

# **The Shutdown of Trigger 4**

*Report of the*  
**Project Trigger**  
*Study Team*

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## Foreword

Of the many axioms that rule the swirling world of aerial combat, none is truer than “get the first shot.” Fighter pilots will go to almost any length to beat their adversaries to the draw, because that puts the opponent on the defensive. It is a very uncomfortable feeling to be defensive, when one is operating a machine that is by its nature offensive. Granted, the fighter may perform defensive missions, but even the newest fighter pilot learns that the best defense is to attack before the target knows it is under attack. More than three decades ago, fighter crews received a weapon system designed to let them throw the first punch—the AIM-7 Sparrow. The first versions of the AIM-7 seemed impressive; it was a large missile, 425 pounds, with a devastating warhead of expanding steel rods propelled outward in an expanding circle by nearly 70 pounds of explosive. Since the missile was radar-guided, the F-4 Phantom II crews could fire it under any conditions: at night, through the weather, at targets more than ten miles away. In fact, they could fire it beyond visual range without ever seeing the target. The Sparrow seemed to be an ideal weapon to fire from long range at Soviet nuclear bombers attacking America and her military forces.

Then came the air war over Vietnam, and the fighter crews there soon realized that AIM-7 shots beyond visual range were often more dangerous to other Americans than to the enemy, because there was no way to identify the target as friend or foe. Air Force and Navy crews alike quickly reverted to the eyeball as the only sure way to discriminate. They abandoned the capability of the AIM-7 to reach beyond visual range, as they came to distrust shots that might lead to a fratricide—the inadvertent downing of a friendly fighter.

By 1972 a new system was in place in a handful of Air Force F-4s. Nicknamed Combat Tree, the system allowed these few fighters to interrogate the beacons North Vietnamese MiGs carried to show their position to their radar controllers. If an F-4 identified a MiG with Combat Tree, and the crew was certain that no friendlies were in front of them, the crew could shoot beyond visual range. Nonetheless, it was risky for several reasons. Navy fighters entered from one direction as Air Force fighters entered from another. Groups were on different radio frequencies. Sometimes targets changed at the last minute. The weather was almost always a factor. It was common for strike packages to become confused as flights got separated. Combat leaders often had to improvise in a thick fog of war.

On July 29, 1972 Air Force F-4s and North Vietnamese MiG-21s engaged fifty miles northeast of Hanoi. The F-4s shot down two MiGs, and the MiGs shot

down an F-4 whose callsign was Trigger 4 (the fourth F-4 in a flight of four). Such is the historical record, but some pilots thought the record was wrong. They suspected that only one MiG fell, and that the second kill was really Trigger 4, a victim of fratricide perpetrated by Cadillac 1, the lead F-4 of another flight of four on a MiG sweep out of Udorn, Thailand. Fortunately, the two-man crew of Trigger 4 survived the shootdown and several months of imprisonment in Hanoi.

In the mid-1990's, an Air Force Reserve colonel conducted research on Trigger 4's loss. His skill and persistence permitted him to gather an impressive body of data on this one engagement. He reached a preliminary conclusion that it was "highly probable" Trigger 4 had been a victim of fratricide. Yet, he knew his conclusion was based on circumstantial evidence; he had no smoking gun. In 2000, the pilot of Trigger 4, who was aware of the Air University researcher's findings, wrote to the Air Force Chief of Staff and asked that the matter be investigated fully. In response the Chief of Staff directed a team of experts to reconstruct the air battle of July 29, 1972 to determine the facts surrounding Trigger 4's shootdown. He also appointed a non-partisan senior mentor to monitor the team's thoroughness and methodology.

The Project Trigger team began work in the Checkmate division of the operations directorate. They built upon the foundation provided by the Air University researcher. Even though this air-to-air battle occurred nearly 29 years ago, the team found and interviewed 27 participants and other interested observers of the battle. The team was fortunate to be able to synchronize five cockpit tapes, including three from the F-4 flight leaders in the battle, and two others from the flight whose kill was in question. Using the tapes, eyewitness accounts, intelligence records, and the team's considerable experience, they reconstructed the engagement, and determined that a MiG-21 shot down Trigger 4.

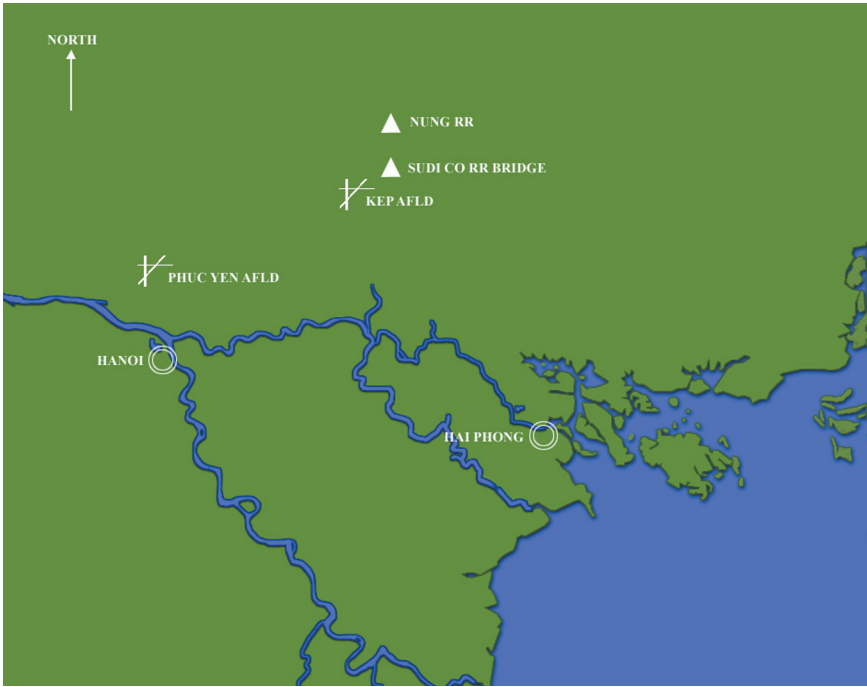
As the reader sees the story unfold, it becomes clear that there are important lessons. None of the three aircrews shot down in this engagement realized they were under attack until it was too late. But firing beyond visual range is also risky, and the system of rules in place today is the direct result of experiences from air battles such as this one. A culture of discipline in the Air Force is an important part of what makes it the best in the world. "Get the first shot" may be axiomatic, but identifying the target is even more basic.

Richard P. Hallion  
The Air Force Historian

# Contents

|                                                             |     |
|-------------------------------------------------------------|-----|
| Foreword . . . . .                                          | iii |
| 1. Methodology . . . . .                                    | 1   |
| Cockpit Tape Recordings . . . . .                           | 1   |
| Interviews . . . . .                                        | 1   |
| Research Sources . . . . .                                  | 2   |
| Engagement Reconstruction . . . . .                         | 3   |
| Shortfalls . . . . .                                        | 3   |
| Role of the Senior Mentor . . . . .                         | 3   |
| Disposition of Research Materials . . . . .                 | 3   |
| 2. Analysis . . . . .                                       | 4   |
| The Historical Record . . . . .                             | 4   |
| Evidence and Analysis                                       |     |
| That Questions the Historical Record . . . . .              | 10  |
| The Importance of Synchronizing the Cockpit Tapes . . . . . | 10  |
| 3. Results . . . . .                                        | 19  |
| Evidence Supporting Cadillac's Claim . . . . .              | 19  |
| Evidence That a MiG Shot Down Trigger 4 . . . . .           | 21  |
| Examination of the Thesis                                   |     |
| that Cadillac 1 Shot Down Trigger 4 . . . . .               | 22  |
| Conclusions . . . . .                                       | 24  |
| Notes . . . . .                                             | 25  |
| Appendix I—Time Matrix . . . . .                            | 29  |
| Appendix II—Project Trigger Team Biographies . . . . .      | 37  |
| Glossary . . . . .                                          | 39  |

**The Target Area in North Vietnam on 29 July 1972**



# 1. Methodology

The official record shows that Cadillac, a flight of four F-4s on a MiG sweep mission over North Vietnam on 29 July 1972, engaged and shot down a MiG-21, a kill credited to Cadillac 1. Shortly thereafter, Pistol, a flight of four F-4s, escorting a chaff mission, engaged and shot down a second MiG-21. Almost immediately thereafter, a third MiG-21 shot down Trigger 4, one of a flight of four that was also escorting the chaff mission. However, research conducted at Air University over the past few years challenged the official record by suggesting that Trigger 4 was mistakenly shot down by Cadillac 1, who had misidentified the friendly F-4 as an enemy MiG-21. The goal of this Air Staff study, nicknamed Project Trigger, was to reconstruct the events of the air battle and resolve the discrepancy.

Several areas comprise the body of evidence gathered to support Project Trigger: analysis of cockpit tape recordings; extensive interviews with aircrew that participated in the mission and others knowledgeable about the mission; review of archived documents, both classified and unclassified; and reconstruction of the air battle by means of computer programs designed to display the fight visually.

## Cockpit Tape Recordings

After mini-tape recorders became commercially available in the 1960s, it was not uncommon for aircrews to carry these devices on combat missions. The recorders captured everything the aircrew heard, including radio transmissions made and received, intercom voice, and warning tones. This study was very fortunate to have access to five cockpit tapes (Cadillac 1, Cadillac 3, Cadillac 4, Trigger 1, and Pistol 1) from the mission in question, all of which were in excellent condition despite being nearly three decades old. All the tapes recorded the key portion of the air battle, and they cover all the major players in the battle.

The study team gave the tapes to the AF Safety Center where technicians digitized the tapes and then transferred the data to compact disks. Although Cadillac flight was on one frequency and Pistol and Trigger on another, the technicians synchronized the tapes based on a radio call present on the tapes from Cadillac 3 and Trigger 1. The call is on the Guard, or emergency frequency, a frequency that only Cadillac 3 and Trigger 1 monitored. The time matrix at Appendix I shows key radio calls as they occurred during the engagement.

## Interviews

The Project Trigger team contacted 27 persons, each of whom either had participated in the air battle or had knowledge of it. The team used a comment sheet to

document and track communications with the participants. On the initial contact, the interviewer determined how much recollection the subject had of the mission. For those who had minimal or no recall of the events, the interview process ended. For the 15 who could remember more, the team conducted a more comprehensive interview. Five of these participated in face-to-face interviews at HQ USAF/XOOC (Checkmate); four participated via video-conference (VTC) interview; and the remaining six interviewed via telephone since it was impractical to conduct either a face-to-face or VTC session.

The team conducted comprehensive interviews with Cadillac 1B\* (Cadillac 1A is deceased), Cadillac 2A, Cadillac 3A, Cadillac 4A, Pistol 1A, Pistol 3A, Trigger 1A, Trigger 3A, Trigger 4A and 4B, and the Red Crown controller that directed Cadillac. The team also interviewed an officer who commanded Teaball, a system that monitored MiG activity and reported it to US pilots, and they interviewed three officers who participated in Project Red Baron. During and immediately after the Vietnam War, Red Baron conducted an extensive analysis of aerial combat over North Vietnam.

Audio-visual technicians videotaped the face-to-face and VTC interviews, and team members audiotaped the telephone interviews. All 15 comprehensive interviews were transcribed.

To provide interviewees the same information and to start all interviews from the same baseline, the team provided each the same list of questions and the summaries of the engagements from the Project Red Baron Report. The primary interviewers were Lt Col (then Maj) Todd P. Harmer, Col C. R. Anderegg (USAF Ret), Dr. Wayne Thompson, and Maj James G. Vick. Biographies of the team members are at Appendix II.

## **Research Sources**

The team mined several information sources beyond the cockpit tapes and interviews. The most productive of these was the National Security Agency (NSA) that provided unredacted intelligence analysis of the air battle. The NSA, at the team's request, declassified several documents that shed considerable light on the results of the air battle. NSA linguists verified translations of original materials, and their analysts searched archives and open source documentation on the engagement. NSA also located and researched Vietnamese documents.

The preliminary investigation conducted by the Air University researcher provided a rich source of information for the team. He had already located several of the participants in the air battle and secured three of the tapes that the team analyzed. Although he was not able to locate some participants in the battle, his interviews helped the team focus its efforts more clearly.

Of course the Air Force Historical Research Agency, Maxwell Air Force Base, Alabama, proved a valuable source for documents such as Project Red Baron

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\* The B callsign suffix refers to weapons system officers (WSO), and the A suffix refers to pilots.

Reports, interview transcripts, missile firing analysis, and other supporting documentation. The AF Technical Order Repository at Tinker Air Force Base, Oklahoma, provided F-4 technical orders.

### **Engagement Reconstruction**

The cockpit tapes, supported by eyewitness accounts, were the primary vehicle the team used to reconstruct the engagement. However, the team was able to take advantage of sophisticated computer programs to assist the effort. The Theater Battle Arena section of the Air Staff provided programmers and analysts that were able to replicate the engagement of 29 July 1972 in a visual display. The display can be rotated in three axes to give the viewer unlimited views of how the battle progressed. Further, the software afforded the opportunity to “fly” the participants through different scenarios to determine each scenario’s plausibility.

The 83 Fighter Weapons Squadron at Tyndall AFB, FL, ran AIM7-E-2 missile flyout profiles on programs still accessible many years after those missiles left the AF inventory.

### **Shortfalls**

Perhaps the most significant shortfall was the team’s inability to locate Cadillac 1’s radarscope camera film. There is no doubt that the film existed; Cadillac 1B commented on his tape that he was turning the camera on, and three separate interviewees said they had reviewed the film. Nonetheless, the film is not at AFHRA, and none of the interviewees have it. The film might have shown exact firing parameters as well as Combat Tree identifications.

Another shortfall is information concerning the whereabouts and actions of Chevy flight during the battle. Chevy, like Cadillac, was an ingress CAP, but Chevy’s territory was west of the battle. In his interview with the team, Chevy 1 could not recall details of his flight and stated that even if he had a tape of the mission it would be impractical to locate it. The team contacted two other officers that frequently flew with Chevy 1, but neither had a tape and neither could recall who was on the mission.

### **Role of the Senior Mentor**

A senior mentor, Maj Gen Larry L. Henry (USAF, Ret.) monitored the team’s research and analysis. Operating *pro bono*, his charter was to ensure that the team thoroughly explored every avenue possible. At the end of the study period he arrived at his conclusions independent of the Project Trigger team.

### **Disposition of Research Materials**

All materials used in this study were given to the Air Force Historical Research Agency, Maxwell AFB, Alabama under the name Project Trigger. These materials

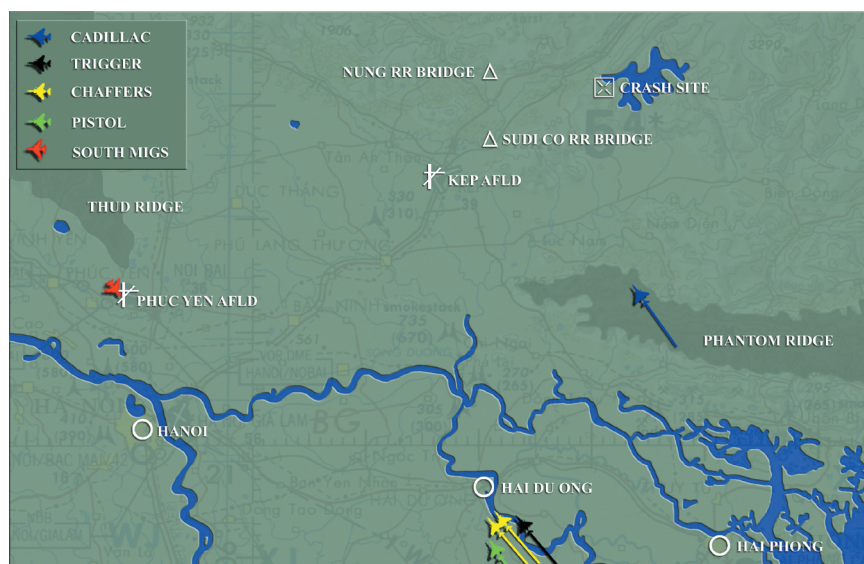
include the cockpit tapes, the digitized tapes on compact disks, interview videotapes and transcripts, the contact sheets, Pistol 1's gun camera film digitized, a copy of the Air University researcher's report, and all supporting documents used by Project Trigger.

## 2. Analysis

This chapter is in nine sections. The first section briefly reviews the historical record—what the Air Force has maintained for nearly 30 years as the official results of the air battle (Linebacker X-Ray III) over North Vietnam on 29 July 1972. The second section reviews and discusses previous research, not done by the Project Trigger team, which questions the accuracy of the historical record. The remaining sections present the Project Trigger team's analysis of the air battle.

### The Historical Record

Cadillac, four F-4s from Udorn Royal Thai Air Force Base (RTAFB), was an ingress CAP in support of a larger package whose mission was to lay chaff into, over, and out of the target area. The chaff flight, from Ubon RTAFB, callsigns Date and Palm, were two flights of four F-4s. Another two flights of four F-4s, callsigns



**Figure 1: Linebacker X-Ray III Enters North Vietnam**

Trigger and Pistol from Takhli RTAFB, had the mission of escorting Date and Palm to protect them from enemy fighters. A flight of four F-105s, callsign Eagle from Korat RTAFB, was also part of the package to provide Wild Weasel suppression of surface-to-air missile (SAM) sites.<sup>1</sup> A US Navy unit, callsign Red Crown on USS *Biddle* stationed in the Gulf of Tonkin, provided ground controlled intercept (GCI) for Cadillac.<sup>2</sup>

The USAF fighters carried different ordnance and equipment depending on their mission areas, but only some of the equipment was critical to the fight. Each Cadillac fighter carried four radar-guided, AIM-7E-2 missiles and four infrared-guided, AIM-9E missiles. Cadillac 2, 3, and 4 were F-4Es equipped with a 20-mm cannon. Although Cadillac 1 was an F-4D with no cannon, it carried Combat Tree, a system that could distinguish between friendly and enemy aircraft by interrogating friendly transponders or enemy beacons. None of the F-4Es in Cadillac, Pistol, or Trigger had Combat Tree. Also, the F-4D, Cadillac 1, was not equipped with a gun camera, although it did have a radarscope camera to film the radar picture.<sup>3</sup>

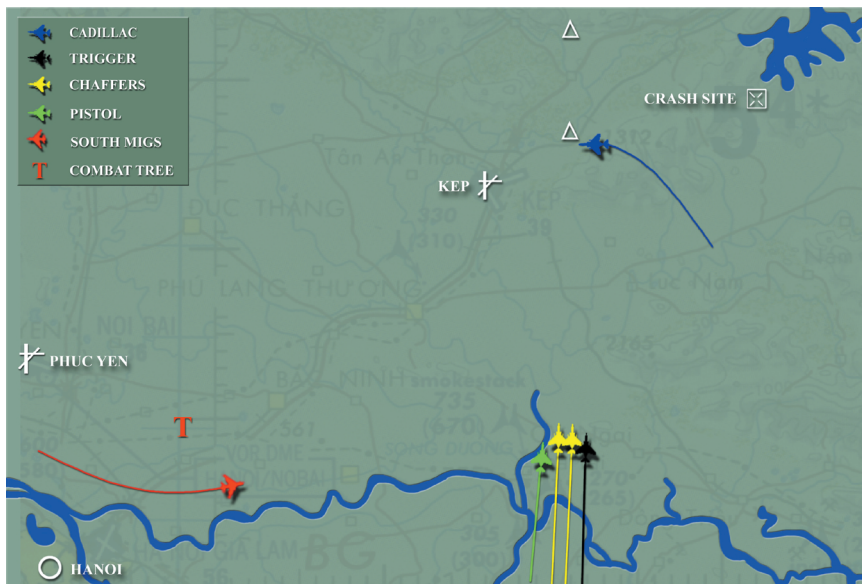
The battle commenced as Cadillac, on its CAP mission, entered North Vietnam north of Haiphong, while Date and Palm, the chaff flights escorted by Trigger and Pistol, entered enemy airspace south of Haiphong. Cadillac swept the airspace westerly along Phantom Ridge until Red Crown informed them that enemy MiGs had taken off from Phuc Yen Airfield. **(Figure 1)**

Red Crown directed Cadillac southwest to intercept the MiGs. During the westerly sweep the WSO, Cadillac 1B, used Combat Tree to identify a group\* of enemy aircraft north of Phuc Yen.<sup>4</sup> As Cadillac turned southwest under the direction of Red Crown, Cadillac 1B detected two different enemy groups several miles apart—a south group and a southwest group. Almost immediately, he lost the southwest group and Cadillac committed to intercept the south group.<sup>5</sup> **(Figure 2)**

During the intercept, Red Crown advised Cadillac of the southern MiGs' position in relative bearing and range as well as altitude—10,000 feet. Cadillac 1 B tracked the target using his Combat Tree gear until about 10 miles when he was able to get a strong enough "skin paint" to lock on with his radar. The MiG was presenting as a left, front-quarter (135-degree) aspect to Cadillac, but the MiG was flying very fast. In order to keep it from drifting off the left side of their scope, Cadillac performed a series of check-turns to the left that ultimately ended as a constant, hard, left turn. Just as Cadillac reached a firing position, Cadillac 4 called on the radio that he had been "hit." In the brief confusion that ensued while Cadillac 1 and 4 conferred, the MiG went off the left side of Cadillac's scope so they lost radar contact. **(Figure 3)** After receiving assurances from Cadillac 4 that his aircraft instruments indicated no damage, Cadillac 1 continued their turn to the north-north-

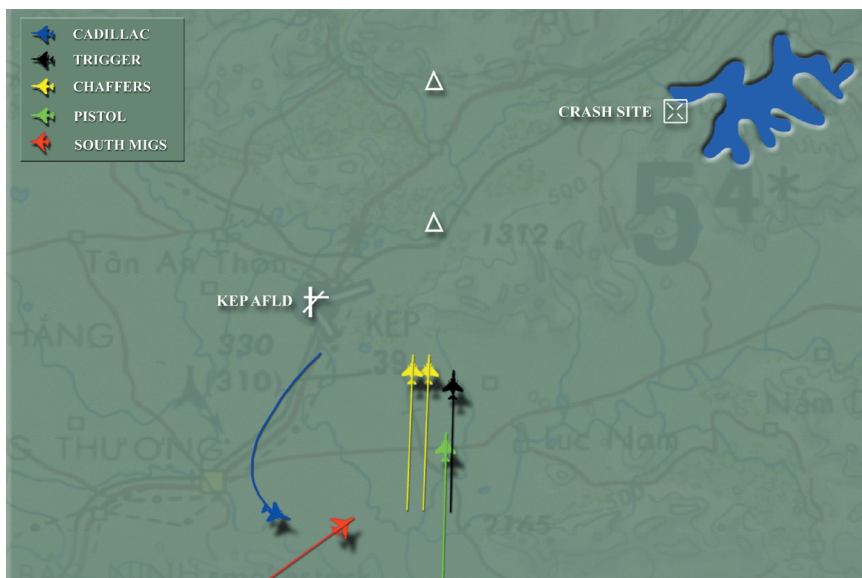
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\* The term "group," refers to one or more aircraft within 3 miles of each other. At long distance, radar returns often are inadequate to determine specific numbers in a group. Project Trigger concluded that at least two groups of MiG-21s, a south group and a west group, engaged with Cadillac, Pistol and Trigger flights.

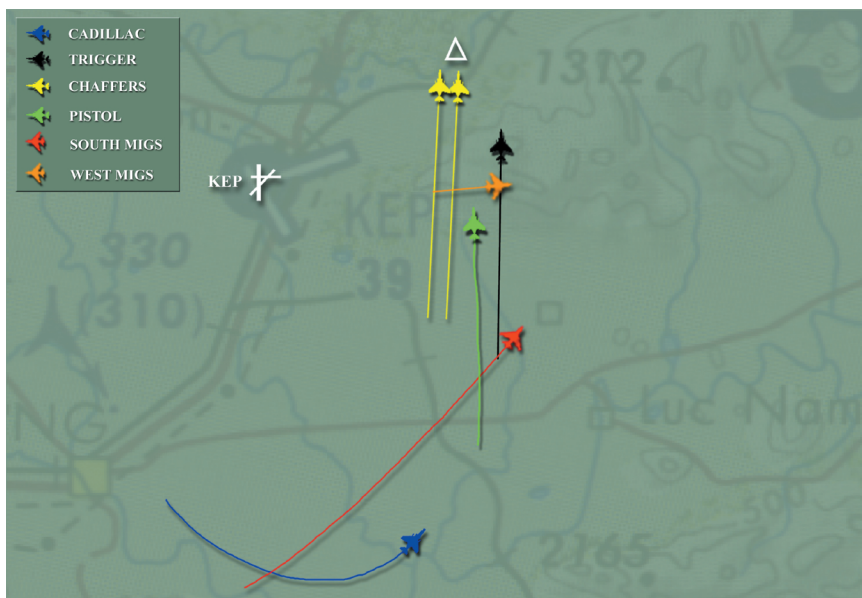


**Figure 2: Cadillac Commits to the South Group**

east. Meanwhile another MiG group, whose origin is unknown, entered the fight from the west, and Red Crown called this west group to Cadillac as “another bandit’s 030 for 7.”<sup>6</sup> Trigger 4 B saw the group pass his flight’s six o’clock and twice called them out on the radio. **(Figure 4)** Cadillac 1B, trying to find the south group,



**Figure 3: Cadillac Misses the Intercept on the South Group**

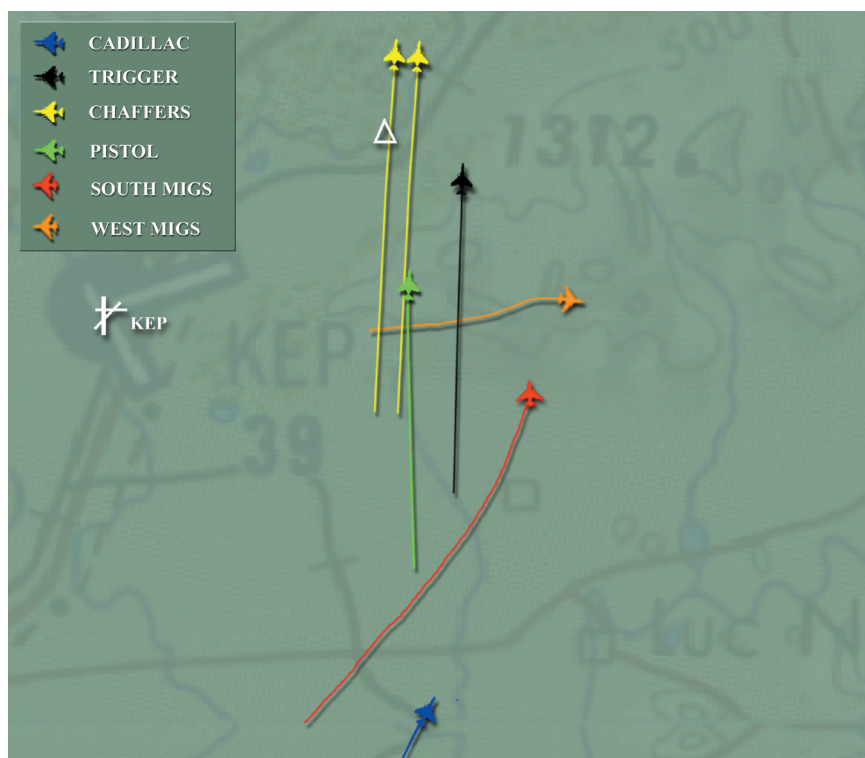


**Figure 4: West MiG Group Passes behind Trigger**

unknowingly locked on the west group. Cadillac 1A queried Red Crown if the target they were locked on to was an enemy aircraft. Red Crown confirmed it was. **(Figure 5)**

Simultaneously, the west group turned right, through south, to west, which gave Cadillac 1B a momentary head-on indication. However, as the group rolled out to the west they flew right-to-left across Cadillac's nose. **(Figure 6)** Shortly thereafter Cadillac 4A saw a MiG-21 flying right-to-left in front of the flight. Nearly simultaneously, Cadillac 2A saw a MiG at the flight's one o'clock and called, "...a MiG at one o'clock, Cadillac, one o'clock." Cadillac 1 launched two AIM-7E-2s, which tracked to the MiG and destroyed it.<sup>7</sup> Cadillac 1 never saw the MiG. However, both Cadillac 2A and Cadillac 3A witnessed the kill. As they egressed the area, several members of Cadillac flight saw an F-4, Trigger 4, burning and spinning to the ground.<sup>8</sup>

Trigger and Pistol had entered North Vietnam at about the same time as Cadillac and were escorting Date and Palm toward the target. Date and Palm were flying at about 16,000 feet with all eight aircraft line abreast in order to lay a reliable chaff corridor for bombers about 10 minutes behind them. Trigger and Pistol escorted the chaffers by flying high and to the rear with Trigger on the east side and Pistol on the west.<sup>9</sup> About two minutes short of the target area, enemy SAM operators launched three missiles toward the 16 F-4s. Pistol took mild evasive action that put them behind the rest of the formation. As the flight was re-grouping Pistol 1A saw a MiG-21 fly out in front of him. **(Figure 6)** Pistol 1 locked on to the MiG and shot a single, AIM-7E-2 that destroyed the MiG.<sup>10</sup> Pistol 3A witnessed this kill and called on the radio, "Nice shot! Nice shot!"<sup>11</sup> Meanwhile, Trigger flight was



**Figure 5: Cadillac Locks to West Group**

turning to the east to follow the chaffers, who had expended their chaff bombs over the targets. During the turn, **(Figure 7)** Trigger 3A saw the MiG Pistol 1 had shot going down in flames. At the same moment he saw a MiG attacking his wingman, Trigger 4, whose WSO also saw the MiG.<sup>12</sup> Trigger 3, already in a right turn, called for a defensive break turn, selected afterburner, jettisoned his external fuel tanks, and went into a very hard right turn.<sup>13</sup> Although Trigger 3 used the wrong callsign, Trigger 4 recognized his leader's voice and reached down to jettison his tanks. However, he was hit by one AA-2 Atoll fired from a MiG-21 flown by Nguyen Tien Sam.<sup>14</sup> The result was catastrophic—Trigger 4 immediately went out of control and burst into flames.<sup>15</sup>

Trigger 3 rolled out of his break turn and immediately saw to his left the MiG-21 overshooting his flight path. He turned hard behind and below the MiG and fired an AIM-7E-2 in a back-up mode because his radar was inoperative. The missile failed to guide, and the MiG escaped.<sup>16</sup>

Trigger 4A and 4B ejected at 8,000 feet indicated altitude.<sup>17</sup> Trigger 1 located the wreckage and initiated a search and rescue effort. However, the North Vietnamese captured both Triggers 4A and 4B, who spent the next eight months as prisoners of war before being repatriated with other prisoners at the end of the war.



**Figure 6: Cadillac Attacks West Group as South Group Attacks Trigger**

Seventh Air Force credited Cadillac 1 and Pistol 1 each with a MiG kill.<sup>18</sup> Project Red Baron and other official sources, including the North Vietnam air force (NVAF), credited a MiG-21 pilot with shooting down Trigger 4.<sup>19</sup>



**Figure 7: Pistol 1 Shoots South Group Wingman as Leader Attacks Trigger**

## **Evidence and Analysis That Questions the Historical Record**

Preliminary investigation by the Air University researcher challenged the accuracy of the historical record and indicated “a high probability” that Cadillac 1 shot down Trigger 4. NSA documents seemed to suggest that only two MiGs were airborne at the time of the battle—one was shot down, but the other landed safely at Phuc Yen. This impression was supported by an interview with the former commander of Teaball, a system that monitored MiG activity. Furthermore, Cadillac 1 never positively identified the target they shot, which occurred remarkably close in time and position to Trigger 4 being hit. If two MiGs took off and one landed, then both Cadillac and Pistol could not have each shot down a MiG. Pistol 1’s kill was irrefutable, because Pistol 3 clearly saw the MiG go down, but Cadillac’s kill was less certain.<sup>20</sup>

In addition to the major points just mentioned, other matters have been raised by critics of the official record. The concluding chapter of this report will address each of the following nine points:

1. Only two MiGs were airborne, and one landed, yet two were claimed as shot down.
2. Pistol 1 killed a MiG-21; therefore, Pistol 1 could not have shot down Trigger 4.
3. The catastrophic damage to Trigger 4’s jet was more typical of the damage caused by a friendly AIM-7 than by an AA-2, Atoll, enemy missile.
4. The pilot of Cadillac 1 was a weak pilot, and his WSO was overly aggressive.
5. Only Cadillac 1 and Pistol 1 expended ordnance in the battle, so no other friendly aircraft could have shot down Trigger 4.
6. Trigger 4 was not lost to a mid-air collision, SAMs, or anti-aircraft artillery (AAA) fire.
7. Cadillac 1 had an aspect angle of 0 degrees on its target, the direction from which Trigger 4 was hit.
8. As they were egressing the fight, Cadillac 1B directed his pilot to shoot at other aircraft that turned out to be friendly, thereby underscoring 1B’s excessive aggressiveness.
9. Red Crown was unreliable in its ability to distinguish friend from foe, so confusion between Cadillac 1 and Red Crown resulted in Trigger 4 being misidentified as a MiG.

## **The Importance of Synchronizing the Cockpit Tapes**

Clearly, the task of reconstructing an aerial engagement nearly three decades after the fact is difficult. For a clearer understanding of the complex discussion that follows, the Project Trigger team constructed a time matrix, or timeline, which chronologically displays the engagement’s critical events. The time matrix is at Appendix I. The matrix is comprised of synchronized tapes from the cockpits of Cadillac 1, Cadillac 3, Cadillac 4, Pistol 1, and Trigger 1.

During the engagements Cadillac was not on the same radio frequency as Trigger and Pistol. However, the WSOs in Cadillac 3 and Trigger 1 had not turned off their Guard (emergency channel 243.0) receivers, and both tapes recorded a call on Guard seconds before Cadillac 1 fired his missiles. The call from Walnut 1 was “Robin and Goose flights, come up 3 6 6 0, Walnut 1 out,” at 13:18:45 on the time matrix. Once the team found this common call it was a simple matter for the AF Safety Center technicians to synchronize Cadillac 3’s tape to Trigger 1’s and then synchronize the other tapes to establish an exact time line of events.

The following analysis breaks the mission down into five main areas: the pre-mission situation; Cadillac’s engagement; Pistol’s engagement; Trigger’s engagement; Eagle’s engagement; and events after the mission.

## **Situation**

Seventh Air Force fraggd the Linebacker mission for 29 July 1972 as a strike on the Sudi Co and Nung railroad bridges 50 miles northeast of Hanoi. The mission included several packages of aircraft: pre-strike MiG CAP; a chaff flight to lay a chaff corridor and to drop chaff bombs over the target; close escort fighters to protect the chaffers; Wild Weasels to suppress enemy SAM defenses; GCI and air threat warning from a Navy radar ship; attack aircraft to bomb the bridges with laser-guided bombs; and post-strike MiG CAP and Wild Weasels to protect the bombers’ egress from enemy aircraft and SAMs. Cadillac’s mission was to CAP for MiGs near the targets ahead of the larger packages. Pistol and Trigger flights both were on missions to provide close escort for Date and Palm flights, the chaffers. Eagle flight’s job was to suppress enemy SAM systems during the ingress.

Cadillac, from Udorn, flew an F-4D in the lead, and F-4Es comprised the other three aircraft. Their flight configuration was a bit unusual because the Udorn wing, the 432<sup>nd</sup> Tactical Reconnaissance Wing, preferred to fly with F-4Ds in the element leads and with F-4Es in the wingman positions. Their preference was based on significantly different equipment on the two F-4 models. About eight of the 432<sup>nd</sup>’s F-4Ds carried the AN/APX-76/80A, nicknamed Combat Tree. Usually referred to simply as Tree, the equipment was new to Udorn and highly classified. It allowed the WSO, in the APX-76 mode, to interrogate friendly aircraft transponders. The APX-80A part of the equipment operated in a similar manner except it could receive replies from the transponders, or beacons, carried by the MiG-21. The 80A had both an active and a passive mode. In the passive mode, an F-4D WSO could simply watch his scope, and if enemy GCI interrogated a MiG’s beacon, the WSO saw the reply the same as the ground controller. In the active mode, the WSO could interrogate the MiG’s beacon exactly like a ground controller.<sup>21</sup> Of course, the Tree gave the F-4D an advantage since the WSO could see beacon replies long before he was close enough to actually lock his radar on to a MiG, a small radar target. In 1972 the F-4E did not carry Tree, but it did have an internal 20mm cannon, or gun. Thus, Udorn preferred to fly whenever possible with F-4Ds in the lead and element lead (#3) positions to identify MiGs at long ranges, with the wingmen in F-4Es. On this particular mission, only Cadillac 1 flew a Tree-equipped F-4D.

Each Cadillac fighter carried four AIM-7E-2, radar-guided missiles. The AIM-7E-2 follows a beam of continuous wave (CW) reflections to the target. The CW is transmitted from the F-4 and the CW transmitter maintains its aim at the target because it points wherever the radar antenna points. Therefore, to successfully employ the AIM-7, the WSO must lock the radar on to the target so that it tracks the target constantly from missile launch to warhead detonation.<sup>22</sup> The AIM-7E-2 was a large missile that weighed 425 pounds, and had a relatively large warhead that weighed 69.4 pounds.<sup>23</sup> Each Cadillac also carried four AIM-9E, infrared-guided, missiles. Typically called a heat-seeker, the AIM-9E actually tracked a specific infrared spectrum, usually the target aircraft's exhaust plume. It was possible, under the right circumstances, for other objects (clouds, bodies of water, and the earth) to reflect or generate infrared energy in this same spectrum. The AIM-9E was a launch-and-leave weapon. The pilot pointed his sight at the target and heard a tone in his headset that indicated the missile seeker sensed the target. The pilot then fired the missile, it flew to the target, and no further action by the pilot was required. Both the AIM-7E-2 and the AIM-9E had an influence fuze to command detonation; therefore, neither missile needed to hit the target to effect a kill. The AIM-9E's warhead, at 20.8 pounds, was considerably smaller than the AIM-7E-2's.<sup>24</sup> Both Pistol and Trigger flights were F-4Es with AIM-7s and 9s.

Two weapons system malfunctions impacted the battle. Trigger 3's radar was inoperative; thus he had only an infamously unreliable way to launch AIM-7s missiles called the boresight mode. To shoot an AIM-7E-2 in boresight the WSO locked the radar antenna straight ahead and set his best estimation of overtake on a dial switch. The pilot then pointed his sight at the target and fired. He had to keep the sight on the target throughout the shot for CW energy to illuminate the target. Boresight AIM-7 shots had an extremely low probability of success.<sup>25</sup> The other malfunction was that Cadillac 1 had a bad AIM-7 on their right, forward missile station. The exact problem is unknown, but the crew knew it was a bad missile and so stated on their cockpit tape.<sup>26</sup>

Both Date and Palm were F-4s loaded with chaff dispensers and chaff bombs. The only noteworthy consideration for their configuration is that they had to fly at a speed very slow for combat due to limitations of the chaff bombs.<sup>27</sup>

The Wild Weasel flight, callsign Eagle, were F-105Gs. They carried both the Shrike anti-radiation missile (ARM) as well as the larger Standard ARM. The usual employment technique for the Shrike was to loft it at an enemy transmitting station, usually a SAM radar. The Weasel electronic warfare officer located the site by analyzing radar signals and strengths. The pilot then turned toward the site, pulled his nose up and launched the Shrike, which then followed the radar signal until an influence fuze burst it over the antenna. The Shrike was the same size as an AIM-7, while the standard ARM was considerably larger. All AIM-7s, AIM-9s, Shrikes, and standard ARMS were painted white.<sup>28</sup>

The main enemy aircraft opposing this mission was the MiG-21. Much smaller than an F-4 and equally as fast and maneuverable, the MiG-21 was a formidable adversary if flown properly. It usually carried two AA-2, infrared-guided, Atoll missiles. The Atoll was remarkably similar to an early version of the AIM-9, the

AIM-9B—same size, shape, guidance system, speed and warhead. Like the AIM-9s carried by the USAF, the Atoll had to be fired from nearly directly behind the target. Usually the North Vietnam air force GCI closely controlled the MiG pilots by vectoring them to the target, telling them when to use afterburner and when to jettison tanks. Typically, they employed very high-speed attacks to hit and run.<sup>29</sup>

Red Crown, the Navy GCI agency located on USS *Biddle* in the Gulf of Tonkin, was a primary factor in this air battle. Red Crown was responsible for the airspace east of the Hanoi, the airspace for this Linebacker mission. The equipment used to control Cadillac was a system of displays that gathered radar track, altitude and intelligence information from other sources and displayed it to the controller as a battle picture.<sup>30</sup>

Poor weather in the target area forced a three-hour delay of the mission from the morning of 29 July until early afternoon. By the time Cadillac and the other flights arrived over North Vietnam, the weather had broken into the clear and was not a factor in the mission. All interviewed recalled the weather as either clear or with scattered-to-broken, low cumulus that may have been a factor to the bombers, but had no effect on the aerial engagements. The gun camera film of Pistol 1's AIM-7 shot confirmed the good weather conditions.

### **Cadillac Engagement\***

Cadillac entered North Vietnam from the Gulf of Tonkin almost directly over Haiphong in Fluid Four formation with the element leaders line abreast 6-9,000 feet apart and their wingmen 1,500-2,500 feet out and slightly back. The element leaders weaved, randomly exchanging sides of the formation in order to avoid flying straight, predictable flight paths. As they flew northwest toward Phantom ridge, enroute to their navigation point near the targets, Red Crown transmitted the code words—x-ray alpha—for MiGs airborne. Almost immediately Cadillac 1B noted Combat Tree MiG returns on his scope. Shortly thereafter he stated that MiGs were north of Phuc Yen and only about 10 miles from a friendly flight.

At 13:14:56 hours, local time, Red Crown advised Cadillac of a bandit bearing 231 degrees from Cadillac at 28 miles. This almost certainly was a second MiG group since this contact is at least 30 miles south of where Cadillac 1B had seen MiG beacons two minutes earlier. Cadillac 1 delayed turning southwest to engage the MiGs until he and his WSO determined that they could intercept the MiGs without going over Hanoi. They turned to the southwest and pointed at the bandits Red Crown was tracking, a group Red Crown identified as “two [bandits] on my gadget.” As they flew southwest, Cadillac 1B momentarily had two Tree contacts, but one moved off his radarscope to the right (west-northwest), and he lost contact with it.

Cadillac committed to the group Red Crown was tracking, the south group, and 1B continued to track it with his Tree gear. **(Figure 2)** At 21 miles, Red Crown designated the group as “Green bandit,” the code for an experienced MiG pilot. When

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\* Except where noted the Cadillac engagement is extracted from the tapes of Cadillac 1, 3, and 4.

they were 10 miles from the group, 1B was able to distinguish the group's radar return, and he locked on to it. Red Crown had reported the bandit's altitude as 10,000 feet only seconds earlier, so it is likely that the bandit was close to that altitude when 1B locked on. It is also likely that Cadillac was slightly below the bandit, since it was a usual tactic for the F-4 to get below its target to optimize radar performance. The MiG group was flying much faster than Cadillac. The timing of the range calls indicates a 135-degree aspect, so Cadillac was looking at the left, front quarter of the contact. In order for Cadillac to keep a very fast, 135-degree aspect target on their radar they would have to be in a nearly continuous, ever-increasing in intensity, left hand turn once they were inside 10 miles. Their cockpit tape reveals that is indeed what they did; turning from 210, to 204, to 192, to 180, and then Cadillac 1B urged his pilot for a harder turn through the southeast and to the east. When they were nearly in-range to shoot, the intercept had decreased in aspect to about 90 degrees so that they were pointing at the bandit's left wing. They were below the bandit at this point as the WSO called "he's 15 degrees high." This call came at about 5 miles, so the bandit was 8,000 feet above them.

Just as Cadillac 1 was preparing to shoot an AIM-7, Cadillac 4 called on the radio that he had been "hit." Cadillac probably eased off his turn while he and 4 discussed the situation for the next 30 seconds, and during this delay the MiG "gimballed"—went off the left side of the scope. **(Figure 3)** Since Cadillac 4 stated that his aircraft was okay, Cadillac 1 elected to continue on a course towards the last known location of the bandit—a heading of 030. **(Figure 4)** The bandit was off Cadillac 1's scope only briefly, eight seconds at the most, and as Cadillac rolled out on a 030 heading, the WSO's of both 1 and 3 saw a contact on that bearing; however, neither of their radars would maintain track. Twenty-four seconds later, Red Crown called, "another bandit 033 at 7." Cadillac 1B locked on and told his pilot that they had a contact on the nose for 8 miles that was not squawking. **(Figure 5)**

At this time, two MiG groups had merged with Trigger, Pistol and the chaffers, who were about 10 miles in front of Cadillac. One was the south group on which Cadillac missed its intercept, and the other was a group that had entered from the west, possibly the group seen earlier near Thud Ridge or a group that had launched silently from the nearby Kep Airfield. This west group flew from west-to-east directly behind Trigger flight and in front of Pistol flight, which never saw them. However, Trigger 4B saw them and called them out as the bandits flew across his tail, "Trigger 4 has two bogies at our eight o'clock," and 12 seconds later called, "Two silver bogies at our seven, going to our six, Trigger 4." **(Figure 4)** This second call came five seconds before Red Crown made his call, "another bandit 033 for 7," to Cadillac. This west group immediately made a hard, descending right turn back to the west, which was tactically sound because if they had turned 90-degrees left to attack Trigger or the chaffers they would have turned their six o'clocks directly toward Pistol.

Immediately after his WSO locked on to the west group, Cadillac 1A queried Red Crown, "Roger, we have one on the nose at 8 miles. Is that a bandit?" Red Crown answered seven seconds later, "Affirmative, that is. Ah, he is 046 for 5 right now." The 046/5 corroborates a right turn for the west group as they swung slightly

right of Cadillac's nose, and Cadillac 1B's comment four seconds later that they had a "head-on" intercept, an observation he made as he saw a momentary high closure on his radar as the west group's nose swung through south on the way to a westerly heading. However, as Cadillac progressed toward the group it is clear that the head-on aspect rapidly changed to a beam aspect since their overtake on the bandit is much too low for a head-on. In fact it took Cadillac 47 seconds to close from eight miles to one mile, an average overtake of 537 knots.

Seven seconds after Red Crown made the 046/5 call, he called, "Looks like an estimated 3 bandits on your 030-3." Although the ranges may have been off by two or three miles, not unusual for GCI equipment, it is clear that Red Crown was looking at the south and the west groups, which were nearly merged in front of Cadillac and close behind Pistol and Trigger. Six seconds later, Cadillac arrived at firing parameters on the west group, which was on the beam, a 90-degree aspect, to Cadillac. Two seconds later, Cadillac 2A saw a MiG-21 moving right-to-left in front of the flight and called, "We got a MiG at one o'clock, Cadillac, one o'clock." His call matched sightings of a MiG in front of the flight by Cadillac 4A and Cadillac 3B, both of whom observed the MiG moving right-to-left across their noses. Cadillac 3B was so certain the bogies were bandits that he talked his pilot's eyes to the MiGs and encouraged him to fire.

The instant after Cadillac 2A made his bandit call, Cadillac 1B said to his pilot, "Okay, cleared to fire." Cadillac 1A attempted to fire four AIM-7s. Since it was standard operations to fire the AIM-7s in pairs, it is logical to assume that Cadillac 1A pulled the trigger, released it, then pulled it a second time and held it—the common technique to ripple-fire missiles.<sup>31</sup> The first missile in the firing sequence, the left forward, ejected from the missile bay, but the rocket motor did not fire.<sup>32</sup> The missile that should have fired next, the right forward was a bad missile, a fact known by the crew, thus the fire control system "stepped over" it. So, the first normal missile that came off the jet was the left aft missile at 13:18:51. Six seconds later the WSO, thinking there were still two AIM-7s left, directed the pilot to "fire the last two," and the pilot fired the right aft station a second later.<sup>33</sup> The team estimates that the two missiles were fired between 3.5 and 2.5 miles from the MiG, with respective flyout times of 13 and 11 seconds.<sup>34</sup>

Both missiles guided normally by turning hard left to compute a lead-collision course on the MiG that was crossing right-to-left some three miles in front of Cadillac. Cadillac 2A, who still had a tally on the MiG that was slightly higher in altitude, watched the missiles all the way to impact. The first missile detonated at 13:19:04 and the second at 13:19:09. Cadillac 2, during his interview with the team, was absolutely certain that the missiles destroyed the MiG, saying, "I was positive then, I'm still positive now."<sup>35</sup> Cadillac 3, who had confirmed the kill just before post-strike refueling, was not so positive during his interview that the missiles destroyed the MiG. Cadillac 4A commented on his cockpit tape "that blew up short of him."<sup>36</sup> However, in his interview he stated that he had seen the MiG prior to the shots, but he did not have sight of it during the shots, and in retrospect thought he made the comment based on his estimate of the MiG's position.<sup>37</sup>

A second before the second missile exploded, Cadillac 1A made a comment

that is unintelligible but could be “Guide...No” or “God...No.”<sup>38</sup> The Project Trigger team speculated that either interpretation might be a result of his surprise or frustration that the first two missiles failed, or he may have been surprised by the position of his wingman, Cadillac 2, who was flying line-abreast to forward of line-abreast “a quarter of a mile” immediately to Cadillac 1’s left. Such a position could have looked to Cadillac 1 like the missiles were a threat to his wingman as they turned sharply left to achieve the Sparrow’s normal lead-pursuit intercept course. Or, it is most likely that Cadillac 1A, like Cadillac 2A, thought the missiles had malfunctioned since they turned so sharply left immediately after launch.

Five seconds after Cadillac’s missiles timed out, Pistol 1 shot down a MiG-21 from the south group. **(Figure 7)** Six seconds after that the lead MiG-21 of the south group shot down Trigger 4. Thirteen seconds later Cadillac 1A transmitted that he saw a “bird” on fire, and later the WSO commented “there’s a big explosion in the mountains. Somebody just crashed.”

During their egress from the engagement, Cadillac 1A misidentified friendly F-4s for enemy MiGs and tried to position for an AIM-9E shot on them. However, he realized they were F-4s before he arrived at a shooting position. As Cadillac raced away from the engagement area, Red Crown made four radio calls as he tracked a bandit near Kep Airfield. The last three of these indicated the bandit was low on fuel. These radio calls do not jibe with NSA analysis that only two MiG-21s were airborne that day, and that the only surviving MiG-21 landed at Phuc Yen.

After Cadillac flight exited North Vietnam, Red Crown warned them of MiGs over the water, an unusual occurrence, and reported that Eagle 3 and 4 were engaged. Unidentified aircraft attacked Eagle 3 and 4, the element from the package’s Wild Weasel support, and fired four missiles at Eagle flight.<sup>39</sup>

### **Pistol Engagement\***

Pistol entered enemy airspace in a cover position on the chaffers, Date and Palm. Pistol flew a weave at 22,000 feet behind and on the west side of the chaffers, weaving to keep their speed higher in anticipation of engaging MiGs. They ended up on a heading of 020 to the target area. About two minutes short of the target, the North Vietnamese launched three SAMs in the general direction of the formation. Pistol saw the missiles and took mild evasive action to the right and down. This action put them below and further behind the chaffers, almost in trail with Trigger, the other escort flight that was on the east side protecting the chaffers. Shortly thereafter Pistol 1 lost sight of the chaffers. At 13:16:58 and 13:18:36 hours, Date and Palm dropped their chaff bombs over the targets and turned southeast to exit enemy airspace. In between the chaff drops, at 13:17:55, Trigger 4B called “bogies at our eight o’clock,” and 12 seconds later called, “Two silver bogeys at our 7 going to our 6, Trigger 4.” **(Figure 4)** No one acknowledged either bogey call. Pistol 1, who was still looking for Date and Palm, regained visual on them and

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\* Except where noted the Pistol engagement is extracted from the tapes of Pistol 1 and Trigger 1.

called for the flight to turn 180 degrees to the right. About 15 seconds later a silver MiG-21 flew out in front of Pistol 1, who locked on to the MiG and fired one AIM-7E-2 at the MiG. The missile knocked a wing off the MiG, which caught fire and went out of control. Pistol 1 flew within “50 yards” of the burning MiG, and Pistol 3, who witnessed the shot and kill, transmitted on the radio, “Nice shot! Nice shot!” Twenty-five seconds later Pistol 1 heard Trigger 3 comment that Trigger 4 was shot down, and a few seconds later Pistol 1 noted Trigger 4’s burning aircraft going down. Pistol 1 then saw two parachutes and orbited the downed airmen as they descended.

Shortly after Pistol 1 killed the MiG, Pistol 3A saw a white missile pass 500 feet below his airplane. He could not identify the type of missile, except he was certain it was not a SAM.<sup>40</sup> Since Cadillac and Pistol’s missiles had already detonated, the team speculated that the missile could have been a Shrike fired by Eagle flight in response to the SAM launch witnessed by Cadillac 4A moments before.

### **Trigger Engagement\***

Trigger took little if any evasive action to avoid the three SAMs since the missiles were not guiding toward them. Their formation stayed relatively unchanged until Date and Palm dropped their chaff bombs over the first target. One minute later Trigger 4B called the west group of MiGs at his eight o’clock and then a few seconds later this same group crossing his six o’clock. Twenty seconds later Trigger 3A called for Trigger 1 to “come back to the right. There’s somebody following me.” However, the bogies turned out to be Pistol flight, so Trigger 3 called 12 seconds later, “Okay, come back left Trigger 1 [to resume course.]” These two turns allowed the south MiG group to rapidly close to Trigger’s six o’clock. By this time the west MiG group had disengaged in a right, descending turn, then rolled out to the southwest, which brought them left-to-right across Cadillac’s nose. It is one of this west group that Cadillac 1 killed. However, the south group, as yet unseen by Trigger, merged with Pistol and was pressing toward Trigger’s six o’clock. Just as Pistol 1 shot down the trailing MiG in the south group, Trigger flight started a fluid four turn to the east, and several of Trigger flight heard Pistol 3 call “Nice shot! Nice shot!” (**Figure 7**) Trigger 3A saw the mortally wounded MiG on fire. At nearly the same instant Trigger 3A and Trigger 4B saw and called on the radio a MiG behind Trigger 4. Trigger 3A then called for a break turn, selected afterburner, and jettisoned his fuel tanks. Trigger 3A used the wrong callsign, but Trigger 4A recognized his element leader’s voice and saw Trigger 3 pull into a violent break turn. Trigger 4A added some force to his turn and reached down to jettison his tanks. Before he could jettison and before he could start a break turn, his aircraft violently departed controlled flight. It took only a short time to realize the jet was no longer flyable and both crewmen ejected at 8,000 feet.

The MiG-21 shot Trigger 4 from close range—1,500 to 3,000 feet behind.<sup>41</sup>

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\* Except where noted the Trigger engagement is extracted from the tapes of Pistol 1 and Trigger 1

An enemy air defense commander reported almost immediately that MiGs had shot down an F-4.<sup>42</sup> After landing, the MiG pilot claimed an F-4, and NVAF records credit him with an F-4 kill.<sup>43</sup>

Trigger 3's break turn was so violent he pegged the meter on his airplane at 10 G.<sup>44</sup> Shortly thereafter he saw the MiG-21 overshooting his flight path to his left. He called on the radio that he was engaging the MiG and that Trigger 4 was shot down. Since his radar was inoperative, Trigger 3 tried to employ an AIM-9E, but the missile seeker would not track the MiG. The MiG continued a descent as Trigger 3 fired a boresight AIM-7E-2, which not surprisingly failed to guide. Trigger 3 tried a second shot, but this AIM-7E-2 did not come off the airplane. Trigger 1, 2, and 3 exited North Vietnam.

### **Eagle Engagement**

Eagle 3 and 4, the element of the Wild Weasel flight, had an unremarkable mission until they exited North Vietnam "feet wet," or over the Gulf of Tonkin. There they assumed they were safe because they believed that MiGs hardly, if ever, ventured away from the landmass. As the element cruised toward their tanker, Eagle 3 spotted two aircraft high and to the right of the flight as the bogies turned hard down and toward Eagle. The F-105s immediately spread their formation in order to see better behind them and lit their afterburners to accelerate. Both pilots lost sight of the bogeys, and before they could regain tally, at least two, possibly four, missiles streaked through their flight missing both of them. As Eagle 3 rolled into a hard break turn he attempted to jettison his centerline fuel tank, but the tank fouled and wrapped around one of his wing pylons. Neither pilot ever saw the bogies again, and neither was able to identify the aircraft. Red Crown, however, at nearly this same time, was warning Cadillac that MiGs were active over the water. Eagle 3 was able to fly his aircraft back to South Vietnam, but the fouled tank blocked the landing gear from lowering, so the crew bailed out over the water and were recovered.<sup>45</sup>

### **After the Mission**

After landing Cadillac debriefed their mission. All seven of the living members of the flight interviewed with the Project Trigger team. None recalled any controversy about their MiG kill in their flight debriefing. However, Cadillac 1B clearly recalled an "investigation" a few days later by officers from the 7/13<sup>th</sup> AF headquarters located at Udorn wherein 1B was asked to describe the mission.<sup>46</sup> Cadillac 3B also recalled that he was asked to surrender his radar scope film and possibly his cockpit tape to an officer from the wing tactics office.<sup>47</sup> The wing commander, who had been Cadillac 3A, recalled no investigation. The team located two officers from the operations office of the 7/13<sup>th</sup> headquarters, but neither recalled an investigation, although the officer who was deputy commander of 7/13<sup>th</sup> recalled there was some "concern" over the validity of the kill.<sup>48</sup> The Project Trigger team believes that there was an investigation but was unable to find any record of a report. It is logical to assume that any investigation would have agreed with

Cadillac's claim since Cadillac 1 later received credit for a MiG kill.

Pistol and Trigger were from the same Takhli squadron, and their squadron commander was Pistol 1. The squadron commander stated in his interview with the team that he made no complaint about the loss of Trigger 4, and that he was unaware of an investigation.<sup>49</sup> Neither Trigger 1 nor Trigger 3 recalled any bitter controversy over the possibility that their wingman and squadron mates may have been the victims of fratricide.

A former Udorn pilot stated in his interview with the team that an officer in charge of the Red Baron Reports, a personal friend, told him in 1973 that the Trigger 4 shootdown was a case of fratricide, but his superiors would not let him say so in the report.<sup>50</sup> However, when Project Trigger talked to that officer, he stated that he did not recall the specific events of the engagement, and he was unaware of any controversy that indicated it might be a case of fratricide. Two other officers on the Red Baron project also said they were unaware of any controversy or investigation. All three Red Baron report participants denied that there was pressure to suppress any such information concerning this engagement or any other engagement.<sup>51</sup>

Another forum where it may have been likely for fratricide to be raised as an issue was during a Linebacker conference held at Udorn the day after the mission. Such conferences were an effort to hash out improvements to Linebacker operations. Trigger 1A attended the conference to debrief the mission of 29 July; yet he recalled no suggestion or controversy that Cadillac 1 shot down Trigger 4.<sup>52</sup>

One of the more difficult issues to explain is the number of MiGs airborne during the battle. NSA analysis clearly states that two MiGs departed Phuc Yen; Pistol shot down one and the other shot down Trigger 4.<sup>53</sup> However, the same analysis does not account for another MiG flight being airborne. Nonetheless, Red Crown called more than one group on several occasions, and two US aces both said in their interviews that it was a known tactic for the NVAF to launch MiGs silently to avoid radio intercept of their presence and position.

## 3. Results

### Evidence Supporting Cadillac's Claim

#### Eyewitness Accounts

1. *Cadillac 2A saw a MiG-21 crossing right-to-left in front of the flight just before Cadillac 1 fired and watched the missiles shoot down the MiG as documented on all three Cadillac tapes and his interview. Enroute to the post-mission tanker he stated on the radio that he "thinks [Cadillac 1] had a splash."* This comment carried considerable weight with the team because the radio call came unsolicited. Further, the

team believes he must have been very sure since he was risking his credibility in front of both his squadron commander and wing commander. In his interview with the team he remained certain that he had seen a MiG-21 moving right-to-left, against a blue sky. He stated that Cadillac 1's missiles veered hard left in front of him whereupon he immediately assumed they were bad shots. However, he then realized that the missiles were performing normally and watched them as they tracked to and shot down the MiG. When a team interviewer asked him how certain he was that Cadillac 1 had shot down a MiG, he replied, "I was positive then. I'm still positive now." The entire team found this interview to be highly credible. Although young, Cadillac 2A had flown 100 combat missions prior to 29 July, 50 of which were in search of MiGs. Certainly, the atmosphere of this critical time at Udorn would indicate that both he and Cadillac 4 were two of the squadron's better pilots since they were flying as wingmen to the squadron commander and wing commander. Clearly, Cadillac 2A was a superior pilot because he had qualified as a combat flight leader and led missions over North Vietnam. Also, he was one of a select group of pilots tapped as the original cadre of Aggressor pilots at Clark AB, an impressive achievement accorded only the very top aviators. Further, Cadillac 2A separated from the Air Force early, and seems to carry a bit of a chip on his shoulder about the institutional Air Force. The team believes he has no motivation to protect anyone that may have pressured him to confirm the kill, especially the Air Force.

2. *Cadillac 4A also saw the MiG-21 in front of the flight just before Cadillac 1 fired* and so stated as documented on his cockpit tape and in his interview. However, in his interview with the team, he was less certain, although he stated that because the sun was behind them conditions for seeing the very small MiG at long range were ideal.

3. *Cadillac 3B saw "two birds" crossing right-to-left in front of Cadillac.* Although he did not use the word MiGs, it is clear that he thought they were MiGs by the tone of his voice as he urged his pilot to shoot when he was ready.

4. *Red Crown confirmed that Cadillac was engaged with a MiG.* In his interview with the team, the controller stated that he did not clearly remember this particular engagement; however, he was adamant that if he told Cadillac the west group was a bandit, then it was a bandit. He based this statement on his confidence that when intelligence sources put a B on his scope he was absolutely certain the contact was a bandit. An interview with the captain of USS *Biddle* corroborated the Red Crown controller's view. The captain was highly confident in the ability of his "spooks," an intelligence center aboard *Biddle*, to identify MiGs.

5. *Cadillac 3A confirmed the kill over the radio* after Cadillac 2 brought it up and later confirmed the kill in the flight debriefing. However, in his interview, Cadillac 3, stated that he assumed the kill was valid because he thought that the explosion he witnessed was too large to be only the missile exploding.

### Reconstruction of Engagement

1. *The radar contact Cadillac engaged was moving right-to-left across their nose.* Analyses of the cockpit tapes as well as three eyewitness accounts of the MiG

in front of the flight going right-to-left support this point. Further, eyewitness accounts from all of Cadillac's wingmen state that Cadillac 1 was nearly wings-level during the attack, thus, it is unlikely that Cadillac was in a right turn that would make the target appear to be moving right-to-left. However, the team's conclusion of a beam target contradicts what Cadillac 1B, the WSO, reported on his tape that they were in a head-on attack. It very well may have been a head-on when he first locked on, during the seconds that the west group, after aborting its attack on the chaffers turned hard right to escape and then came back to the left to clear away from Pistol flight. Clearly, the closure rates—a little over 500 knots—indicated on Cadillac's cockpit tape shows an overtake that indicates a beam attack. For it to be a head-on attack throughout, the overtake would have had to be twice as high. The team's conclusion that the attack was on the beam also contradicts the missile firing report that states the aspect angle was zero—a tail shot. The timing of the range calls shows unequivocally that the shots were not taken from the stern unless the target was stationary. Such geometry would have been possible if Cadillac inadvertently had locked on to and shot a chaff bundle. In fact, had there not been credible eyewitness accounts of MiGs in front of Cadillac, the team could easily draw a scenario wherein Cadillac shot chaff, because the intercept geometry and overtake, as well as the lack of a visual sighting by either Cadillac 1A or Cadillac 1B, might be convincing that there was no aircraft at the end of the missiles' flightpaths.

2. *There is ample evidence that more than one MiG group entered the battle.* Cadillac saw three distinct Combat Tree groups on his radar. Red Crown tracked two separate groups in the fight. Trigger 4B saw MiGs fly past his six o'clock that almost certainly were not the same group that Pistol shot. Red Crown warned Cadillac of MiGs over the water that almost certainly was neither of the two groups in Cadillac's battle. Red Crown encouraged both Cadillac and Chevy flights to reverse course toward bandits, low on fuel, that were at Kep Airfield, even though it is clear that the surviving MiG from the south group landed at Phuc Yen Airfield.

#### Archived Documents

1. *Intelligence summaries credit Cadillac with the kill of a MiG-21 on 29 July 1972.*
2. *Seventh Air Force published orders that credit Cadillac with a kill.*
3. *The Project Red Baron Report credits Cadillac with a MiG-21 kill on 29 July 1972.*

#### Evidence That a MiG Shot Down Trigger 4

##### Eyewitness Accounts

1. *Trigger 3 saw a MiG-21 behind Trigger 4 an instant before Trigger 4 was hit and called it on the radio. He then went into such a severe break turn that he overstressed his jet.*

2. *Trigger 3 saw a MiG-21 overshoot his flight path seconds after Trigger 4 was hit.* Further, Trigger 3 has been consistent in this account in his Red Baron debrief in 1973 and his statements during his interview 28 years later with the Project Trigger team.
3. *Trigger 4B saw MiGs at his six o'clock and called it on the radio just before they were hit.*

### Reconstruction of Engagement

1. *Cadillac 1 could not have shot down Trigger 4.* Trigger 4 was in a right turn when he was hit—a fact confirmed by Trigger 4A, 4B, and 3A. The MiG that Cadillac shot was in a constant flight path moving right-to-left across Cadillac's nose—confirmed by Cadillac 2A, 4A, 3B, the flight path of Cadillac's missiles, and analysis of Cadillac 1's cockpit tape.
2. *Cadillac's kill happened 11 seconds before Trigger 4 was hit.* This is the closest the team could reconstruct the kills. It assumes the maximum flyout time for Cadillac's missiles against a beam target, and it assumes Trigger was hit at the beginning of Trigger 3's break call.
3. *Cadillac was too far away from Trigger to have shot him down.* Even if Cadillac had locked on to Trigger at the "8 miles" call, Cadillac could not have run Trigger down in 47 seconds. In corroboration, all the Cadillac flight members recalled Trigger's burning F-4 as being well away from their engagement.

### Archived Documents

1. *NVAF air defenses claimed an F-4 was killed "by MiGs."*
2. *The NVAF credited the pilot with an F-4 kill on 29 July 1972.*
3. *The MiG pilot reconstructed his shot and kill in a drawing on display in a Hanoi museum.*

### **Examination of the Thesis that Cadillac 1 Shot Down Trigger 4**

In this section, Project Trigger examines nine points that have been used to argue for the probability of fratricide. Each point is summarized in *italics* followed by Project Trigger's conclusion about the truth or falsehood of that point.

1. *Only two MiGs were airborne and one landed safely, yet two were claimed as shot down.* Although NSA documents state that sources reported two MiGs airborne, they also leave the door open for the possibility that others were airborne. Cadillac's cockpit tape clearly identifies two, if not three, MiG groups airborne. Red Crown's transmissions clearly identify two, if not three, MiG groups airborne. Three eyewitnesses reported that MiGs fired four missiles at their flight over the Gulf. Further, Red Crown reported MiGs low on fuel at Kep Airfield.
2. *Pistol 1 killed a MiG-21; therefore, Pistol 1 could not have shot down Trigger 4.* This statement is almost certainly true. Both Pistols 1A and 3A, as well as other flight members, identified the target as a MiG. However, Pistol 1's gun camera film

is inconclusive because the film ran out before the missile got to the target, and the target is never in the camera's field of view.

3. *The catastrophic damage to Trigger 4's jet was more typical of the effects of the AIM-7 than the small AA-2 Atoll.* This assessment is an anecdotal comparison to an occasion when an AIM-7 hit a MiG-21 and produced similar damage. However, another officer, who flew over 300 combat missions, saw an Atoll hit an F-4 and the damage was just as catastrophic and very similar in that the tail broke off and the aircraft tumbled forward.

4. *Cadillac 1A was a weak pilot, and 1B was overly aggressive in an attempt to become the first USAF ace of the war.* One interviewee described Cadillac 1A as a weak pilot. All other interviewees that had flown with Cadillac 1A described him as a competent pilot and flight leader. In fact, this was Cadillac 1A's second MiG kill of the war. His first kill was a high-speed engagement between 50 and 100 feet above the ground as he pursued and killed a MiG-21. Highly experienced former F-4 crewmen that listened to the Cadillac tape observed that Cadillac 1A was passive in the cockpit and tended to rely on his WSO, perhaps to a fault. Nonetheless, the engagement was a radar engagement, wherein the WSO should rightfully be directive as opposed to informative.

5. *Only Cadillac 1 and Pistol 1 expended ordnance in the battle, so no other friendly aircraft could have shot down Trigger.* Trigger 3 also expended one AIM-7. Eagle, the Wild Weasel flight, expended several Shrikes and Standard ARMs, which in flight resembled a Sparrow missile in shape and color (and size in the Shrike's case).

6. *Trigger 4 was not lost to a mid-air collision, SAM, or AAA.* Probably true. SAMs were fired at the flight 90 seconds before Trigger 4 was shot down, however, another SAM was fired only 14 seconds before Trigger 4 was hit, and Cadillac 4A commented, "There's a missile. Another SAM." None of the interviewees recalled seeing unusual amounts of AAA that day; however, Cadillac 4A commented on his tape that there was AAA in front of them a minute before they engaged the MiG. One interviewee recalled AAA being fired at the crewmen in their parachutes, and Trigger 4A recalled the rounds zipping by him as he came down in his parachute. It is possible, but unlikely, that AAA gunners could have hit Trigger at the altitude he was flying.

7. *Cadillac 1 had an aspect angle of 0 degrees on its target, the direction from which Trigger took his hit.* Cadillac 1B thought his target was flying head-on, and his missile firing report stated that their aspect was zero. But the timing and pacing of Cadillac's intercept, as well as witnesses to the MiG's flight path, indicate that Cadillac 1 was on the beam to the target (90-degrees aspect) when they shot.

8. *As they were egressing from the fight, Cadillac 1B urged his pilot to shoot at other aircraft that turned out to be friendly. Although the pilot did not fire, the incident demonstrated the WSO's excessive aggressiveness.* The WSO did urge the pilot to fire, but it was the pilot that initially misidentified the friendly aircraft as MiG-21s. The pilot did not fire; once he saw the aircraft were friendly, he said so immediately and discontinued maneuvering.

9. *Red Crown was unreliable in its ability to distinguish friend from foe and also*

*misidentified Trigger as a MiG.* Every crewman from Udon was asked in his interview to rate Red Crown's ability to distinguish between MiGs and friendlies. They all rated Red Crown as highly reliable. Crewmen from other bases were not nearly as confident in Red Crown's abilities. The team believes this discrepancy is a result of Udon crews working frequently with Red Crown to hunt MiGs, whereas crews from other bases had less experience with Red Crown and usually only used Red Crown as a warning agency. The Red Crown controller was moderately confident in his system's ability to track MiGs, but he was "100 percent sure" that those identified as MiGs were actually MiGs. The captain of *Biddle* was very confident in the ability of his team to identify aircraft.

## **Conclusions**

### **Cadillac 1 Did Not Shoot Down Trigger 4.**

1. Trigger 4 was in a right turn when he was hit, whereas Cadillac's target was flying right-to-left across their nose.
2. Cadillac 1's missiles exploded 11 seconds *before* Trigger 4 was hit, based on the synchronized cockpit tapes.
3. Trigger 3A and Trigger 4B both sighted MiGs behind their element and attempted to defend themselves.
4. Trigger 3 attacked the MiG-21 that overshot his flight path seconds after Trigger 4 was hit.

### **A MiG-21 Shot Down Trigger 4**

The body of evidence overwhelmingly supports the historical record. Trigger 4 was lost to a MiG-21 on 29 July 1972.

### **Cadillac 1 Shot Down a MiG-21**

Cadillac 2A's eyewitness account of Cadillac's shots was very credible to the team. Further, his eyewitness report confirmed Cadillac's kill in accordance with established kill confirmation policy just as Pistol 3's did for Pistol 1.

# Notes

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4. Transcript of Cadillac 1 cockpit tape, 29 July 1972, transcribed by C.R. Anderegg, 1A-5, AFHRA, Maxwell AFB, AL.
5. Cadillac 1 cockpit tape, 1A-8.
6. Cadillac 1 cockpit tape, 1A-11.
7. Peter A. Kirchner, transcript of telephone interview by the Project Trigger team, 21 February 2001, 2G-8, AFHRA, Maxwell AFB, AL.
8. Cadillac 1 tape, 1A-13.
9. Message, 31115Z Jul 72.
10. Gene E. Taft, Col, USAF (Ret), transcript of video-teleconference interview with the Project Trigger team, 2 February 2001, 2N-4, AFHRA, Maxwell AFB, AL.
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12. Transcript of Trigger 1 cockpit tape, 29 July 1972, transcribed by C. R. Anderegg, 1D-8, AFHRA, Maxwell AFB, AL.
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  25. 1<sup>st</sup> Test Squadron, 24.
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  32. 1<sup>st</sup> Test Squadron, 137.
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53. Message, 312030Z Jul 72.

# Appendix I

## Time Matrix

**Cadillac 1: 13:06:36** (Time hack on Cadillac 1 tape serves as the event matrix master time)

**Trigger 1: 13:06:43** (Start time for Trigger 1 using common call from Cadillac 3)

**Cadillac 3: 13:05:02** (Start time for Cadillac 3 using common call from Cadillac 1)

**Cadillac 4: 13:06:47** (Start time for Cadillac 4 using common call from Cadillac 1)

**Pistol 1: 13:08:10** (Start time for Pistol 1 using common call from Trigger 1)

| Real Time | Callsign   | Voice         | Significant Event                                                                   |
|-----------|------------|---------------|-------------------------------------------------------------------------------------|
| 13:08:11  | Cadillac 1 | Baily (I)*    | Okay, looks to me like we're right over Haiphong.                                   |
| 13:08:15  | Pistol 1   | Imaye (I)     | We're at 2031 and 10641 [N 20 31' / E 106 41'] and our heading is 310.              |
| 13:08:42  | Date 1     | Unknown       | And Date right turn and start dispensing.                                           |
| 13:09:12  | Pistol 1   | Taft (I)      | We're at 22 thousand [feet].                                                        |
| 13:09:28  | Unknown    | Unknown       | Got a Thud [F-105 Wild Weasel], 2 o'clock low.                                      |
| 13:09:47  | Cadillac 4 | Petkunas (I)  | SAM site's at 9 o'clock 7 miles.                                                    |
| 13:11:24  | Pistol 1   | Imaye (I)     | Yeah, we're maintaining 380. They're not doing very good...we're moving up on them. |
| 13:11:24  | Red Crown  | Anderson      | Chevy, Crown, x-ray alpha. X-ray alpha from Crown, out. [MiG activity]              |
| 13:12:04  | Cadillac 1 | Feinstein (I) | 60 miles, got IFF. [Combat Tree]                                                    |
| 13:12:49  | Cadillac 1 | Feinstein (I) | All right, there's bandits at Phuc Yen. We're holdin' the IFF returns.              |
| 13:12:59  | Cadillac 1 | Feinstein (I) | Rog, just north of Phuc Yen. Between Phuc Yen and Thud Ridge.                       |
| 13:13:15  | Trigger 1  | White (I)     | Whoa! What the fuck is that? I hope that was a Thud!                                |

|          |            |               |                                                                                                                                                                                                |
|----------|------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13:13:31 | Trigger 1  | White (I)     | Can't fuckin' tell. Hope they're Thuds shootin' here. What are these airplanes, I hope these are Thuds shootin' they look big.                                                                 |
| 13:13:43 | Date 1     | Unknown       | Okay, Date, right turn.                                                                                                                                                                        |
| 13:13:44 | Trigger 1  | White (I)     | Christ that scared me when I saw that fuckin' missile come off...Date's comin' right a little bit...Those Shrikes just went like shit. Looked like a big, ol' missile. Air to air type I mean. |
| 13:13:59 | Pistol 1   | Taft (I)      | ...and we'll try to go over the bend in the river down there.                                                                                                                                  |
| 13:14:01 | Cadillac 1 | Feinstein (I) | Oh, I got good guys right up there on Thud Ridge about 10 miles from the bad guys.                                                                                                             |
| 13:14:01 | Cadillac 4 | Petkunas (I)  | 18 miles out of Kep. Now at 10 to 11 o'clock.                                                                                                                                                  |
| 13:14:55 | Cadillac 1 | Feinstein (I) | Okay, we're at our point at 15 after.                                                                                                                                                          |
| 13:14:56 | Red Crown  | Anderson      | Cadillac, Crown, you have a bandit 231 at 28.                                                                                                                                                  |
| 13:15:02 | Red Crown  | Anderson      | Bandit 231-31                                                                                                                                                                                  |
| 13:15:17 | Red Crown  | Anderson      | Okay, ah, Cadillac, let's go get him, ah, let's vector 225. He's 226-31.                                                                                                                       |
| 13:15:28 | Unknown    | Unknown       | Take it down, take it down. Triple launch 12 o'clock                                                                                                                                           |
| 13:15:30 | Red Crown  | Anderson      | Roger, he's ah 226-28. Believe I hold two on my gadget.                                                                                                                                        |
| 13:15:37 | Red Crown  | Anderson      | Altitude 10,000 on my gadget. He's 223 at 28.                                                                                                                                                  |
| 13:15:41 | Cadillac 1 | Feinstein (I) | 30 miles...I got two of 'em.                                                                                                                                                                   |
| 13:15:49 | Red Crown  | Anderson      | He's 224-27 Cadillac                                                                                                                                                                           |
| 13:15:50 | Cadillac 1 | Feinstein (I) | Roll out 240 for a moment and let me get a good paint. I had one off to our right also, but I lost him.                                                                                        |
| 13:15:57 | Red Crown  | Anderson      | He's ah, 219-25.                                                                                                                                                                               |
| 13:15:58 | Cadillac 1 | Feinstein (I) | Okay, take this heading.                                                                                                                                                                       |
| 13:16:05 | Red Crown  | Anderson      | He's 216-23.                                                                                                                                                                                   |
| 13:16:06 | Cadillac 1 | Baily         | Steady on.                                                                                                                                                                                     |
| 13:16:10 | Cadillac 1 | Feinstein (I) | And I'm paintin'...paintin' IFF.                                                                                                                                                               |
| 13:16:12 | Red Crown  | Anderson      | He's 215-21...Green bandit, green bandit.                                                                                                                                                      |
| 13:16:18 | Cadillac 4 | Gardner (I)   | There's Kep off the right.                                                                                                                                                                     |

|          |            |               |                                                                                        |
|----------|------------|---------------|----------------------------------------------------------------------------------------|
| 13:16:19 | Red Crown  | Anderson      | He's 210-15.                                                                           |
| 13:16:24 | Cadillac 4 | Gardner (I)   | Okay, I got some SAMs blowing up way out there at 9.                                   |
| 13:16:28 | Red Crown  | Anderson      | He's 204 at 12.                                                                        |
| 13:16:29 | Cadillac 1 | Baily         | Rog, you got an altitude?                                                              |
| 13:16:33 | Red Crown  | Anderson 1    | 0,000. 10,000.                                                                         |
| 13:16:36 | Pistol 1   | Imaye (I)     | We're 50 miles due east...north-east. We should be turning back to the left somewhere. |
| 13:16:37 | Red Crown  | Anderson      | Green bandits. 192 at 10.                                                              |
| 13:16:42 | Cadillac 1 | Feinstein (I) | Come on radar. Skin paint. Lock on.                                                    |
| 13:16:52 | Cadillac 1 | Feinstein (I) | Okay, come port 150...130.                                                             |
| 13:16:57 | Red Crown  | Anderson      | 162 at 4.                                                                              |
| 13:16:58 | Date 1     | Unknown       | Date 2 and 3, Palm 2 and 3 ready, pickle!                                              |
| 13:16:58 | Cadillac 1 | Feinstein (I) | He's one mile from in-range.                                                           |
| 13:17:02 | Cadillac 1 | Feinstein (I) | Harder port. 'kay. Good, keep...hold this hard port turn.                              |
| 13:17:13 | Red Crown  | Anderson      | 118 at 4.                                                                              |
| 13:17:19 | Cadillac 1 | Feinstein (I) | Okay he's 15 degrees high...                                                           |
| 13:17:20 | Cadillac 4 | Gardner       | And 4 just took a hit. Cadillac 4 just took a hit                                      |
| 13:17:32 | Cadillac 1 | Baily         | Cadillac 4, you took a hit? Okay, let's go. Let's get outta here.                      |
| 13:17:40 | Cadillac 1 | Feinstein (I) | Zero, roll out...030! Yeah 030!                                                        |
| 13:17:42 | Walnut     | Unknown       | Walnut flight come up 3660. Walnut on Guard.                                           |
| 13:17:45 | Cadillac 1 | Baily (I)     | Where is he Jeff?                                                                      |
| 13:17:46 | Cadillac 1 | Feinstein (I) | 030 for 6... Fuckin' broke lock.                                                       |
| 13:17:49 | Pistol 1   | Imaye (I)     | 60 miles - 050.                                                                        |
| 13:17:50 | Pistol 1   | Taft (I)      | Tally-ho. The flight's 12 o'clock to us.                                               |
| 13:17:53 | Red Crown  | Anderson      | Okay, bandits 300 at 9, Cadillac.                                                      |
| 13:17:54 | Cadillac 1 | Baily         | Roger, 300 at 9.                                                                       |
| 13:17:55 | Trigger 4  | Matsui        | Trigger 4 has 2 bogies at our 8 o'clock                                                |
| 13:18:02 | Trigger 1  | Bettine (I)   | Everybody's on our right. I'm watchin'.                                                |
| 13:18:07 | Trigger 4  | Matsui        | Two silver bogies at our 7 going to our 6, Trigger 4.                                  |
| 13:18:10 | Cadillac 4 | Gardner (I)   | Looks like 57 [mm AAA] up ahead.                                                       |
| 13:18:12 | Red Crown  | Anderson      | And you have another bandit 033 at 7.                                                  |

|          |            |               |                                                                                                    |
|----------|------------|---------------|----------------------------------------------------------------------------------------------------|
| 13:18:17 | Cadillac 1 | Feinstein (I) | Okay, I got somebody on the nose he's not squawkin' for...                                         |
| 13:18:21 | Red Crown  | Anderson      | Another bandit's 004 for 3.                                                                        |
| 13:18:24 | Pistol 1   | Taft          | Pistol flight, a 180 to the right.                                                                 |
| 13:18:24 | Cadillac 1 | Feinstein (I) | On the nose for 8 miles.                                                                           |
| 13:18:26 | Cadillac 1 | Baily         | Roger, we have one on the nose at 8 miles. Is that a bandit?                                       |
| 13:18:27 | Trigger 3  | Myers         | Okay, Trigger 1 & 2, comeback to the right. Come back to the right. There's somebody following me. |
| 13:18:33 | Red Crown  | Anderson      | Affirmative, that is. Ah, he is at 046 for 5 right now.                                            |
| 13:18:33 | Trigger 1  | White         | Trigger's coming right.                                                                            |
| 13:18:36 | Date 1     | Unknown       | Okay 1 and 4 start your pickle.                                                                    |
| 13:18:37 | Cadillac 1 | Feinstein (I) | Okay, 1 mile from in range, we've got a head-on.                                                   |
| 13:18:39 | Trigger 3  | Myers         | Okay, come back left Trigger 1.                                                                    |
| 13:18:40 | Red Crown  | Anderson      | Looks like an estimated 3 bandits on your 030-3.                                                   |
| 13:18:44 | Pistol 1   | Taft          | Okay, we've got a MiG up here! 12 o'clock...Pistol.                                                |
| 13:18:45 | Walnut 1   | Unknown       | [Common Guard Call: Trigger 1/ Cadillac 3] Robin and Goose flight, come up 3-6-6-0, Walnut 1 out.  |
| 13:18:46 | Cadillac 1 | Feinstein (I) | Okay, we're in range.                                                                              |
| 13:18:48 | Cadillac 2 | Kirchner      | We got a MiG at one o'clock. Cadillac, one o'clock.                                                |
| 13:18:50 | Cadillac 1 | Feinstein (I) | Okay. Cleared to fire. Fire two.                                                                   |
| 13:18:51 | Cadillac 1 | N/A           | First AIM 7, the left aft missile, is fired.                                                       |
| 13:18:52 | Cadillac 4 | Gardner(I)    | I got a tally on it. [MiG]                                                                         |
| 13:18:54 | Pistol 3   | Kempton       | Pistol, you got the MiG at 12 o'clock?                                                             |
| 13:18:57 | Cadillac 1 | Feinstein (I) | Okay the circle's about the largest, fire the last two.                                            |
| 13:18:57 | Cadillac 4 | Gardner (I)   | There go the tanks                                                                                 |
| 13:18:58 | Cadillac 1 | N/A           | Second AIM 7, the right aft, is fired.                                                             |
| 13:19:01 | Cadillac 4 | Gardner (I)   | There goes ours. [tanks]                                                                           |
| 13:19:02 | Cadillac 3 | Becker (I)    | Two of them [Bogies] at 1 o'clock. Got 'em?                                                        |
| 13:19:02 | Cadillac 1 | Feinstein (I) | Okay fire again.                                                                                   |
| 13:19:04 | N/A        | N/A           | Timeout of Cadillac 1's first AIM 7                                                                |

|          |            |               |                                                                                                                    |
|----------|------------|---------------|--------------------------------------------------------------------------------------------------------------------|
| 13:19:04 | Cadillac 1 | Feinstein (I) | Okay you should see 'em just slightly low, 10 left at...                                                           |
| 13:19:04 | Cadillac 3 | Smith (I)     | I got his [Cadillac 1] missiles.                                                                                   |
| 13:19:06 | Cadillac 4 | Gardner (I)   | There goes a missile. Another SAM.                                                                                 |
| 13:19:06 | Trigger 4  | Matsui        | Trigger 4 has a bogey at 6 o'clock                                                                                 |
| 13:19:06 | Trigger 3  | Myers         | Trigger 3's got a MiG at our 6 o'clock.                                                                            |
| 13:19:08 | Cadillac 1 | Baily (I)     | ****[God / Guide] No.                                                                                              |
| 13:19:08 | Cadillac 1 | Feinstein (I) | ...one and a half miles.                                                                                           |
| 13:19:08 | Red Crown  | Anderson      | Bandit should be 038 for 4                                                                                         |
| 13:19:09 | N/A        | N/A           | Timeout of Cadillac 2's second AIM 7                                                                               |
| 13:19:09 | Pistol 3   | Kempton       | Lead, ah...just had a MiG go by you                                                                                |
| 13:19:11 | Cadillac 1 | Feinstein (I) | Okay, 1 mile. 15 left.                                                                                             |
| 13:19:12 | Pistol 1   | Taft (I)      | Okay, there's a shot (missile away).                                                                               |
| 13:19:14 | Red Crown  | Anderson      | Tracker breaking port.                                                                                             |
| 13:19:14 | Cadillac 1 | Baily         | Okay.                                                                                                              |
| 13:19:14 | Pistol 3   | Kempton       | Nice Shot! Nice Shot!                                                                                              |
| 13:19:16 | Pistol 1   | Taft (I)      | We got a MiG!                                                                                                      |
| 13:19:18 | Pistol 1   | Taft (I)      | Let's get our tanks off!                                                                                           |
| 13:19:19 | Cadillac 1 | Feinstein (I) | Okay, who's that at our right? Tally.                                                                              |
| 13:19:19 | Cadillac 1 | Baily (I)     | Okay, those are bad guys.                                                                                          |
| 13:19:20 | Trigger 3  | Myers         | Pistol 3 break!...ah shit that's a MiG (Note: Trigger 3 jettisons tanks and starts a break turn, Trigger 4 is hit) |
| 13:19:22 | Cadillac 1 | Baily         | All right, Cadillac let's get it outta here.                                                                       |
| 13:19:26 | Red Crown  | Anderson      | Looks like he went low to 319 at 2.                                                                                |
| 13:19:29 | Cadillac 1 | Feinstein (I) | Is that our element in front of us?                                                                                |
| 13:19:33 | Cadillac 1 | Baily (I)     | No. That's another flight. Droppin' their tanks!                                                                   |
| 13:19:43 | Cadillac 1 | Baily         | Okay, we got a bird on fire out here Cadillac                                                                      |
| 13:19:43 | Trigger 1  | White         | Trigger 3 say position on lead.                                                                                    |
| 13:19:46 | Trigger 3  | Myers         | Trigger 3's padlocked, 4's shot down                                                                               |
| 13:19:47 | Red Crown  | Anderson      | What's your heading Cadillac?                                                                                      |
| 13:19:49 | Cadillac 1 | Baily         | Cadillac's coming around to east.                                                                                  |
| 13:19:55 | Cadillac 1 | Feinstein (I) | Okay, good guys on the nose for ah...                                                                              |

|          |            |               |                                                                                     |
|----------|------------|---------------|-------------------------------------------------------------------------------------|
| 13:20:01 | Pistol 1   | Taft (I)      | There's an F-4 going right down, right there, take a [fix]. What's our latitude?    |
| 13:20:01 | Cadillac 1 | Feinstein (I) | You see anything that looked like a hit?                                            |
| 13:20:02 | Cadillac 1 | Baily (I)     | No.                                                                                 |
| 13:20:05 | Unknown    | Unknown       | ***got a MiG going 9 o'clock.                                                       |
| 13:20:08 | Pistol 1   | Imaye (I)     | 2158...10632 [N 21 58' / E 106 32']                                                 |
| 13:20:12 | Cadillac 1 | Baily (I)     | There's a bird spinnin' in. See him over there.                                     |
| 13:20:12 | Pistol 1   | Taft (I)      | Okay two chutes, two chutes.                                                        |
| 13:20:13 | Cadillac 4 | Petkunas (I)  | There's AAA all around him. [one of the survivors in his parachute] Keep it moving. |
| 13:20:21 | Trigger 1  | White         | Trigger, come back left, come back east                                             |
| 13:20:23 | Red Crown  | Anderson      | [Cadillac] bandit at 336 for 7.                                                     |
| 13:20:31 | Cadillac 1 | Baily         | Cadillac reverse we got somebody right behind us.                                   |
| 13:20:33 | Pistol 1   | Imaye (I)     | 150 heading.                                                                        |
| 13:20:34 | Date 1     | Unknown       | Trigger, Pistol, you still with me?                                                 |
| 13:20:36 | Trigger 1  | White         | Negative. We're disengaged at this time from you.                                   |
| 13:20:36 | Cadillac 1 | Feinstein (I) | There's a big explosion in the mountains. Somebody just crashed.                    |
| 13:20:43 | Date 1     | Unknown       | Okay, Date and Palm, let's spread 'em out.                                          |
| 13:20:45 | Red Crown  | Anderson      | [Cadillac] one back of ya there, 301 at 9 miles.                                    |
| 13:20:58 | Red Crown  | Anderson      | Bandit 279 at 15.                                                                   |
| 13:20:58 | Trigger 1  | White         | Trigger 3, I have you in sight, come back east.                                     |
| 13:21:03 | Trigger 1  | White         | I have you in sight come back east. I have two chutes over Trigger 4.               |
| 13:21:22 | Red Crown  | Anderson      | You have a bandit 274 at 16, Cadillac.                                              |
| 13:21:43 | Red Crown  | Anderson      | Black bandit. Black bandit. 289-16.                                                 |
| 13:22:08 | Red Crown  | Anderson      | Bandit's gone low, estimating 282 at 17.                                            |
| 13:22:41 | Red Crown  | Anderson      | Cadillac, Crown, are you coasting outbound this time now?                           |
| 13:22:43 | Cadillac 1 | Baily         | That's affirmative.                                                                 |
| 13:22:57 | Red Crown  | Anderson      | Cadillac we have a Black Bandit 300-21.                                             |

|          |            |               |                                                                                                                                                     |
|----------|------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 13:24:28 | Red Crown  | Anderson      | Roger, we have Black Bandits at Kep.                                                                                                                |
| 13:24:35 | Red Crown  | Anderson      | *****Cadillac, everything looks clear on my gadget.                                                                                                 |
| 13:25:08 | Red Crown  | Anderson      | Cadillac, Crown, what was the result of your engagement?                                                                                            |
| 13:25:11 | Cadillac 1 | Baily Roger.  | Unknown. We got two good guides. I couldn't observe an impact.                                                                                      |
| 13:25:21 | Cadillac 1 | Baily (I)     | I'll tell you one thing Jeff. The first one blew up and the second one went to the same spot and blew it up.                                        |
| 13:25:32 | Cadillac 1 | Feinstein (I) | So all four of them...the bad one did launch?                                                                                                       |
| 13:25:33 | Trigger 1  | Bettine (I)   | Okay, swing that heading around to 170.                                                                                                             |
| 13:25:35 | Cadillac 1 | Baily (I)     | No it's still there.                                                                                                                                |
| 13:26:01 | Trigger 1  | White (I)     | It [MiG attack on Trigger 4] was in the bottom of that fuckin' fluid 4 turn. Jesus.                                                                 |
| 13:26:28 | Cadillac 1 | Feinstein (I) | Okay. Hold, hold ah, 120. We're exiting the mine here at 27.                                                                                        |
| 13:26:51 | Red Crown  | Anderson      | Cadillac, Crown, everything looks clear.                                                                                                            |
| 13:27:28 | Red Crown  | Anderson      | Cadillac, music.                                                                                                                                    |
| 13:28:07 | Cadillac 1 | Baily (I)     | I wanna wait until we're clear of all these islands.                                                                                                |
| 13:28:40 | Cadillac 1 | Feinstein (I) | Okay we can head 180.                                                                                                                               |
| 13:29:01 | Red Crown  | Anderson      | We got a bandit feet wet.                                                                                                                           |
| 13:29:06 | Trigger 1  | White         | Trigger 1 and 2 are feet wet at this time.                                                                                                          |
| 13:29:26 | Red Crown  | Anderson?     | Be advised we got a bandit west of channel 26 approximately 40 miles.                                                                               |
| 13:29:35 | Cadillac 1 | Feinstein (I) | Christ, that's out over the water.                                                                                                                  |
| 13:29:51 | Red Crown  | Anderson?     | Estimate him at 090 at 55. And understand Eagle 3 and 4 [Iron hand] is engage?                                                                      |
| 13:30:50 | Trigger 1  | White (I)     | Shit no. There were two camouflaged MiGs it looked like to me...that's why we didn't go down and engage 'cause there was four of them chasing them. |

|          |           |        |                                                                                                                |
|----------|-----------|--------|----------------------------------------------------------------------------------------------------------------|
| 13:31:48 | Trigger 2 | Penney | 1 and 3 are 030 for 58 [from Bullseye-Hanoi]                                                                   |
| 13:33:04 | Trigger 1 | White  | Okay, let's turn for a heading of about 210.                                                                   |
| 13:34:06 | Trigger 1 | White  | Could you tell what it was?                                                                                    |
| 13:34:07 | Trigger 3 | Myers  | Hell, yeah! It was a bunch of MiGs. I fired one AIM 7 at him as he was running away, but, ah, it didn't guide. |
| 13:34:17 | Trigger 1 | White  | Okay, I saw a couple of aircraft being chased by about four.                                                   |
| 13:34:23 | Trigger 3 | Myers  | This was a MiG-21.                                                                                             |
| 13:34:25 | Trigger 1 | White  | Nah, these were camouflaged.                                                                                   |
|          |           |        | 13:34:48 Trigger 2 Penney Sam, did you see that MiG go down? I think somebody shot the guys wingman off ****   |

\* (I) Indicates use of the intercom

# Appendix II

## Project Trigger Team Biographies

Lieutenant Colonel Todd P. Harmer is the leader of Project Trigger. He is an F-16 pilot presently serving as the Chief, EUCOM/PACOM Team in Checkmate, HQ USAF/XOOC. Prior to serving on the Air Staff, Lt Col Harmer accumulated over 2,300 hours in the F-16 while serving at Osan AB, Korea, Moody AFB, GA, Pope AFB, NC, and Misawa AB, Japan. He is a graduate of the USAF Weapons School as well as the School of Advanced Airpower Studies.

Colonel C. R. Anderegg (USAF Ret), IIT Research Institute, is a writer and historian who participated on the team under a contract with AF/XO. A former Air Force fighter pilot, he flew 4,000 hours in the F-4 and F-15. He served two tours as an instructor in the F-4 Fighter Weapons School and a Vietnam War combat tour in the 555 TFS, Udorn RTAFB. His most recent book, *Sierra Hotel*, describes the sweeping, post-Vietnam changes the Air Force made in fighter weapons, training, and tactics.

Dr. Wayne Thompson is Chief of Analysis, Air Force History Support Office. His *To Hanoi and Back: The U.S. Air Force and North Vietnam, 1966-1973*, was published in 2000 by the Smithsonian Institution Press and by the Air Force. During the Gulf War, he worked in the Checkmate air campaign planning group, and subsequently he was Senior Historical Advisor for the Gulf War Air Power Survey.

Major James G. Vick is currently assigned as Chief, Operations, Air Force Executive Issues Team (AFPAZ), Office of the Secretary of the Air Force, Washington, D.C. A navigator with over 2,000 hours in the B-52 and T-43, Major Vick located interviewees and participated as an interviewer. He also served as the Project Trigger team interface with the Office of the Secretary of the Air Force.

Timothy B. Alger develops virtual environments, models, and high-resolution 3D animations for AF/XOC. He holds a BS in Engineering Design Graphics with a background in both mechanical and architectural design. An SAIC contractor, he supports the Theater Battle Arena office of the Air Staff.

Kevin C. Hollingsworth, a former US Navy intelligence analyst, develops scenarios for the Theater Battle Arena's participation in distributed, interactive war games, exercises, demonstrations, and event re-creations. He is a graduate of the Russian Intermediate Course at the Defense Language Institute and is currently a Russian Studies/International Relations major at George Mason University.

Major Cheryl Law is the media operations officer, Secretary of the Air Force Public Affairs Media (SAF/PAM) Washington, D.C., where she recommends media relations policy to senior Air Force leaders on critical issues involving worldwide operational activities. She provided public affairs policy and guidance advice to the Project Trigger team.

# Glossary

|              |                                                            |
|--------------|------------------------------------------------------------|
| AA           | Air-to-Air, reference to Soviet guided missiles            |
| AA-2         | Atoll Infrared Guided Air-to-Air Missile similar to AIM-9  |
| AAA          | Anti-Aircraft Artillery                                    |
| AF           | Air Force, reference to numbered AF such as 7 AF in Saigon |
| AFB          | Air Force Base                                             |
| AFHRA        | Air Force Historical Research Agency, Maxwell AFB, Alabama |
| AFHSO        | Air Force History Support Office                           |
| AFSC         | Air Force Safety Center                                    |
| AGM          | Air Ground Missile                                         |
| AIM          | Air Intercept Missile                                      |
| AIM-7        | Sparrow Radar Guided Air Intercept Missile                 |
| AIM-9        | Sidewinder Infrared Guided Air Intercept Missile           |
| Alpha        | Callsign suffix denotes F-4 pilot or front seat crewmember |
| ARM          | Anti-Radiation Missile                                     |
| Aspect       | Relative intercept geometry between aircraft               |
| Atoll        | AA-2 Infrared Guided Missile                               |
| AWC          | Air Weapons Controller                                     |
| Bandit       | Known enemy aircraft                                       |
| Beam         | Intercept geometry toward either side of enemy aircraft    |
| Black Bandit | Code words indicating enemy aircraft low on fuel           |
| Bogey        | Aircraft of unknown identity                               |
| Bravo        | Callsign suffix denotes F-4 back seat crewmember           |
| Cadillac     | Callsign of F-4 aircraft based at Udorn RTAFB              |
| CAP          | Combat Air Patrol                                          |

|              |                                                                 |
|--------------|-----------------------------------------------------------------|
| Chaff        | Material designed to interfere with radar signal returns        |
| Combat Tree  | AN/APX-76/80A IFF interrogation equipment                       |
| CW           | Continuous Wave, refers to missile guidance radar illumination  |
| Date         | Callsign of F-4 aircraft based at Ubon RTAFB                    |
| DTIC         | Defense Technical Information Center                            |
| Eagle        | Callsign F-105 aircraft based at Korat RTAFB                    |
| Feet Dry     | Code words informing others that aircraft was over land         |
| Feet Wet     | Code words informing others that aircraft was over water        |
| G            | Abbreviation denoting force of gravity or g-loading on aircraft |
| GCI          | Ground Control Intercept                                        |
| Gimbal       | Mechanical limits of radar antenna                              |
| Green Bandit | Code words indicating an experienced enemy                      |
| Group        | One or more aircraft within three miles of each other           |
| Guard        | Emergency radio frequency                                       |
| Head         | Intercept geometry toward front of enemy aircraft               |
| IFF          | Identify Friend or Foe                                          |
| MiG          | Mikoyan-Gurevich, Soviet fighter aircraft company               |
| mm           | Millimeter, refers to caliber of aircraft gun                   |
| nm           | Nautical Mile                                                   |
| NSA          | National Security Agency                                        |
| NVAF         | North Vietnamese Air Force                                      |
| PACAF        | Pacific Air Force                                               |
| Palm         | Callsign of F-4 aircraft based at Ubon RTAFB                    |

|             |                                                            |
|-------------|------------------------------------------------------------|
| Pistol      | Callsign of F-4 aircraft based at Takhli RTAFB             |
| Red Baron   | Post-war project to document aerial combat engagements     |
| Red Crown   | Callsign of Navy Air Weapons Control in the Gulf of Tonkin |
| RTAFB       | Royal Thai Air Force Base                                  |
| SAM         | Surface to Air Missile                                     |
| SEAD        | Suppression of Enemy Air Defenses                          |
| Shrike      | AGM-45 Anti-Radiation Missile                              |
| Splash      | Indicates downing of enemy aircraft                        |
| Squawk      | Reference to operating mode of IFF transponder             |
| Tail        | Intercept geometry toward rear of enemy aircraft           |
| Tally       | Visual contact with enemy aircraft                         |
| TBA         | Theater Battle Arena, used for computer simulation         |
| Teaball     | Intelligence collection and reporting agency in Thailand   |
| TFS         | Tactical Fighter Squadron                                  |
| Trigger     | Callsign of F-4 aircraft based at Takhli RTAFB             |
| TRW         | Tactical Reconnaissance Wing                               |
| USAF        | United States Air Force                                    |
| Visual      | Visual contact with friendly aircraft                      |
| VTC         | Video-Tele Conference                                      |
| WSO         | Weapons System Operator                                    |
| X-Ray Alpha | Code words denoting MiG activity                           |