

CLOSE HOLD
UNTIL PUBLIC RELEASE

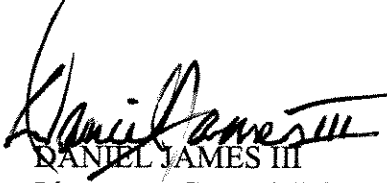


DEPARTMENTS OF THE ARMY AND THE AIR FORCE
NATIONAL GUARD BUREAU
1411 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22202-3231

10 DEC 2004

ACTION OF THE CONVENING AUTHORITY

The report of the Accident Investigation Board, conducted under the provisions of AFI 51-503, that investigated the 3 November 2004 mishap near Little Egg Harbor, New Jersey, involving F-16C, S/N 85-1474, assigned to the 113 FW, DC ANG, Andrews AFB MD, complies with applicable regulatory and statutory guidance and on that basis is approved.


DANIEL JAMES III
Lieutenant General, USAF
Director, Air National Guard

EXECUTIVE SUMMARY
AIRCRAFT ACCIDENT INVESTIGATION

F-16C, S/N 85-1474 MISHAP

**113th WING, 121st FIGHTER SQUADRON, ANDREWS AIR FORCE BASE,
MARYLAND**

3 NOVEMBER 2004

On 3 November 2004, at 2110 hours Eastern Standard Time, an F-16C, serial number (S/N) 85-1474, gun discharge resulted in an off-range ordnance impact near the Warren Grove Range (WGR), Little Egg Harbor, New Jersey. The mishap aircraft was part of a two-ship F-16C formation launched from Andrews Air Force Base, Maryland for a night time training sortie. The Mishap Pilot (MP) was flying as flight lead. The Instructor Pilot was the wingman pilot of the other F-16C aircraft in the flight. Both the pilots and aircraft were assigned to the 121st Fighter Squadron, 113th Wing, Andrews AFB, MD.

Just prior to the flight-related mishap, the MP was preparing to conduct a High Angle Strafing pass at the WGR. At the time of the gun discharge, the MP pulled the trigger on the flight control stick to command the aircraft's targeting pod to emit a laser marker to illuminate his intended target on the range. The targeting pod attached beneath the aircraft is capable of rotating its seeker head and pointing at a target on the ground independent of the aircraft's flight path. However, the aircraft's gun can only fire directly ahead of the aircraft's flight path. At the time the trigger was pulled, the aircraft was not headed towards the intended strafing target.

Because the aircraft's gun was armed when the MP pulled the trigger to emit a laser marker, the MP's trigger action also caused the aircraft's 20 mm gun to fire a total of 27 rounds of inert training ammunition. Some of the discharged ordnance from the mishap aircraft struck the Little Egg Harbor Township Intermediate School. There were no injuries but the ordnance that struck the school caused holes in the roof, holes in the acoustic ceiling tiles, torn carpet and several indentations in the asphalt parking area surrounding the building.

There is clear and convincing evidence that this flight-related mishap was caused by pilot error, a poorly designed pilot vehicle interface for the laser marker located on the flight control stick trigger, and the lack of published guidance for a commonly utilized range safety procedure for live strafing passes at WGR.

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

SUMMARY OF FACTS AND STATEMENT OF OPINION
F-16C, S/N 85-1474 MISHAP
3 NOVEMBER 2004

TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
COMMONLY USED ACRONYMS & ABBREVIATION	iii
SUMMARY OF FACTS	1
1. AUTHORITY, PURPOSE, AND CIRCUMSTANCES	1
a. Authority.....	1
b. Purpose.....	1
c. Circumstances.....	1
2. ACCIDENT SUMMARY.....	1
3. BACKGROUND	2
4. SEQUENCE OF EVENTS	3
a. Mission.....	3
b. Planning.....	3
c. Preflight.....	3
d. Flight.....	4
e. Impact.....	8
f. Life Support Equipment, Egress and Survival.....	8
g. Search and Rescue.....	8
5. MAINTENANCE	9
a. Forms Documentation.....	9
b. Inspections.....	9
c. Maintenance Procedures.....	9
d. Maintenance Personnel and Supervision:	9
e. Fuel, Hydraulic and Oil Inspection Analysis.....	9
f. Unscheduled Maintenance.....	10
6. AIRCRAFT AND AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS.....	10
a. Condition of Systems.....	10
b. Post Mishap Testing.....	10
7. WEATHER.....	11
a. Forecast Weather.....	11
b. Observed Weather.....	10
c. Space Environment.....	10
d. Conclusions.....	10
8. CREW QUALIFICATIONS.....	11
9. MEDICAL	12
a. Qualifications.....	12
b. Health.....	12
c. Toxicology.....	12
d. Lifestyle.....	12
e. Crew Rest and Crew Duty Time.....	13
10. OPERATIONS AND SUPERVISION	13

a. Operations.....	13
b. Supervision.	13
11. HUMAN FACTORS ANALYSIS.....	13
12. GOVERNING DIRECTIVES AND PUBLICATIONS.....	15
a. Primary Operations Directives and Publications.	15
b. Maintenance Directives and Publications.....	15
c. Known or Suspected Deviations from Directives or Publications.....	16
13 . NEWS MEDIA INVOLVEMENT	16
STATEMENT OF OPINION	17

COMMONLY USED ACRONYMS & ABBREVIATION

ACC	Air Combat Command
ACIU	Advanced Central Interface Unit
AEF	Aerospace Expeditionary Force
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFPAM	Air Force Pamphlet
AFTO	Air Force Technical Order
AFSC	Air Force Specialty Code
AGR	Active Guard Reserve
AGOS	Air Ground Operations School
AHC	Advance Handling Characteristics
AIB	Accident Investigation Board
AMC	Air Mobility Command
AMS	Aircraft Maintenance Squadron
ANG	Air National Guard
APC	Armored Personnel Carrier
AT	Advanced Technology
ATC	Air Traffic Control
AVTR	Airborne Video Tape Recording
BATR	Bullets at Target Range
BDU	Bomb Dummy Unit
BFM	Basic Fighter Maneuvers
BIT	Built-In Test
BSA	Basic Surface Attack
CAMS	Core Automated Maintenance System
CCIP	Continuously Computed Impact Point
CCRP	Continuously Computed Release Point
CMR	Combat Mission Ready
CSFDRS	Crash Survivable Flight Data Recorder System
CT	Continuation Training
DCA	Defensive Counter Air
DMPI	Desired Mean Point of Impact
DO	Director of Operations
DOC	Designed Operational Capability
DOD	Department of Defense
DSN	Digital Switching Network
DTC	Data Transfer Cartridge
ECM	Electronic Counter Measures
EOD	Explosive Ordnance Demolition
EST	Eastern Standard Time
FAC	Forward Air Controller

FCC	Fire Control Computer
FCIF	Flight Crew Information File
FLUG	Flight Lead Upgrade
FMC	Fully Mission Capable
FS	Fighter Squadron
FSR	Flight Service Representative
FW	Fighter Wing
G's	Force of Gravity
GBU	Guided Bomb Unit
GCU	Gun Control Unit
HADB	High Altitude Dive Bomb
HAP	High Accident Potential
HAS	High Angle Strafe
HQ	Headquarters
HUD	Heads up Display
IC	Intercom
IFR	Instrument Flight Rules
IP	Instructor Pilot
IR	Infrared
ISS	Interim Safety Supplement
IQT	Initial Qualification Training
KIAS	Knots Indicated Air Speed
L	Local Time
LAS	Low Angle Strafe
LANTIRN	Targeting Pod
LED	Light Emitting Diode
LGB	Laser Guided Bomb
LITENING	Targeting Pod (II, ER, AT refers to various models)
LM	Laser Marker
LOX	Liquid Oxygen
MA	Mishap Aircraft
MAJCOM	Major Command
MAU	Miscellaneous Armament Unit
MDS	Mission Design Series
MFD	Multi-Function Display
MIL-STD	Military Standard
MK	Mark
MOC	Maintenance Operations Center
MP	Mishap Pilot
MQT	Mission Qualification Training
MSL	Mean Sea Level
NM	Nautical Mile
NAV	Navigator
NGB	National Guard Bureau
NOTAM	Notice to Airman
NVG	Night Vision Goggles

OCA	Offensive Counter Air
OJT	On Job Training
Ops Sup	Operations Supervisor
ORM	Operational Risk Management
OSB	Option Select Button
OSF	Operational Support Flight
PA	Public Affairs
PCDS	Personal Computer Debriefing System
POL	Petroleum, Oils, Lubricants
PVI	Pilot Vehicle Interface
QA	Quality Assurance
RAP	Ready Aircrew Program
RAV	Ravage 1 Flight
RCO/RO	Range Control Officer
SA	Situational Awareness
SAR	Search and Rescue
SCU	Software Capability Upgrade
SE	Chief of Safety
SIB	Safety Investigation Board
SLO	Safety Liaison Officer
SM	Statute Mile
SMS	Stores Management System
S/N	Serial Number
SOF	Supervisor of Flying
SOI	Sensor of Interest
TCTO	Time Compliance Technical Order
TDY	Temporary Duty
TERs	Triple Ejector Racks
TGP	Targeting Pod
TL	Targeting Laser
TO	Technical Order
TP	Target Practice
TX	Transition
UALS	Universal Armament Loading System
UHF	Ultra High Frequency
USAF	United States Air Force
UTA	Unit Training Assembly
VFR	Visual Flight Rules
VHF	Very High Frequency
WGR	Warren Grove Range
WSO	Weapons System Operator
Z	Zulu or Greenwich Mean Time

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

SUMMARY OF FACTS

1. AUTHORITY, PURPOSE, AND CIRCUMSTANCES

a. Authority.

On 4 November 2004, Lieutenant General Daniel James, III, Director, National Guard Bureau (NGB) verbally appointed Colonel Kevin W. Bradley to conduct an aircraft accident investigation of the 3 November 2004 off-range ordnance impact near the Warren Grove Range (WGR), Little Egg Harbor, New Jersey, involving an F-16 aircraft, serial number (S/N) 85-1474. Colonel Bradley conducted the investigation at Andrews Air Force Base (AFB), Maryland from 8 November 2004 through 24 November 2004. Technical advisors were Lieutenant Colonel Carl E. Croft (Pilot), Major Eric J. Settergren (Maintenance), Major Lisa K. Snyder (Flight Physician), and Major Chris M. Supernor (Legal). (Tab Y-1)

b. Purpose.

This aircraft accident investigation was convened under Air Force Instruction (AFI) 51-503, *Aircraft, Missile, Nuclear, and Space Accident Investigations*. The purpose of this investigation is to provide a publicly releasable report of the facts and circumstances surrounding the accident, to include a statement of opinion on the cause or causes of the accident; to gather and preserve evidence for claims, litigation, disciplinary, and adverse administrative actions; and for all other purposes. This investigation is separate and apart from the Safety Investigation Board (SIB), which was convened for the purpose of mishap prevention in accordance with AFI 91-204, *Safety Investigations and Reports*. This report is available for public dissemination under the Freedom of Information Act (5 United States Code (U.S.C.) §552) and the Air Force Supplement to Department of Defense Regulation 5400.7, *Department of Defense Freedom of Information Act Program*.

c. Circumstances.

The accident board was convened to investigate the 3 November 2004 off-range ordnance impact that occurred during a two-ship F-16 night training sortie at the Warren Grove Range, Little Egg Harbor, New Jersey. Both the pilots and aircraft were assigned to the 121st Fighter Squadron, 113th Wing, Andrews AFB, Maryland.

2. ACCIDENT SUMMARY

On 3 November 2004, a two-ship of F-16's, call sign Ravage 1, launched from Andrews AFB, Maryland and flew to the Warren Grove Range, New Jersey for a nighttime training sortie. The Mishap Pilot (MP), Major Roberto Balzano (Ravage 1) was flying as flight lead. (TAB K-4, and V-6.7) The Instructor Pilot (IP), Major Kirk Pierce (Ravage 2) was the wingman pilot of the other F-16 aircraft at the time of the mishap. (TAB K-4, and V-6.6 to V-6.7) The MP was

preparing to conduct a high angle strafing pass at the Warren Grove Range while flying an F-16 aircraft S/N 85-1474 when the aircraft's 20 mm gun discharged a total of 27 rounds of inert training ammunition. (TAB V-3.6) Some of the discharged ordnance from the Mishap Aircraft (MA) struck the Little Egg Harbor Township Intermediate School. There were no injuries but ordnance that struck the school caused holes in the roof, holes in the acoustic ceiling tiles, torn carpet and several indentations in the asphalt parking area surrounding the building. (TAB P-1 to P-11, and Z-1 to Z-9) The mishap generated exceptionally high media interest. (TAB FF-1 to FF-13)

3. BACKGROUND

The 113th Wing, stationed at Andrews AFB, Maryland, is composed of both fighter and transport aircraft. The 113th Wing is responsible to both Air Combat Command (ACC) and Air Mobility Command (AMC) and operates the F-16/D, C-38A, C-40 and C-130 aircraft. The Wing provides command and control for three groups and eight squadrons, totaling over 1,300 assigned military members. The Wing is tasked throughout the world to provide combat capability and military transport. The wing and its subordinate units are all components of ACC, AMC and the Air National Guard (ANG). (TAB HH-1)

The F-16 Fighting Falcon is a compact, multi-role fighter aircraft. It is highly maneuverable and has proven itself in air-to-air and air-to-surface attacks. The F-16 is capable of conducting day, night, and all-weather combat operations worldwide. It provides a relatively low-cost, high performance weapon system for the United States and allied nations. (TAB HH-2 to HH-3)

Pilots assigned to the 121st Fighter Squadron, 113th Wing frequently conduct training at the Warren Grove Range since it is the closest range of the three ranges that are accessible to Andrews AFB. (TAB V-4.9) Currently, the need to conduct strafe training is particularly high since this weapon is well suited for the close combat situations of the current conflicts because of its low impact and fragmentation pattern as opposed to dropping general-purpose bombs. (TAB V-4.11) To meet the operational needs of deployed commanders, HQ ACC published a memorandum directing all ANG units flying certain models of the F-16 to train to the qualification level for Low Angle Strafe (LAS)/High Angle Strafe (HAS). (TAB BB-21) This new directive reprioritized the need for strafe training for pilots at the 121st Fighter Squadron from a familiarization skill-level to a qualification level that is required for the pilot to maintain Combat Mission Ready (CMR) status. Pilots at the 121st Fighter Squadron are now required to complete a specified number of LAS/HAS training events each year. Half of the required strafe training can be simulated and graded through video playback but the remaining 50% must be actual LAS/HAS on range. If a 121st Fighter Squadron pilot fails to complete the required strafe training, they would be rated as non-combat ready. (TAB V-4.11)

The Warren Grove Range is located in central southeastern New Jersey, approximately 17 miles northeast of Atlantic City international airport. The Warren Grove Range (WGR) is contained in the Federally protected 1 million acre Pinelands National Reserve. The WGR owns approximately 9,400 acres of land containing the targeting complex and range facilities. (TAB BB-1 to BB-1A) The impact area within the WGR is approximately 500 acres. (TAB V-11.50)

4. SEQUENCE OF EVENTS

a. Mission.

On 3 November 2004, a two-ship F-16 sortie launched from Andrews AFB, Maryland to conduct multiple night-time training objectives to include Basic Surface Attacks (BSA) at the Warren Grove Range, Aerial Refueling, and Tactical Aerial Intercepts. This training sortie was a Flight Lead Upgrade (FLUG) for the MP in accordance with the 121st Fighter Squadron training syllabus so that he would be qualified to fly as a two-ship element lead at night. (TAB V-4.24, and V-6.7) Lieutenant Colonel David J. Miles, "A" Flight Commander, 121st Fighter Squadron, authorized the 3 November 2004 training sortie. (TAB K-3 to K-4)

b. Planning.

At least two hours and fifteen minutes prior to the MA's take-off, the 121st Fighter Squadron conducted a mass briefing for all flights to cover overall mission objectives, general mission execution, weather, NOTAMs (Notices to Airmen-worldwide posting of information regarding airfield conditions, airspace, or communications), pilot currencies, flying/ground operational notes and training rules. (TAB V-7.15, and V-4.49 to V-4.50) The flights then split for their separate two-ship flight briefings.

For the element briefing, the MP planned and briefed the 3 November 2004 training sortie in accordance with Air Force Instruction 11-2F-16, volume 3. (TAB V-6.13 to V-6.14) The IP described the overall quality of the MP's briefing as average. (TAB V-6.14) During the mission brief, the MP discussed a technique of using his aircraft's laser marker to illuminate his intended target on the range. At this point of the mission brief, the IP cautioned the MP not to use his laser marker with the air to ground gun mode selected and the gun armed. (TAB V-6.20 to V-6.22) In the F-16, the same trigger is used to command a targeting laser, a laser marker, start the Airborne Video Tape Recorder (AVTR) and to fire the gun in certain modes of operation. The F-16 flight control stick has a two-detent trigger. If the pilot squeezes the trigger to the first detent (a one half trigger squeeze) the aircraft will command the targeting laser and/or the laser marker to fire and start the AVTR. If the pilot fully squeezes the trigger (a full trigger squeeze to the second detent) on the flight control stick while the aircraft is in master arm and the gun mode is selected, the gun will discharge. For the aforementioned concerns, the IP told the MP not to use the laser marker during a night HAS pattern. (TAB V-6.22) The IP offered to use his aircraft's laser marker to illuminate the MP's intended strafing target if it was deemed necessary. (TAB V-6.21) After the IP's guidance, the MP clarified that he had no intention of using his laser marker during his strafing pass. (TAB V-6.19) The IP testified that in his opinion, at the end of the 3 November 2004 mission brief, both the IP and the MP fully understood the training sortie. (TAB V-6.19)

c. Preflight.

The MP and IP accomplished all required sign-out procedures and accomplished a step briefing to review any last minute updates or changes, signed off the Flight Crew Information

Files (FCIF-local information for pilots relevant to the aircraft or flying procedures and conditions), reviewed all NOTAMs, and proceeded to their assigned aircraft on time. The step briefing is the final preflight briefing which normally includes updates to weather, airfield status and any other items of interest related to the aircrew's mission. (TAB V-6.23)

The MA was configured with two external wing mounted fuel tanks, two wing mounted triple ejector racks (TERs), the left TER loaded with three inert BDU-33 (Bomb Dummy Units) practice bombs, a chin mounted Litening II AT (Advanced Technology) Targeting Pod (TGP), one captive dummy missile and one captive training missile. (TAB K-4, and V-6.31) The Litening TGP is an airborne targeting system that provides target acquisition, tracking and laser designation for an air to ground, day or night, beyond-visual-range precision strike capability. The approximate take-off weight for an F-16 with the above configuration is approximately 34,000 pounds. All ground checks, engine start and taxi were uneventful. (TAB V-6.23)

d. Flight.

At 2031 hours Eastern Standard Time (EST), the MA departed from Andrews AFB, Maryland. (TAB K-4) The MP's take off was 16 minutes late from the scheduled take off due to directed delays by the Andrews AFB air traffic control tower. (TAB K-4, and V-6.23) After take-off, both the MP and IP donned their night vision goggles (NVG). (TAB V-6.36 to V-6.37) The MP then flew in formation with the IP to the Warren Grove Range, New Jersey. The eighteen-minute flight to the range was uneventful. (TAB V-6.37 to V-6.38)

The F-16 aircraft is capable of engaging air-to-air targets and air-to-ground targets. Before the F-16 can engage a particular target, the pilot must correctly configure the Master Mode Switch and the Master Arming Switch in the cockpit. These switches provide the pilot with multiple fail-safe opportunities. The below table explains the switch settings that must be accomplished before the aircraft can release a weapon. The below table assumes that the aircraft is fully configured with all available weapons. For example, if a missile is not actually attached to the aircraft, a missile could not be released even if the Master Mode Switch and the Master Arming Switch are configured to permit the aircraft to fire a missile.

Master Mode Switch	Master ARM Switch	Weapons Capability
Navigate (NAV)	Simulate (SIM) or Off	Aircraft can not release weapons
Navigate (NAV)	ARM	Aircraft can not release weapons
Missile Override (MSL OVRD)	SIM or Off	Aircraft can not release weapons
Missile Override (MSL OVRD)	ARM	Aircraft can fire a missile
Dog Fight (A/A)	SIM or Off	Aircraft can not fire gun
Dog Fight (A/A)	ARM	Aircraft can fire gun
Continual Computed Release Point (CCRP)	SIM or Off	Aircraft can not release bomb
Continual Computed Release Point (CCRP)	ARM	Aircraft can release bomb

Master Mode Switch	Master Arm Switch	Weapons Capability
Continual Computed Impact Point (CCIP)	SIM or Off	Aircraft can not release bomb
Continual Computed Impact Point (CCIP)	ARM	Aircraft can release bomb
Strafe (STRF)	SIM or Off	Aircraft can not fire gun
Strafe (STRF)	ARM	Aircraft can fire gun

At approximately 2049 hours, the MA obtained clearance over the radio from the Range Control Officer to enter the Warren Grove Range. (TAB CC-4, and DD-2) After entering the range, the MP conducted a simulated air to ground attack at an intended target on the range. During this simulated attack pass, the MP pulled the trigger on his flight control stick to command a combat targeting laser. (TAB CC-4) No munitions were released from the aircraft during this simulated attack. For approximately 8 seconds, a targeting laser was emitted from the aircraft's TGP to the intended target on the range. (TAB CC-4) A targeting laser is used to guide laser-guided bombs or to provide ranging information for the delivery of bombs.

After completing the simulated attack pass, the MP completed a G-awareness exercise. (TAB CC-2, CC-5, and DD-2) The G-awareness exercise is a standard series of turns performed before any activity that may include high G forces. It allows pilots the opportunity to practice their anti-G straining maneuvers and ensure that their anti-G equipment is operating properly.

After completing the G-awareness exercise, the MP changed his targeting laser mode from combat to simulate. (TAB CC-5) While the targeting laser mode is in simulate, the aircraft will not emit a targeting laser (TL). However, even with the targeting laser mode switch set to simulate, the aircraft can still emit an eye-safe laser marker (LM) from the TGP. A laser marker will illuminate a spot on the ground allowing anyone who is wearing night vision goggles to see the marked area as well as the laser beam emitting from the aircraft. (TAB V-6.46 to V-6.47) The targeting pod attached beneath the aircraft is capable of rotating its seeker head so that it can be pointed at intended targets on the ground. Accordingly, the direction of the laser marker emission can be different from the flight path of the aircraft. However, the aircraft's gun can only fire directly ahead of the aircraft's flight path.

At approximately 2053 hours EST, the MP started his next simulated laser guided bomb attack. During this event, the MP depressed the weapons release button (also known as the pickle button) on his flight control stick to simulate the release of bombs from his aircraft. (TAB CC-2 to CC-9, and DD-2 to DD-3)

At approximately 2058 hours EST, the IP conducted a simulated scenario where a missile launch is observed on the MA. During this simulated threat reaction, the IP transmitted to the MP a simulated observation of an enemy missile launch directed toward the MP's aircraft. The MP reacted to the simulated threat without incident. At approximately 2059 hours EST, the MP and IP discussed over the radio conducting a cooperative simulated laser guided bomb (LGB) attack. (TAB CC-5 to CC-7, and DD-3)

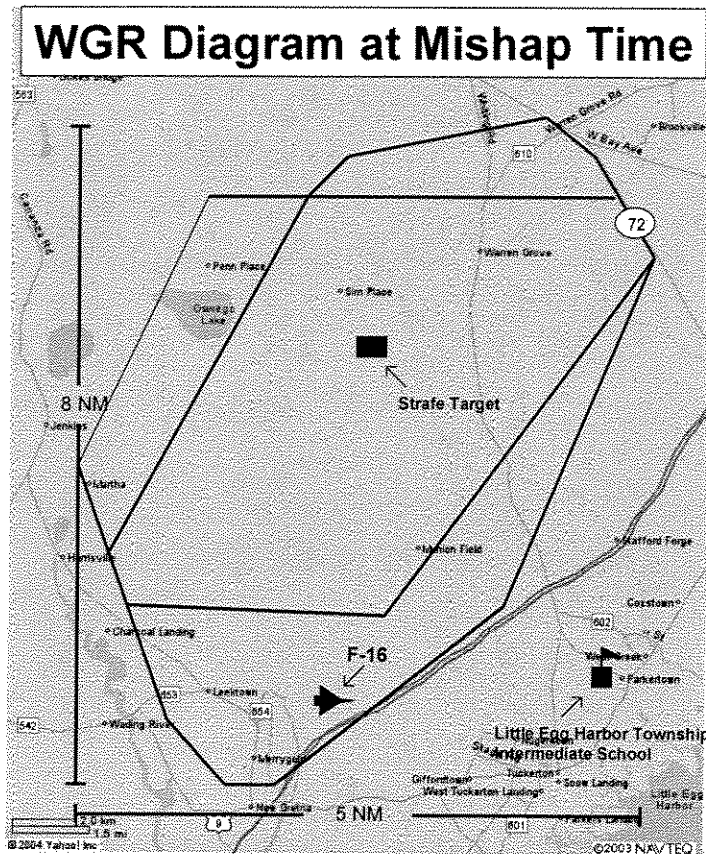
During the cooperative simulated LGB attack, the MP should have commanded a targeting laser at the intended target on the range while the IP was making an attack pass on the target. However, the cooperative simulated LGB attack was unsuccessful because of a MP avionics selection error. Consequently, the same simulated attack was repeated. On the second attempt, the MP's laser engaged for 25 seconds, successfully simulating lasing the IP's intended target for his simulated bombing pass. (TAB CC-9 and DD-4)

At approximately 2107 hours EST, the MP informed the range control tower that he was ready to conduct a High Altitude Dive Bomb (HADB) attack simultaneously dropping three 25 pound practice bombs on the range. (TAB CC-9 to CC-10, and DD-5) The intended target for the bomb drop is a conventional circle that is lighted with steady lighting for night weapon deliveries. At approximately 2108 hours, the MP selected an air-to-ground master mode, CCRP, and ARM, which armed the aircraft's weapon system for actual release of weapons. (TAB CC-10) Both members of the flight then executed a 30-degree nose low diving delivery and each released three practice bombs. The MP successfully placed a practice bomb within 12 meters of the intended target. (TAB DD-5, and V-6.50)

During the MP's flight pattern on his practice bomb attack, between 21:06:53 hours and the time the aircraft's gun discharged (21:10:25 hours), he pulled his trigger 17 times. (TAB CC-9 to CC-11) The pilot had selected a targeting pod mode that commands the targeting laser and laser marker to fire simultaneously when the trigger is pulled to at least the one half detent. Since the MA's laser was in training mode, a trigger pull would only command a simulated targeting laser. However, each trigger pull would command the targeting pod to emit a laser marker aimed at the target. As a safety precaution, the targeting pod will not emit a laser marker when commanded if any portion of the aircraft is blocking the laser marker's path to the intended target. This is called masking. For seven of the 17 times, the MP pulled the trigger; the targeting pod did not emit a laser marker because a portion of the MA was masking the target. (TAB CC-9 to CC-10) For ten of the seventeen trigger pulls, the MA would have emitted a laser marker to mark the target. (TAB CC-9 to CC-10)

The MP then repositioned his aircraft to prepare for his next training event, a HAS pass. At approximately 2110 hours, the MP switched his master mode to strafe mode on the downwind portion of his attack pattern after he leveled off at approximately 7,000 feet MSL. (TAB CC-11, and R-5) While the MA is in strafe mode with the master ARM still selected, the aircraft's gun will fire if the trigger is pulled fully to the second detent. While the MP was turning into the left base portion of his attack pattern for his strafing run, the MP fully squeezed the trigger. The aircraft's gun fired a 0.25 second burst. (TAB CC-11) A total of 27 inert training rounds were released from the MA's gun. Some of the released rounds struck the Little Egg Harbor Township Intermediate School, which was located over 4 nautical miles from the mishap aircraft when the gun discharged. (TAB R-1, and V-11.38) However, the MP did not know where the fired ordnance impacted.

The below figure indicates the approximate relative positions between the mishap aircraft, the strafe target within the Warren Grove Range, and the Little Egg Harbor Township Intermediate School.



The fact that the MP armed the aircraft's gun before his aircraft was pointed towards his intended target on the range was in compliance with published WGR procedures. The instruction governing operations at the WGR, 177th Wing Supplement to AFI 13-212, volume 1, *Range Planning and Operations*, permits pilots to have their aircraft's weapon systems armed whenever they are within the restricted air space above the range. (TAB BB-2) However, Major Cooper, the Range Control Officer for the WGR, testified that it was a common practice for F-16 pilots from the 177th Wing during strafing passes to switch their aircraft's master mode to missile override when their aircraft was not pointed towards their intended target. The purpose of the common practice of not flying throughout the range with an armed gun mode selected is to minimize the possible consequences of an unintentional or inadvertent gun discharge. However, the above-described practice was only communicated by word of mouth and was not a regulatory requirement of the WGR operating instruction. (TAB V-11.41 to V-11.42)

After the aircraft's gun discharged, the MP immediately transmitted a "knock it off" call over his radio to cease all tactical maneuvering and he completed an armament safety check on the MA to preclude the chance of another discharge. (TAB C-11, and DD-5) At the point the MA's gun fired, the MA was positioned as follows (TAB CC-11, and R-5):

Altitude: 6,988 MSL
Latitude: N 39 degrees 38 minutes 15 seconds
Longitude: W 74 degrees 24 minutes 30 seconds
Heading: 105 degrees
G's: 3.7

After the MP reported that his gun discharged, the following communication occurred between the IP and the MP over the radio:

IP: "Were you trying to mark or something?"

MP: "Yes"

IP: "That's what we talked about, don't do that"

MP: "Yeah"

IP: "That is why I covered that in brief" (TAB CC-11, and DD-6)

The MP discussed with the Range Control Officer saving his recorded flight parameters so that the necessary data could be obtained to estimate the impact area for the discharged rounds. At approximately 2117 hours, the MP and IP departed the range and immediately proceeded back to Andrews Air Force Base. (TAB CC-13, and DD-7) The return flight and landing was uneventful. (TAB V-6.63)

e. Impact.

The MA did not impact the ground. Some of the 27 inert training rounds discharged from the MA impacted the Little Egg Harbor Township Intermediate School, the parking lot and the surrounding wooded area. (TAB P-1 to P-11, and TAB Z-1 to Z-9) The Ocean County Sheriff's Department documented the locations of the impact areas and where rounds were recovered. A total of 11 rounds were recovered. (TAB P-8) Five rounds were found lying on top of the surrounding asphalt parking lot or the grass area around the school. (TAB P-9) One round was found lying on top of the roof. (TAB P-10) Five rounds were recovered from inside the school. (TAB P-11) There were eight holes or scuffmarks on the roof of the school. (TAB P-10)

f. Life Support Equipment, Egress and Survival.

No ejection or emergency egress was activated in this mishap. Review of the MP's inspection records for his life support equipment did not reveal any abnormalities. The MP's gloves were visually inspected and did not show any areas of torn or worn fabric. (TAB HH-4 to HH-8)

g. Search and Rescue.

No Search and Rescue efforts were required for this mishap.

5. MAINTENANCE

General Information.

Each individual aircraft has its own set of both written and electronic maintenance records used to record all flight discrepancies and/or maintenance performed. These records are called the Air Force Technical Order (AFTO) form 781 series and the Core Automated Maintenance System (CAMS). All existing aircraft 781 series forms were reviewed for accuracy and completeness. This information, along with information obtained from CAMS, was used to determine the maintenance condition and suitability for flight of the Mishap Aircraft (MA), F-16 S/N 85-1474 during the 90 days prior to the mishap. (TAB H-1 to H-27).

a. Forms Documentation.

The Mishap Aircraft's AFTO 781 forms were in order and had no discrepancies. (TAB H-1 to H-27) There was no outstanding Time Compliance Technical Orders (TCTO) relevant to the mishap. Ninety day historical records show no recurring maintenance problems relevant to the mishap. (TAB U-1)

b. Inspections.

All scheduled inspections were tracked and maintained satisfactorily. There were several properly documented deferred maintenance items that were listed in the AF Form 781, however none were relevant to the functionality of the MA's gun. (TAB H-1 to H-27)

c. Maintenance Procedures.

There were no maintenance procedures, practices, or performance deficiencies found. (TAB U-1)

d. Maintenance Personnel and Supervision.

Reviews of AF Forms 623, *Individual Training Records*, and AF Forms 797, *Job Qualification Standard Continuation/Command Job Qualification Standard*, for involved maintenance personnel verified that there were no unqualified personnel performing maintenance tasks on the MA. All personnel who serviced, maintained, or supervised the maintenance on the MA, received proper training and fully completed all assigned tasks.

e. Fuel, Hydraulic, and Oil Inspection Analyses.

A fuel test of the JP-8 fuel that was in the MA showed no contamination and was not a factor in the mishap. (TAB O-29 to O-30) The results of an engine oil analysis showed no anomalies and engine oil contamination was eliminated as a factor in the mishap. (TAB O-25) Results from testing on liquid oxygen (LOX) were also nominal and not a factor in the mishap. (TAB O-24) The hydraulic fluid was not sampled or tested.

f. Unscheduled Maintenance.

A previous flight to the 3 November 2004 mishap occurred earlier the same day and was flown without discrepancy. Before the mishap flight, the following normal flight preparation maintenance events were accomplished for the mishap aircraft:

- A flight maintenance check was completed with no noted discrepancies
- The MA was loaded with three non-explosive BDU-33 training bombs
- The MA's gun was mechanically armed
- An argon bottle on the MA was charged
- A post flight maintenance check was completed on the Triple Ejector Racks
- Cartridges were removed from Miscellaneous Armament Unit-12s station 3 & 7 (TAB H-7 to H-20, V-2.5 to V-2.7)

A comprehensive review of all unscheduled maintenance actions documented during the previous 90 days revealed no evidence that any maintenance action contributed to this mishap. (Tab U-1)

6. AIRCRAFT AND AIRFRAME, MISSILE, OR SPACE VEHICLE SYSTEMS

a. Condition of Systems.

After the flight mishap, all systems on the MA were determined to be operating within normal technical order parameters. (TAB V-3.16)

b. Post Mishap Testing.

After the flight mishap, maintenance personnel at the 113th Wing, Andrews Air Force Base impounded the MA to perform a series of tests. (TAB V-3.7) On 5 November 2004, weapons release personnel accomplished an aircraft weapons Stores Management System (SMS) confidence check and a full gun operational check. (TAB H-5 to H-18) Maintenance personnel also accomplished an operational check on the MA's Litening Targeting Pod. (TAB O-31) All systems on the MA, including the aircraft's gun and targeting pod were functioning within normal technical order parameters. (TAB V-3.16, and V-3.32) On 12 November 2004, per the request of the Aircraft Investigation Board, additional maintenance tests were accomplished. (TAB V-3.16 to V-3.21) On 12 November 2004, weapons release personnel performed a trigger check on the gun that defined the exact position of the trigger when firing power was initiated.

(TAB V-3.31 to V-3.32) A visual and electrical inspection of the wires between the trigger, the Gun Control Unit (GCU) and the Advance Central Interface Unit (ACIU) was accomplished to identify any possible electrical shorts. (TAB V-3.19 to V-3.20, and V-3.31) No abnormalities were discovered by any of the additional maintenance tests. (TAB U-3 to U-6, V-3.15 to V-3.16, and V-3.32)

7. WEATHER

a. Forecast Weather.

For the MA's night take-off at Andrews Air Force Base, the forecast weather was unlimited visibility with winds from the northwest at 12 knots with gusts up to 18 knots. The forecast also projected a few clouds at 1,500 feet and scattered at 3,000 feet above the ground. The forecast weather for the Warren Grove Range was six-statue miles visibility with winds from the northwest at 7 knots and sky clear of clouds. The sunset at Atlantic City occurred at 1654 hours Eastern Standard Time. The moonrise was forecasted for approximately 2200 hours Eastern Standard Time. Night illumination for the training sortie at the range was forecast as low illumination conditions. No precipitation was forecasted. (TAB K-6 to K-9)

b. Observed Weather.

For the MA's night take-off at Andrews Air Force Base, the observed weather was sky clear, unlimited visibility with winds from the northwest at 10 knots. The observed weather at the Warren Grove Range was unlimited visibility with winds from the northwest at 5 knots and sky clear of clouds. Winds at 7,000 feet above the Warren Grove Range were 26 knots out of the northwest. The observed night illumination was low. (TAB V-6.38 to V-6.39, and V-11.23 to V-11.24)

c. Space Environment.

Not applicable.

d. Conclusions.

Weather conditions were favorable and would not have affected the flight of the MA.

8. CREW QUALIFICATIONS

The MP was an experienced pilot with over 2,000 total hours of flight time. The MP had 975 hours of flying experience in the F-16 aircraft. The MP had over 1,000 hours of flying experience as an instructor pilot in the T-38 aircraft. (TAB G-11 to G-12)

The MP was fully qualified to fly the sortie as briefed on the day of the mishap. (TAB

G-1, and V-4.24) In the previous 90 days before the mishap, four of the 17 total sorties the MP had flown were with a TGP mounted on the aircraft. These four sorties were surface attack sorties with three day and one night sorties. (TAB G-13 to G-27) The IP testified that the 3 November 2004 mishap sortie was the MP's first nighttime non-simulated HAS event. (TAB V-6.26)

Recent flight time is as follows (Tab G-4):

Mishap Pilot's Sortie Count Look Back

Time	Hours	Actual Sorties
Last 30 Days	10.5	6
Last 60 Days	18.6	11
Last 90 Days	27.1	17

**Mishap Pilot's Ready Aircrew Program (RAP)
Sortie Count Look Back by Month**

Month	RAP Sorties
November	2
October	5
September	7
August	9

The MP's total 3 month RAP look back sortie count for August to October 2004 was 21 RAP sorties. (TAB T-1)

9. MEDICAL

a. Qualifications.

The medical records of the MP were thoroughly reviewed and the MP was worldwide and medically qualified for flight duties at the time of the mishap. (TAB X-2)

b. Health.

The health of the MP was not a contributing factor in this mishap. (TAB X-1)

c. Toxicology.

The post-mishap toxicology tests of the MP revealed no alcohol, drugs or other significant findings. (TAB X-1)

d. Lifestyle.

There is no evidence that unusual habits, behavior, or stress on the part of MP contributed to the accident.

e. Crew Rest and Crew Duty Time.

Air Force Policy dictates aircrew members must receive adequate rest to insure safety and mission effectiveness. Air Force instructions outline maximum allowable flight duty periods, maximum monthly and quarterly total flying hours, and minimum crew rest periods to ensure adequate time for meals, transportation, and sleep. In accordance with AFI 11-202, volume 3, *General Flight Rules*, section 9.3.5, pilots are required to get 12 hours of crew rest prior to reporting for duty. Since the MP exercised his right not to be interviewed by the Accident Investigation Board, the Board was not able to determine if the MP met his crew rest requirements. (TAB V-1.3) However, the IP testified that before the mishap sortie, the MP did not appear to be tired, nervous or distracted. (TAB V-6.14)

10. OPERATIONS AND SUPERVISION

a. Operations.

The 121st Fighter Squadron was conducting routine training from their home station. On 3 November 2004, the squadron flying schedule consisted of 9 sorties during the day and 6 sorties during the night. (TAB K-3 to K-4) Lieutenant Colonel Marc Sasseville, 121st Squadron Commander, described the operations tempo for the unit as low to medium. However, he characterized the operations tempo for the mishap flight as medium to high. (TAB V-4.7)

b. Supervision.

On the 3 November 2004 Flight Authorization Order, the MP was originally scheduled to fly as a wingman on a different training sortie. (TAB K-4) However, prior to 1100 hours Eastern Standard Time on 3 November 2004, the flight schedule was changed and the MP was assigned to fly the flight lead upgrade ride with the IP as his wingman. Although the exact time for the schedule change is not known, the SOF testified that the schedule change occurred early enough in the day to permit the MP to adequately prepare for his upgrade sortie. (TAB V-7.14 to V-7.16)

In addition to being the squadron's Operation Officer, the IP was also a highly experienced instructor pilot. The MP's Squadron Commander was working as the Supervisor of

Flying (SOF) at the time of the mishap. (TAB V-4.5) Squadron supervision of the flight and aircraft was not a contributing factor to this mishap.

11. HUMAN FACTORS ANALYSIS

Human factors are divided into two categories: environmental and individual. Environmental factors include operational issues, logistic or maintenance factors, matters pertaining to egress and survival, and issues associated with facilities and services essential to mission accomplishment. Individual factors can range from physiological or biodynamic issues to psychological and psychosocial concerns.

The Board considered the Environmental and Individual Human Factors Elements contained in Air Force Pamphlet (AFPAM) 91-211, Attachment 8, Human Factors Terms, to identify potentially relevant factors that may have influenced this mishap. These factors were explored to determine whether they could have contributed to this mishap.

a. Habit Interference

Habit interference is a factor when the individual reverts to previously learned response modes, which are objectively inappropriate to the task at hand. Habit pattern interference usually occurs at the preconscious level of awareness. The impedance of an action or a series of actions required through regression to an earlier learned behavior not appropriate to the current situation.

During the mishap flight, the MP was flying with night vision goggles on a low illumination evening. (TAB V-6.36 to V-6.40) During the MP's previous bombing attack just prior to his planned strafing pass, the MP frequently used his aircraft's laser marker to illuminate the position of the intended target on the range. (TAB CC-9 to CC-11) A pilot commands a laser marker in a Litening AT TGP equipped F-16 by pulling the trigger to at least the first detent on the flight control stick. During the bombing pass, the MP demonstrated a pattern of repetitively marking his intended target on the range. (TAB V-6.70 to V-6.73) During the three minutes preceding the discharge the MA's gun, the MP pulled the trigger 17 times to mark the intended target. (TAB CC-9 to CC-11) The MP selected strafe mode approximately 15 seconds before the gun discharged. Shortly after the MA's gun discharged, the MP acknowledged over his radio that his gun fired when he was attempting to mark his intended target. (TAB CC-11)

b. Channelized Attention

Channelized Attention is a factor when the individual is focusing conscious attention on a limited number of environmental cues to the exclusion of others of subjectively equal, higher, or more immediate priority leading to an unsafe condition. Channelized Attention creates a limited focus of awareness leading to the exclusion of comprehensive information.

At the time the gun discharged, the MP communicated that he pulled the trigger to laser mark his intended target. (TAB CC-11, and DD-5 to DD-6) In other words, the MP was focused

on visually locating his intended target on the range. At the same time, the MP lost awareness that the aircraft's gun was selected and armed when he pulled the trigger.

c. Lack of Technical/Procedural Knowledge.

Technical/Procedural knowledge is a factor when a pilot was adequately exposed to the information needed to perform the mission element but did not absorb it, lack of knowledge is considered a factor. Lack of knowledge implies no deficiency in the training program, but rather the failure of the pilot to absorb or retain the information.

During 2004, there were three other instances at other Department of Defense ranges where pilots of an F-16 aircraft unintentionally fired the aircraft's gun while preparing to conduct a nighttime strafing pass. (TAB EE-1 to EE-9) In all three of these previous incidents, the discharged ordnance did not cause any injury or property damage. The Air Force Safety Center sent information to all units regarding each of these incidents to raise awareness regarding the potential for an unintentional gun discharge while conducting nighttime strafing. The safety officer for the 121st Fighter Squadron relayed the information from the Air Force Safety Center to each of the pilots in the squadron. For two of the unintentional gun discharges, Lieutenant Colonel Synoracki forwarded the information to the pilots in the squadron via e-mail. (TAB V-7.9 to V-7.11 and TAB V-7.16 to V-7.18) For one of the unintentional gun discharge incidents, Lt Col Synoracki testified that he briefed the incident to the squadron. (TAB V-7.10) During the mission brief, the IP counseled the MP not to use the aircraft's laser marker when the aircraft's gun was armed for strafing. (TAB V-6.17 to V-6.22) Despite the squadron safety officer's effort to educate pilots in the unit and the specific guidance from the IP during the mission brief, on 3 November 2004, the MP still attempted to use the aircraft's laser marker while the aircraft's gun was selected and armed for strafing. (TAB CC-11)

12. GOVERNING DIRECTIVES AND PUBLICATIONS

a. Primary Operations Directives and Publications.

121FS/113WG, *In-Flight Guide*

113th Wing Supplement to AFI 11-202, volume 2, *Operations Supervision*

177th Wing Supplement to AFI 13-212, volume 1, *Range Planning and Operations*

AFI 11-202, volume 3, *General Flight Rules*

AFI 11-214, *Air Operations Rules and Procedures*

AFI 11-214, *ACC Sup1, Air Operations Rules and Procedures*

AFI 11-2F-16, volume 1, *F-16 Pilot Training*

AFI 11-2F-16, volume 3, *F-16 Operations Procedures*

AFI 48-123, *Medical Examinations and Standards*

AFPAM 91-211, *USAF Guide to Aviation Safety Investigation*

TO 1F-16-1, *Flight Manual*

TO 1F-16-1CL-1, *In-Flight Checklist*

TO 1F-16-1-1, *Flight Manual Performance Data*

TO 1F-16-34-1-1, *Avionics & Nonnuclear Weapons Delivery Flight Manual*

TO 1F-16-34-1-1CL-1, *Avionics and Nonnuclear Weapons Delivery Flight Crew Procedures*

b. Maintenance Directives and Publications.

AFI 21-101, *Aerospace Equipment Maintenance Management*
D.C. ANG Maintenance Group Operating Instruction 21-59, *Impoundment of Aircraft*
TO 1F-16-2-31JG-00-1
TO 1F-16-2-94JG-50-5
TO 1F-16-2-94JG-00-1
TO 1F-16-2-94JG-50-1
TO 1F-16-2-12JG-00-1
TO 1F-16-2-12JG-30-5

c. Known or Suspected Deviations from Directives or Publications.

In order to prevent accidental gun firing while the gun is armed and selected, Air Force Instruction 11-2F-16, volume 3, paragraph 6.9 states that pilots will not squeeze the trigger until they actually intend to fire the gun. Contrary to this regulatory guidance, during the 3 November 2004 mishap sortie, the MP squeezed the trigger to command a laser marker while his gun was selected and armed. (TAB CC-11, and DD-5 to DD-6)

13. NEWS MEDIA INVOLVEMENT

The fact that ordnance from an F-16 aircraft impacted an intermediate school received worldwide coverage via television, radio, and printed news media. (TAB FF-1 to FF-13) Major General David Wherley, Commanding General of the District of Columbia National Guard, is quoted in several media articles addressing the circumstances of the mishap and the fact that this mishap is under investigation. While media coverage has significantly decreased since the date of the mishap, at the time of this report there is still substantial media interest in this mishap.

08 December 2004


KEVIN W. BRADLEY, Col, USAF
President, Accident Investigation Board

STATEMENT OF OPINION

F-16, S/N 85-1474

3 November 2004

1. Under 10 U.S.C. 2254(d) any opinion of the accident investigators as to the cause of, or the factors contributing to, the accident set forth in the accident investigation report may not be considered as evidence in any civil or criminal proceeding arising from an aircraft 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.

2. OPINION SUMMARY:

In order to meet the urgent real world needs of deployed commanders, the Air Force has tasked F-16 pilots to master high angle nighttime strafing. To meet these operational needs, the 121st Fighter Squadron pilots trained in strafing attacks on the Warren Grove Range. On 3 November 2004, a two-ship F-16 mission, call sign Ravage 1, launched from Andrews Air Force Base, Maryland and flew to the Warren Grove Range, New Jersey for a night time training sortie. The Mishap Pilot (MP) was flying as flight lead. The Instructor Pilot (IP) was the wingman pilot of the other F-16 aircraft in the flight at the time of the mishap. The MP was preparing to conduct a high angle-strafing pass at the Warren Grove Range when the aircraft's 20 mm gun discharged a total of 27 rounds of inert training ammunition. Some of the discharged ordnance from the Mishap Aircraft (MA) struck the Little Egg Harbor Township Intermediate School. There were no injuries but ordnance that struck the school caused holes in the roof, holes in the acoustic ceiling tiles, torn carpet and several indentations in the asphalt parking area surrounding the building.

There is clear and convincing evidence that this flight-related mishap was caused by pilot error, a poorly designed pilot vehicle interface for the laser marker located on the flight control stick trigger, and a lack of published guidance for a commonly utilized range safety procedure for live strafing passes.

3. DISCUSSION OF OPINION:

I developed my opinion of the cause of this accident through a thorough review of radio transcripts, witness testimony, and recorded flight data from the mishap aircraft and in consultation with functional experts in flight medicine, F-16 maintenance, F-16 operations, and range operations. Based on evidence, which I found to be clear and convincing, it is my opinion as the investigating officer that this accident was caused by a combination of the following factors:

a. Pilot Error

The MP did not intend to strafe the Little Egg Harbor Township Intermediate School. The MP's firing of the aircraft's gun was an unfortunate and unintentional mistake. The MP was flying with night vision goggles on a low illumination evening. Just prior to the gun's discharge,

the MP was verifying his aircraft position in relation to the intended strafing target on the range. This was accomplished by pulling the trigger, commanding the aircraft's targeting pod to emit a laser marker for orientation. Unfortunately, the MP forgot that his aircraft's air to ground gun mode was selected and armed ready to fire. The MP immediately realized his error when the aircraft's gun discharged. The aircraft's trigger was only fully depressed for approximately 1/4 of a second. The gun discharged 27 inert training rounds because of the gun's high rate of fire. Upon realizing his error, the MP's quick reactions significantly limited the rounds that were released from the aircraft's gun.

The MP is an experienced F-16 pilot and a dedicated Air Force officer. Several human factors explain how an experienced pilot could momentarily lose awareness of whether or not his gun is armed. During the mishap-training sortie, the MP demonstrated the habit pattern of repeatedly using the aircraft's laser marker to illuminate targets on the Warren Grove Range. During the three minutes preceding the discharge of the aircraft's gun, the MP squeezed the trigger 17 times to mark a target on the range. As long as the aircraft's gun is not selected and armed, a pilot's use of the laser marker is valid technique to maintain situational awareness and orientation to the intended target. Unfortunately, during the mishap sortie, the MP's habit pattern of using the laser marker lowered his inhibitions regarding the use of the aircraft's trigger.

Just prior to the gun's discharge, the MP channelized his attention to locating his intended target on the range. The MP frequently used the aircraft's laser marker to maintain situational awareness of the intended target on the range. The MP's focus on always knowing the location of his intended target demonstrates the pilot was appropriately concerned about the safety of personnel manning the range. However, the MP focused his attention on continuously locating his intended target on the range to the exclusion of maintaining awareness that the aircraft's gun was armed.

Prior to the training sortie, Air Force personnel had taken appropriate measures to alert the MP to the potential for unintentional discharge during strafing. The squadron safety officer disseminated information from the Air Force Safety Center on three other similar incidents to pilots in the 121st Fighter Squadron. This information would have alerted the MP that the use of the laser marker during a strafing pass could lead to an unintentional gun discharge. Additionally, prior to the mishap sortie, the IP specifically cautioned the MP against using the laser marker when he was preparing for his strafing pass. Unfortunately, the MP's habit pattern and channelized attention prevented him from adhering to the above guidance. I find that there is clear and convincing evidence that pilot error was a causal factor for this flight-related mishap.

b. Pilot Vehicle Interface (PVI)

This flight-related mishap was the fourth time in 2004 that an F-16 pilot had an unintentional gun discharge while preparing to conduct nighttime strafing operations. Pilots are responsible for maintaining awareness concerning whether their aircraft's gun is armed or not. However, the mechanisms in the cockpit should also be designed in such a manner as to minimize the possibility for human error. In the F-16, the trigger that the pilot pulls to command a laser marker is the same trigger that the pilot pulls to fire the aircraft's gun. In my opinion,

using the same trigger for both laser marking and firing the aircraft's gun significantly increases the risk of human error and an unintentional gun discharge. If the on/off control of the laser marker had been slaved to another mechanism in the cockpit other than the trigger, I believe that this mishap would not have occurred. Accordingly, there is clear and convincing evidence that poor pilot vehicle interface was a casual factor in this flight-related mishap.

c. Warren Grove Range Procedures


The Air Force has a responsibility to protect the public to the maximum extent possible from the hazards and effects associated with range operations. In order to ensure safe range operations, the range must implement procedures that minimize the possibility of an off-range impact. The current range procedures at the Warren Grove Range (WGR) permit pilots to fly patterns around the range with an armed gun. However, prior to this flight-related mishap, most F-16 pilots flying on WGR with an armed gun utilized an unofficial practice to minimize the risk of an unintentional or inadvertent gun discharge. These F-16 pilots would fly the early part of their strafing pattern with the aircraft switched to a missile override mode as opposed to an air-to-ground or air-to-air gun mode. Since the aircraft did not have an air-to-air missile aboard, there was no possibility of a firing in this mode. Pilots would then only select their aircraft's air-to-ground gun mode for strafing on final approach towards the intended strafing target. Unfortunately, this practice was only communicated by word of mouth and was not institutionalized as part of the written range procedures.

During this flight-related mishap, the MP correctly followed all published WGR procedures. However, if the procedures at the range had limited the selection of a gun mode or final arming until after the aircraft was on its final approach towards the target, I do not believe that there would have been an off-range ordnance impact on 3 November 2004. I find that there is clear and convincing evidence that the lack of published guidance for a commonly utilized range safety procedure for live strafing passes at Warren Grove Range was a casual factor in off-range ordnance striking the Little Egg Harbor Township Intermediate School.

4. CONCLUSION:

There is clear and convincing evidence that this flight-related mishap was caused by pilot error, a poorly designed pilot vehicle interface for the laser marker located on the flight control stick trigger, and the lack of published guidance for a commonly utilized range safety procedure for live strafing passes at Warren Grove Range. The unfortunate combination of these casual factors led to the unintentional gun discharge that impacted off-range at the Little Egg Harbor Township Intermediate School.

08 December 2004


KEVIN W. BRADLEY, COL, USAF
President, Accident Investigation Board

PA Release Plan – As of December 10, 2004

Strategic Objective: To ensure a timely reopening of the Warren Grove Range to ensure ANG aircrews maintain mission proficiency.

Tactical Objective: To provide accident investigation board releasable information and related safety changes in a way that ensures highest public support and confidence in the safety of the range.

Description of public, press and congressional interest

Anticipate congressional interest from Sen., Frank Lautenberg , Rep. Jim Saxton; New Jersey, 3rd , Rep Frank LoBiondo; New Jersey, 2nd, Sen. Jon Corzine (courtesy) – check w/ LL;

Anticipate considerable news interest from local, regional (New York, New Jersey, Philadelphia, Wash., D.C.), national;

Anticipate high local official and citizen interest from local municipalities in New Jersey – Little Egg Harbor, Bass River, Stafford, Eagleswood, Tuckerton townships; Pinelands Regional and Little Egg Harbor boards of education,

Key audiences – Local and federal elected officials, local citizens, press.

Goal

Maintain integrity with local elected officials and citizens - should get releasable information first hand, directly from the source, vs from the press.

Procedure

Working with local and federal elected officials, NGB will establish a process that will comply with release of information guidelines, and be responsive to the elected, public and journalism communities.

Proposed

- Seek earliest opportunity to meet with elected officials, interested citizens and press in the Little Egg Harbor Township, N.J. locale. (Recommend initial contact be with Mr. Brian Rumpf, a Little Egg Harbor township committeeman and Republican state assemblyman.)
- Recommend that elected officials be briefed first in private session, and then in public session in the Little Egg Harbor locale.
- Recommend early afternoon briefing for local and federal elected officials, to be followed by public session in early evening, consistent with local meeting formats.
- Recommend to elected officials that press be notified of public session via news advisory one day before public session. Offer to assist with issuing news advisory.
- Provide a news release as required AFI 51—503.

Key ANG

Col Kevin Bradley, AIB president

Maj Gen Dave Wherley, CG, DCANG

Brig Gen Maria Falca-Dodson, deputy adjutant general, Air, NJ

Col Brian Webster, commander, 177th Wing

Proposed timeline for report release – public release

ANG director's AIB approval + two duty days after delivery to CSAF/SAF - TBD

Presentation to local and federal elected officials, citizens and press

QUESTIONS AND ANSWERS

(for response to query only)

Q1. Who was the pilot, and how experienced was he?

A1. Major Roberto Balzano, an experienced aviator with more than 2,000 total flying hours, 975 hours of which were in the F-16.

Q2. What was the cause of the accident?

A2. The mishap was caused by pilot error, a poor designed pilot vehicle interface for the laser marker, and the lack of published procedures for a commonly utilized range safety procedure for live strafing passes at Warren Grove Range.

Q3. Can you address the pilot error?

A3. The pilot was preparing to fire at a target on the ground at the Warren Grove Range. The pilot switched the weapons from master mode to strafe mode, which will allow the aircraft's gun to fire if the trigger is pulled. While the pilot was turning into the left base portion of his pattern to fire at the ground target on the range, the pilot squeezed the trigger. The aircraft's gun fired a ¼ second burst and released 27 training rounds of 20 mm ammunition.

The pilot had no intent of firing at the school – the firing was an unfortunate and unintentional mistake.

Before the gun discharged, the pilot was trying to locate his target on the range. The pilot decided to pull the trigger to command the aircraft targeting pod that would allow a laser marker to illuminate the intended impact area at the range. He accidentally pulled the trigger past the setting to illuminate the target and fired the gun.

Q4. What other factors, if any, contributed to the accident?

A4. A poorly designed vehicle interface for the laser marker and the lack of published procedures for a commonly utilized range safety procedure for live air to ground firing passes at Warren Grove Range.

Q5. Why do you say the “vehicle interface” was poorly designed? How did this contribute to this incident?

A5. The F-16’s trigger that the pilot pulls to command a laser marker is the same trigger used to fire the aircraft’s gun. The AIB president concluded that using the same trigger for both laser marking and firing the aircraft’s gun increased the risk of human error and unintentional gun discharge. The AIB president felt that if the on/off control of the laser marker was switched to another mechanism in the cockpit other than the trigger, this mishap would not have occurred.

Q6. What changes are being undertaken as a result of the AIB report?

A6. A new pilot procedure has been developed that will ensure safe, effective operations at Warren Grove Range. Effective immediately, all aircraft will be restricted from arming weapons until established on the final part of the attack pattern.

- Software changes to aircraft systems will prevent this type of incident from occurring again. Block 25/30/32 model F-16s are prohibited from live air-to ground gun training until this software is released and installed. It will reduce the likelihood of accidental firing.

- Range flight patterns are being modified – these changes will enhance safety and allow required training to continue. The flight routes will be altered so that the maximum distance between the aircraft and the range airspace boundary is achieved. The routes are also being changed to increase the time that weapons are facing or are over unpopulated areas.

Q7. What was the previous procedure for arming the weapons?

A7. Arming the weapons was permitted once in approved range airspace.

Q8. How are the flight routes being changed?

A8. Specific response must be provided by the range officials

Q9. How do the software changes reduce the risk of accidental weapons firing?

A9. Currently a pilot intending to illuminate the target with the laser might pull the trigger past that setting and may accidentally fire the gun.

- The new software will force the targeting pod to look forward instead of a target picture off to the side.

- This will remind the pilot that the gun is selected and armed.

- The only reason for the pilot to pull the trigger with the new software is that he fully intends to fire the gun.

Q10. Could this accident have been avoided?

A10. The Air National Guard takes great care to ensure safe operations while training for the complicated missions that we can expect in combat. As missions grow more complex, we constantly review procedures to guarantee the safety of our personnel and the surrounding civilian population. We are confident that the steps we are taking will prevent a similar mishap.

Q11. What is the pilot's current medical status?

A11. The day after the mishap, the pilot was evaluated by a flight surgeon and his physical examination was normal. He was determined to be medically qualified for flight duties at the time of the mishap.

Q12. How well qualified was the pilot to perform the planned mission?

A12. The pilot was fully qualified and current to perform this type of training

Q13. Was there an aircraft system failure that contributed to the accident?

A13. No

Q14. When will the range be open?

A14. The range will open immediately.

Q15. Will the range operations be restricted during school hours?

A15. No, the changes being implemented will improve safety and reduce the risk of accidents. We need this and other ranges to ensure our aircrews are fully trained and ready to conduct operations worldwide at a moment's notice in support of the Global War on Terrorism.

Q16. How can we be certain that we are safe – accidents can still happen?

A16. Last year (FY 03) was the safest year ever for the Air National Guard. This year (FY 04) the Air National Guard had another great year and the Air Force overall had their safest year ever. We are committed to safety. Safety in training is the utmost consideration. We do everything humanly possible to train to the highest of safety standards.

Q17. Will the pilot be disciplined? What measures will be taken?

A17. The commander of the pilot's unit will determine if any punitive or administrative action should be taken, and whether any retraining is necessary. It is not appropriate to predict what will happen.

Q18. How reliable is the software and how has it been tested?

A18. The software was thoroughly tested in the lab and in about 120 flight test sorties. It is as safe and reliable as we can make it.

Q19. What is the status of the Safety Investigation Board?

A19. The Safety Investigation is complete. This report is not releasable to the public. The goal of safety investigations is to prevent other incidents and we are confident that the steps we are taking will prevent a similar occurrence.

Q20. Why can't the public see the SIB?

A20. The Safety report is designed to help prevent accidents. The purpose of affording privilege in safety investigations is to encourage frank and open communication with witnesses, allow commanders to quickly obtain accurate mishap information, and help ensure appropriate corrective action can be taken. If information from the SIB were releasable to the public, then witnesses might be less willing to discuss accidents and the possible causes. Therefore, the SIB is protected from public release.

Proposed press release

F-16C ACCIDENT REPORT RELEASED – Draft

Proposed press release

FOR IMMEDIATE RELEASE

Date

Call Lt. Col. Mike Milord, (703) 607-2780

F-16 ACCIDENT CAUSES SAFETY CHANGES AT RANGE

ARLINGTON, Va. – Pilot error, a poorly designed pilot vehicle interface, and the lack of published procedures for a commonly used range safety procedure, caused an F-16C aircraft pilot to accidentally release approximately 27 training rounds at the Warren Grove Range, N.J., Nov. 3, according to a report Air National Guard officials released today. The Air National Guard is implementing specific changes in range procedures and aircraft software to greatly reduce any recurrences of this mishap.

Aircraft at the range will be restricted in when they can arm weapons and range flight plans are being changed to point weapons toward unpopulated areas whenever possible. F-16s are getting changes to their software that will help prevent this kind of mishap.

The rounds left the range and struck a school about four miles south of the range. No one was injured during the incident, which occurred when the pilot was positioning for range operations.

The pilot was preparing to fire at a ground target on the Warren Grove Range. The pilot switched the weapons master mode to strafe mode, which will allow the aircraft's gun to fire if the trigger is pulled. While the pilot was turning into the left base portion of his attack pattern for the strafing run, the pilot squeezed the trigger. The aircraft's gun fired a ¼ second burst and released 27 training rounds of 20 mm ammunition. The pilot had no intent of firing at the school – the firing was an unfortunate and unintentional mistake.

Before the gun discharged, the pilot was trying to designate his target on the range. The pilot decided to pull the trigger to command the aircraft targeting pod that would allow a laser marker to illuminate the intended impact area on the range.

Several of the rounds landed on an elementary school and in the parking lot in Little Egg harbor Township, N.J. The pilot immediately terminated training, and reported the release to range officials. He is assigned to the District of Columbia Air National Guard's 121st Fighter Squadron, 113th Wing at Andrews Air Force Base. Md.

-END-