly attacked the requested positions. With limited time, the JTAC violated standard procedures due to situational conditions and failed to inform the Incident Flight of the change in Type control or call an abort. This was likely due to overconfidence in the pilot. (TABs A-III-a, A-III-b, A-III-c, A-VI-a and A-VI-b)

Overall, the JTAC may have instilled a sense of urgency to employ ordnance by abbreviating procedures and allowing the pilot to fire before assessing attack geometry. This urgency may have contributed to the pilot becoming tightly focused during the final run which ultimately led to target misidentification. (TABs A-III-a, A-III-b, A-III-c, A-VI-a and A-VI-b)

DoD HFACS Codes

AV001 Violation -Based on Risk Assessment

Violation based on risk assessment is a factor when the consequences/risk of violating published procedures was recognized, consciously assessed and honestly determined by the crew, individual or team to be the best course of action. Routine "work arounds" and unofficial procedures that are accepted by the community as necessary for operations are also captured under this code.

PC206 Overconfidence -JTAC

Overconfidence is a factor when an individual overvalues or overestimates personal capability, the capability of others or the capability of aircraft/vehicles or equipment and this creates an unsafe situation

AE203 Necessary Action - Rushed -JTAC

Necessary Action - Rushed is a factor when the individual takes the necessary action as dictated by the situation but performs these actions too quickly and the rush in taking action leads to an unsafe situation.

Related Factors

PE104 Vision Restriction in Workplace- JTAC

AE201 Risk Assessment-During Operations -JTAC

13. NEWS MEDIA INVOLVEMENT

) Initial media coverage concerning the friendly fire incident was moderate. A Reuters media team was embedded at the time of the incident, and the story was picked up by worldwide news agencies. Upon release of the CIB's findings, media attention is expected to range from low to moderate throughout the U.S. and UK and will be available for worldwide dissemination. Since this friendly fire incident is not the first

during the Global War on Terror, the level of publicity might be overcome by the quantity of news stories. (Tab J-V)

14. REFERENCES

DOD Instruction 6055.7, "Accident Investigation, Reporting and Record Keeping," October 3, 2000

Air Force Instruction 51-503, "Aerospace Accident Investigations," 16 July 2004

OPNAV Instruction 3710.7T, "NATOPS General Flight and Operating Instructions," 1 March 2004

Department of Defense Human Factors Analysis and Classification System (HFACS) *version 6.2, current as of 11 January 2005 and agreed upon by the Department of Defense Service Safety Chiefs and the Coast Guard Director of Health and Safety in a Memorandum of Agreement dated May 2005*

**STATEMENT OF FINDINGS
COMBINED INVESTIGATION BOARD
FRIENDLY FIRE INCIDENT
HELMAND PROVINCE, AFGHANISTAN**

1. Incident Flight tasked to support Royal Marines engaged in TIC.
2. The JTAC passed friendly coordinates to Incident Flight upon initial check-in.
3. Incident Pilot One slewed FLIR onto friendly position, received talk-on from the JTAC and positively confirmed friendly position.
4. The JTAC passed target coordinates to Incident Flight.
5. Incident Flight attacked enemy compound with two successful passes from east to west (Incident Pilot One employed GBU-12, then strafe).
6. Incident Flight attacked enemy compound with three passes from west to east during which ordnance was delivered only on the third pass (Incident Pilot Two employed GBU-12; buddy-lased by Incident Pilot One).
7. The JTAC and Royal Marines received "effective" enemy fire.
8. The JTAC requested Incident Flight strafe enemy position in tree line south of last target.
9. (CAUSAL) Incident Pilot One was CLEARED HOT by the JTAC without visual verification of his alignment with the correct target.
10. (CAUSAL) Incident Pilot One transitioned to visual references for the target without cross-checking weapons system information.
11. (CAUSAL) Incident Pilot One visually misidentified the friendly position as the assigned target.
12. Incident Pilot One initiated roll-in for strafe pass.
13. Incident Pilot One un-designated the weapons system target position despite accurate targeting information displayed in his FLIR, HUD and displays.
14. Incident Pilot One rolled out pointing at friendly position and strafed.
15. Incident Royal Marine One was mortally wounded by effects of 20 millimeter strafe.

16.) Incident Royal Marine Two was simultaneously injured, likely by effects of a 20 millimeter strafe.

**STATEMENT OF OPINIONS
COMBINED INVESTIGATION BOARD
FRIENDLY FIRE INCIDENT
HELMAND PROVINCE, AFGHANISTAN**

OPINION SUMMARY

) The Combined Investigation Board concludes the friendly fire incident on 5 December 2006 was a direct result of Incident Pilot One's misidentification of the friendly position as the intended target.

) Incident Pilot One lost situational awareness of the friendly position and misperceived the similar terrain and cultural features between the target and friendly position due to expectations of visual cues. Incident Pilot One strafed the friendly position due to channelized attention and failure to utilize available weapon system designation cues.

FACTORS OF NOTE:

The Combined Investigation Board finds the following factors of note:

) Incident Pilot One had low situational awareness of the friendly position because it was close and visually similar to the enemy position. Both positions have a compound of buildings with a crater to the west and an east-west oriented tree line south of the compound. Additionally, Incident Pilot One was distracted by Incident Pilot Two's ATFLIR problem and poor execution of buddy-lasing procedures. Incident Pilot Two required extensive and time-consuming coaching from Incident Pilot One to employ his weapons during three separate buddy-lasing passes.

) During the final portion of the incident strafing pass, Incident Pilot One failed to use his aircraft system designation to confirm the target. Incident Pilot One undesignated the target thereby removing the target designation diamond from the HUD, and the FLIR. Undesignation of the target eliminated a critical means of positively identifying the target.

) The Incident Flight and the JTAC deviated from approved CAS procedures. Enemy fire caused the JTAC to take cover at the bottom of a trench. His position in the trench, in addition to the desire to immediately suppress the enemy fire instigated abbreviated procedures. A complete 9-Line Briefing was not accomplished, therefore bearing and range of the friendly position in relationship to the target was not passed; however, the JTAC identified the friendly position with a grid coordinate and a brief talk-on. Incident Pilot One was CLEARED HOT by the JTAC without being visual with the aircraft and assessing attack geometry. According to TTPs, the JTAC should have informed Incident Pilot One of a transition to Type 2 control or aborted the attack.

OTHER FINDINGS WORTHY OF DISCUSSION

a. Use of the CAS format in the F/A-18C

The F/A-18 has an integrated capability to facilitate timely and accurate information exchange in the CAS environment via a battlespace network. This functionality also provides a means to uniquely display friendly position in the HUD and These unique friendly cues are only available if the CAS format is used. Unfortunately, the battlespace networks required to utilize this format are not widely available. The manual (back-up) entry method is too cumbersome to be effectively utilized by F/A-18 aircrew.

b. Cockpit Recording

F/A-18 recorded HUD video is not normally preserved after post-flight debrief of a guided weapon release. However, FLIR recordings of weapon delivery are routinely captured and archived for future review. The board noted that debrief and analysis for training or other purposes would be enhanced if all source cockpit video was preserved following weapon release.

c. Secure Communications

F/A-18 secure communications are not directly recorded. The board noted that debrief and analysis of combat and training situations where secure voice is used would be improved by recording secure voice communications.

d. Gun Firing out of range

In order to employ

the pilot has to make

in order to make

This results in a planned firing of the gun without an in range cue on the HUD, counter to normal habit patterns. Training to this particular deviation may lead to a change in habit during normal situations and result in the pilot unintentionally firing without an in range cue.

e. PGU Series 20 millimeter Ammunition

Based on the observed behavior of the rounds at the time of the strafing, the analysis of the round recovered on the scene and the lethality characteristics of the PGU-28, the PGU series ammunition fired by Incident Pilot One was either a PGU-27 Target Practice round or a dud PGU-28 SAPHEI.

f. Command and Control Notification of Friendly Fire Incident

Thirty-four (34) hours passed from the time of the suspected incident and unit notification. Early notification allows preservation of critical evidence.

**RECOMMENDED CORRECTIVE MEASURES
COMBINED INVESTIGATION BOARD
FRIENDLY FIRE INCIDENT
HELMAND PROVINCE, AFGHANISTAN**

**COMBINED INVESTIGATION BOARD
FRIENDLY FIRE INCIDENT
HELMAND PROVINCE, AFGHANISTAN**

ADDITIONAL U.S. ONLY OPINION AND RECOMMENDATION

In addition to the preceding opinions and recommendations of the Combined Investigation Board, the following opinion and recommendation is made only through the respective U.S. members of the CIB:

That [redacted] did not use reasonable care on 5 December 2006 in his actions in support of Z Company, 45 Commando, United Kingdom Royal Marines as exhibited by his failure to maintain awareness of the friendly position, maintain awareness of the enemy position and to make full use of the aircraft systems available. As a result of this failure to use reasonable care, one Royal Marine was killed and one Royal Marine was injured.

ADDITIONAL UK ONLY OPINION AND RECOMMENDATION

In respect of this joint report, the Senior UK Member does not seek to reserve judgement on or amend any of the findings. The Senior UK Member commends this report to the UK Board of Inquiry.

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