

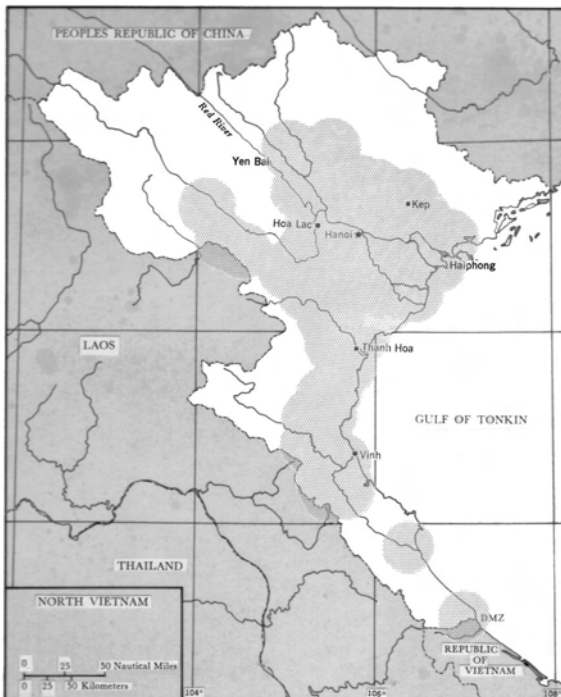
III

Combat Narratives

1972–1973

(Far left) A USAF RF-101 reconnaissance pilot photographed one of the North Vietnamese surface-to-air missiles in flight.

(Left) North Vietnamese surface-to-air missiles were launched from sites such as this one near Haiphong.



Following the USAF victories on 14 February 1968, there was an interruption in shootdowns that lasted more than 4 years.* The next USAF aerial victory over a MIG did not come until 21 February 1972. Numerous changes took place during this period, e.g., the election of President Richard M. Nixon, the withdrawal of the bulk of American forces from South Vietnam, and a renewed emphasis on turning over responsibility for conduct of the war to the South Vietnamese armed forces.

North Vietnam used this breathing spell to improve and strengthen its air defenses with the material assistance of the Soviet Union and Communist China. Additional AAA and SAM sites appeared at strategic points, particularly in Quang Binh Province. New airfields were also constructed, and coverage of North Vietnam ground control intercept radars was extended southward. American commanders noted that MIG aircraft airborne below 20° North latitude increased from a daily average of five flights in late 1971 to an average of 10 per day early in 1972. By March 1972 the North Vietnamese fighter inventory included 93 MIG-21's, 33 MIG-19's, and 120 MIG-15's and -17's—although prob-

*The hiatus, as noted in the previous chapter, followed President Johnson's 31 March 1968 decision to halt the bombing of North Vietnam above the 20th parallel and to invite North Vietnam to begin peace negotiations. Seven months later the President ordered an end of all bombing north of the DMZ in hopes of bringing about an end to all hostilities.



*A USAF Phantom falls prey
to a North Vietnamese SAM.*

ably no more than 190 of these aircraft were combat ready.

By early 1972 North Vietnam had what was generally recognized as one of the best, if not the best, air defense system in the world. Its strongest features were excellent radar integration, the Soviet-built SA-2 surface-to-air missile, and the MIG-21 aircraft. And an intangible advantage was the fact that this defense system operated over its own homeland. The enemy air defense system, therefore, had an impressive array of firepower from ground level to 19 miles in the air. Further, its MIG-21's could be vectored by radar with split-second timing against U.S. strike and support forces. It was no secret that the North Vietnamese could determine the structure of American strike forces soon after the U.S. aircraft left the ground.

American forces had the advantage of special chaff-dispersing flights which helped to degrade the enemy's SAM and AAA gunlaying radars. This degradation was further supplemented by EB-66 electronic jamming, U.S. Navy jamming, and jamming pods installed on all strike aircraft. In the Gulf of Tonkin the U.S. Navy operated an early warning radar ship nicknamed Red Crown (officially designated: Positive Identification Radar Advisory Zone Ship), while the U.S. Air Force had an airborne counterpart, coded Disco, to provide forces with MIG warnings. Red Crown was more effective along coastal and Disco in inland areas.

Notwithstanding the standdown in North Vietnam, B-52 strikes continued in Laos, and USAF fighters flew combat air patrols and escort flights. Early in 1972, MIG's began increasingly to penetrate Laos to try to check these strikes, but USAF F-4's were on hand to greet them. So for a brief period of time during the inactivity over North Vietnam, the F-4's engaged MIG's in air-to-air combat over Laos.

Victories over Laos

The first U.S. Air Force aerial victory in 4 years and, more significantly, the first at night took place on 21 February 1972 over northeast Laos, about 90 miles southwest of Hanoi. Maj. Robert A. Lodge

was aircraft commander and 1st Lt. Roger C. Locher was his weapon systems officer in an F-4D flying MIGCAP. They were from the 555th TFS, which formerly had been a part of the 8th TFW but was now a part of the 432d Tactical Reconnaissance Wing.

"Red Crown called out bandits (MIG's) at our 060° position and proceeded to vector us on an intercept," recalls Maj. Lodge. He adds further:

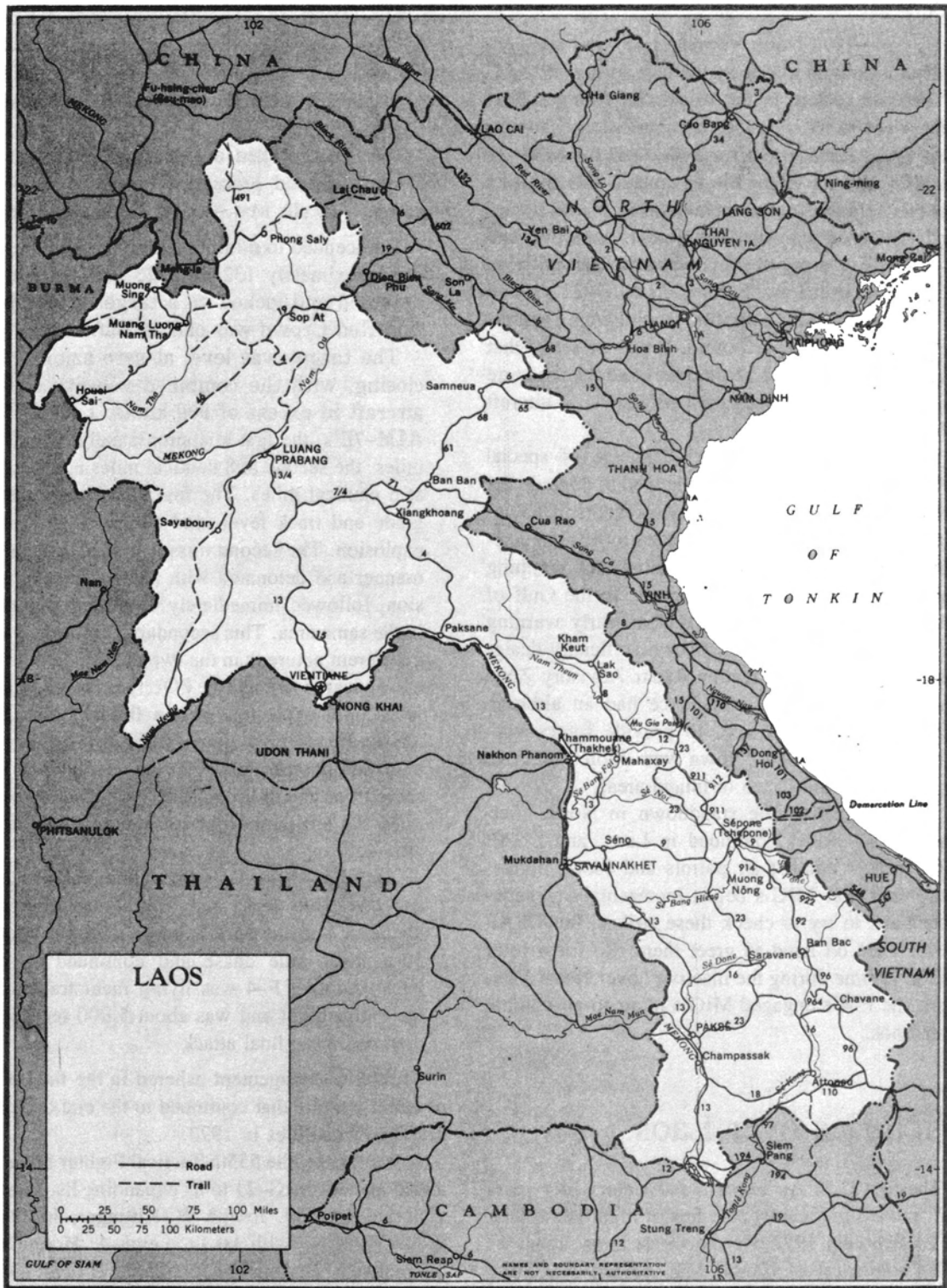
I descended to minimum en route altitude, and at approximately 1323Z [2123 local] my WSO detected and locked on a target at the position Red Crown was calling Bandit.

The target was level at zero azimuth and closing, with the combined velocity of both aircraft in excess of 900 knots. I fired three AIM-7E's, the first at approximately 11 nautical miles, the second at 8 nautical miles and the third at 6 nautical miles. The first missile appeared to guide and track level, and detonated in a small explosion. The second missile guided in a similar manner and detonated with another small explosion, followed immediately by a large explosion in the same area. This secondary explosion was of a different nature than the two missile detonations and appeared like a large POL [petroleum, oil and lubricants] explosion with a fireball. The third missile started guiding in a corkscrew manner and then straightened out. No detonation was observed for the third missile. We had no more AIM-7's left, and broke off and egressed at low altitude.

Two other MIG-21's then attempted to pursue us. We were low, over 500 knots computed airspeed, and the MIG's broke off after about a 30-nautical mile chase and continued to drop back. Another F-4 was flying radar trail during the entire flight and was about 5,000 feet higher than us on the final attack.

This MIG engagement ushered in the final phase of aerial warfare that continued to the end of Southeast Asia hostilities in 1973.

A week later, the 555th Tactical Fighter Squadron added another MIG-21 to its expanding list of aerial victories. Lt. Col. Joseph W. Kittinger, Jr., flying F-4D MIGCAP with 1st Lt. Leigh A. Hodgdon in the rear seat, emerged victors in an air battle. Their



58034 3-68

F-4D was accompanied by another crewed by Maj. R. Carroll and Capt. David L. Harris.

Before taking off for their MIGCAP in northern Laos, they had been briefed to anticipate enemy diversionary flights which sought to lure unsuspecting F-4's into a hazardous environment. American fighter pilots were well aware that the North Vietnamese monitored all radio conversations between U.S. air defense agencies and airborne fighters and used such information to their advantage. About 2000 hours on the night of 1 March Kittinger's flight took up a MIGCAP position in northeastern Laos. Disco soon advised the flight that MIG's were airborne in the area and vectored the Phantoms to make contact. Kittinger's report of the engagement follows:

At approximately 18 miles the system broke lock but it was quickly reacquired. A slow left turn ensued to keep the dot centered. Altitudes were slowly increased from 8,200 feet to 11,500 feet. The Vc on the scope was extremely difficult to interpret; however, it appeared that we were not really overtaking the target, so the outboard tanks were dropped. Heading of the aircraft changed to approximately 360° at time of firing. At approximately 6 miles the "in-range" light illuminated, followed by an increase in the ASE circle. Trigger was squeezed and crew felt a thump as the missile was ejected; however, missile motor did not ignite. The trigger was squeezed again and held for approximately 3 seconds; however, missile did not fire. Trigger was squeezed again and missile #3 fired. The missile made a small correction to the left then back to the right and guided straight away. The pilot maintained the dot centered.

Approximately 5 to 6 seconds after launch, detonation was observed. Almost simultaneously, two enemy missiles were observed coming from the vicinity of the detonation. Evasive action prevented more thorough observations of detonation. The flight turned to a heading of 210°, maintained 9,000 feet, airspeed 500 knots, and egressed the area.

Colonel Kittinger was serving on his third tour of duty in Southeast Asia, which began in May 1971. A few days after his victory, his Phantom was shot down in another aerial battle, only 17 days before he



Col. Kittinger survived his captivity as a prisoner of war. He is shown greeting the home-coming crowd upon his return on 28 March 1973.

was due to return home. Kittinger thus became a prisoner of war. Earlier in his Air Force career, he had gained recognition as "the first man in space" when he ascended in a small gondola under a huge balloon to 96,000 feet on 2 June 1957. He eclipsed his own record on 16 August 1960 by rising to 102,800 feet and then returning to earth by parachute.

A new aspect was added to the air war in Southeast Asia on 30 March 1972, when the North Vietnamese formally invaded the south. They quickly moved through the demilitarized zone into Quang Tri Province. In response to the NVN offensive, American air resources were ordered to active interdiction of MIG's in North Vietnam. That same day there was one aerial victory.

Captains Frederick S. Olmsted, Jr., aircraft commander, and Gerald R. Volloy, weapon systems officer, were pulling F-4D alert duty at Udorn late in the day when they were scrambled to take up an orbit near the Laotian border. About 20 minutes after reaching their orbit point, Red Crown called a bandit and vectored the flight to intercept. According to Volloy:

Red Crown provided vectors until approximately 20 nautical miles, and at 15 nautical miles I established radar contact with the bandit. A full

system lock-on was acquired at 12 nautical miles, and all missile-firing parameters were satisfactory. We fired one AIM-7 at approximately 8 nautical miles with no visible results. Another AIM-7 was fired at approximately 6 nautical miles; the missile appeared to fire properly and guided well, straight off the aircraft. When no visible results were seen a third AIM-7 was fired at approximately 4 nautical miles. This missile appeared to guide well, appeared to track straight off the aircraft and then disappeared from view.

A few seconds later, both I and my aircraft commander, Captain Olmsted, observed at 1 o'clock, almost level, approximately 1-2 nautical miles ahead, a large reddish-yellow fireball that sustained itself for a few seconds. The fireball first appeared, and then trailed what seemed to be sparks behind it. The fiery sparks paralleled our flight path, toward us, and the entire fire pattern was estimated to be 150-200 feet in length. Visual contact was lost with the fireball due to our egress breakaway. A subsequent query to Red Crown confirmed that the bandit had disappeared from their scopes as well. It was at this time that we egressed from the area.

As the North Vietnamese offensive continued, it became apparent to American forces that the enemy had to be hit at his supply points. On 16 April strike forces were sent to bomb fuel depots, warehouses, and truck parks in the vicinity of Haiphong and on the outskirts of Hanoi. These were the first American raids into the Hanoi-Haiphong area since President Johnson's partial bombing halt had been announced on 31 March 1968. As anticipated, the enemy resisted ferociously, firing thousands of rounds of antiaircraft artillery and about 200 surface-to-air missiles. In the air war, MIG-21's met and engaged American strike aircraft. Two MIG's were destroyed by a MIGCAP F-4D flight assigned to protect the strike aircraft.

Capt. Frederick S. Olmsted, Jr., who had downed a MIG-21 two weeks earlier, and his WSO, Capt. Stuart W. Maas, destroyed the first of two MIG's. Captain Olmsted describes the action in detail:

On the morning of 16 April 1972 Capt. Stuart W. Maas and I were assigned to lead a four-ship MIGCAP that was to render cover for strike

forces ingressing and egressing the target area as well as providing the first line of defense for SAR [Search and Rescue] forces orbiting close to the North Vietnam border in northern Laos.

We took off from Udorn RTAFB at 0830 and proceeded northward to a pre-strike holding orbit where we were to await the strike force. At the appointed time we turned eastward and proceeded to take our flight to the assigned orbit. . . As we approached the southern point of the orbit, I made an initial check-in with Red Crown. As our flight drew closer to the border, SAM launch warnings and calls to other flights also on the same frequency increased. A large number of these calls were to warn them of nearby enemy aircraft, but not once was the flight specifically warned.

We crossed the orbit's southern point and began a descending left turn to head toward the northern point, pick up maneuvering airspeed, and place us in clearer airspace. There were numerous layered decks of clouds above, and below were scattered cumulus and rain showers.

As we rolled out on a heading of 340°, Captain Maas picked up two hostile aircraft indications on the radar scope and at 20 nautical miles Captain Maas made a radio call to my flight, warning them of the danger. At 11 nautical miles, Captain Maas again made another radio call to prepare the flight for engagement. At this time I instructed the flight to jettison tanks, and within seconds Captain Maas locked on and tracked the bogies down the scope and off the left side.

As they passed just overhead, I visually identified them as hostile and pulled up into a right, climbing turn. As we broke through the cloud deck, we reacquired the MIG-21's. At this point the flight split, with aircraft 3 and 4 taking one MIG, ourselves and our wing man the other. After a series of turns with the bandit a new, full-system radar lock-on was acquired and, with firing parameters met, the first AIM-7 was fired. It guided to the MIG and sheared off a portion of the right wing. The MIG appeared to tighten up the left turn, so a second missile was fired. Apparently it never guided, so a third missile was triggered. This one flew true and the MIG was seen to explode by Captain Maas, myself, and the two crewmen of aircraft 2 who were in a fighting wing

position. At this time we broke down and left, picking up speed to exit the area.

The second MIG-21 was destroyed by aircraft 3, crewed by Maj. Edward D. Cherry and Capt. Jeffrey S. Feinstein. Cherry's account of his MIG engagement picks up at the point the MIG's were spotted by radar:

Olmsted had made contact with at least two MIG's on his radar and was leading the flight to the MIG's. He obtained visual contact with two MIG-21's and called them to us. The MIG-21's passed overhead and Olmsted started a right turn to engage them.

While in the right turn, our wingman obtained a visual contact with a third MIG-21 and called for us to roll out and turn left. The MIG flew into a cloud layer but we were in hot pursuit. Shortly after breaking through the cloud layer I obtained visual contact with the MIG-21 at 12 o'clock high, in a right, climbing turn. I maneuvered my aircraft into firing position and attempted to fire an AIM-9 heat missile but did not observe the missile launch. (From an analysis afterward, it appears that the missile launched but did not guide.)

We were now in an 80° climb and an 80° right bank. Captain Feinstein obtained a full system radar lock-on and I made two more attempts to fire a missile at the MIG but observed no launch. We went over the top with the MIG in a descending right turn. Our wingman took the lead with us assuming fighting wing formation. Our wingman fired all four of his radar missiles at the MIG and missed. During this time he lost his radio and did not hear our repeated radio calls to break out of the way so we could shoot. While he was shooting, Captain Feinstein obtained a full system lock-on on the MIG.

We regained radio contact with our wingman, passed him on the right, and reassumed lead position in the element. Most of this time our planes were in an 80° right descending turn. I fired one AIM-7 radar missile which impacted the MIG-21 just aft of the right wing post. The MIG's right wing immediately separated and the aircraft went into a wild, gyrating spin to the left, trailing smoke and aircraft fragments. Captains Crane and Lachman in aircraft 4 also observed the missile

impact and explosion. The MIG pilot ejected immediately and I, along with Captain Feinstein and aircraft 4, observed the parachute and the pilot. I estimate that we passed within 500 feet of the MIG pilot's chute.

A third MIG-21 was also destroyed on the same day in a separate engagement. Capt. James C. Null and his WSO, Capt. Michael D. Vahue, flying an F-4D, had been scrambled from Udorn and vectored into northern Laos to investigate a possible hostile track. The target was declared hostile shortly after the flight reached the orbit, and Null was authorized to initiate the attack. He reports:

The flight jettisoned all external tanks. Aircraft 4 acquired a radar lock-on when the target was 19 miles out. He was given the lead and attempted to fire, but all AIM-7's malfunctioned. A flight of two MIG-21's passed overhead, and we started a hard right turn.

A vector of 275° for 12 miles was received and visual and radar contact was made at that point. We closed on the target, confirmed it was a flight of two MIG-21's, and maneuvered to their 12 o'clock position. Radar lock-on was acquired and when in range three AIM-7's were fired, the second of which proximity fused* on the left side of the wingman's tail section, tearing it from the fuselage. We then passed overhead and observed the MIG to be on fire in the aft section of the fuselage and out of control at approximately 2,000 feet altitude. No chutes were observed. We then egressed and heard from a controlling agency that a single hostile aircraft was orbiting in the vicinity of the engagement.

Linebacker Operations

The month of May 1972 was significant in the Vietnamese war. On the 8th, President Richard M. Nixon announced the resumption of bombing of North Vietnam and the mining of entrances to its ports. The mines were set to activate on the 11th.

*A proximity fuze is designed to detonate a bomb, mine, or charge when activated by an external influence in close vicinity of a target.

The Presidential announcement was in effect the "execute" order for Operation Linebacker, the nickname given renewed and generally unrestricted air strikes against military targets in North Vietnam. Throughout April and the first week of May, additional U.S. Navy attack carriers joined the line in the Gulf of Tonkin, large numbers of B-52 heavy bombers were deployed to points from which they could reach Southeast Asia, and more tactical fighter aircraft were placed in Thailand to supplement air power there. The stage had been set for implementation of the new policy.

During an air strike in the Hanoi area on 8 May, two MIG's fell to USAF F-4D aircrews. Two different MIGCAP flights, both from the 432d TRW, supported this strike and each encountered MIG's in the target area. Maj. Barton P. Crews and his WSO, Capt. Keith W. Jones, Jr., downed a MIG-19—the first enemy aircraft of this type destroyed by an Air Force crew. Major Crews describes his skirmish:

On 8 May 1972, a flight of four F-4D's was fragged to provide MIGCAP for strike flights hitting the Hanoi area. I was scheduled as number three, with Capt. Keith W. Jones as my weapon

systems officer. After the flight arrived at the preplanned orbit point the flight proceeded north of Yen Bai airfield and then made a 180° right turn heading south.

After crossing the Red River, the lead aircraft called, "Bogies, 12 o'clock." I immediately acquired them visually and identified them as four MIG-19's.

I called over the radio, "They're not friendly."

The lead aircraft commander confirmed that, and directed the engagement. I set up my attack on the northernmost element of MIG-19's and started a closure on what appeared to be the number two man. My WSO stated that he couldn't get a lock-on so I pulled the pipper up to the MIG and fired one AIM-7. I estimated the range was under 3,000 feet. I did not see the missile impact as I directed my attention to the lead MIG. Captain Jones stated he saw a yellowish chute go by.

As I was trying to get my pipper on the lead MIG he did a hard break and ruined my tracking solution.

At that time my number four aircraft said over the radio, "That's a kill."

Shortly after that my number four WSO, Lieutenant Holland, called, "Bandits at 6 o'clock."

I then broke off my engagement and went into the clouds and lost the MIG's. Later, on the ground, 1st Lt. William S. Magill and 1st Lt. Michael T. Holland, the aircraft commander and weapon systems officer on my wing, confirmed seeing a chute and observing the MIG do a slow roll to inverted position and start down.

The other MIGCAP flight was trailing the strike force over Hoa Binh and heard the radio chatter as Crews' flight engaged its MIG's. Red Crown requested assistance for a flight of F-4 strike aircraft, which was also engaging MIG's near Yen Bai. Before they could reach the battle area, the flight disengaged, but Red Crown advised that another group of bandits were approaching from the east, Maj. Robert A. Lodge, flight leader, with Capt. Roger C. Locher as his WSO, turned his flight eastward and crossed the Red River. Locher soon acquired two targets on his radar, and the flight turned to engage



them. As Lodge closed on a MIG, he saw another at 1 o'clock. "I continued to close on our radar target while watching the second, closer one," he said.

At about one mile I saw that the other aircraft was a silver MIG-21.

We broke radar contact with the leading MIG and locked on to the wingman. We were about Mach 1.4, with the MIG about as fast as us in afterburner. I was low on the MIG, and I do not believe he was aware he was under attack. He was in a right turn, initially, then reversed to the left. I fired two AIM-7 missiles in ripple fire at a distance of 4,500 feet, using a pure pursuit attack at about 20° angle-off.

Both missiles guided directly to the target. The first hit the MIG's right wing, which was breaking up when the second missile hit the center of the fuselage. I observed no bailout. I last saw the MIG disintegrating and out of control. The lead MIG broke up hard and I lost visual contact with him. My wingman then engaged the MIG unsuccessfully.

We disengaged at Bingo fuel and egressed the area. Passing the initial area outbound while descending, I observed a parachute to the left of my aircraft at an estimated 300 feet away. I almost hit the chute. There was a yellow canopy and a body in the chute but I did not notice if the pilot was alive. Egress was then uneventful with a normal recovery.

Operation Linebacker commenced on 9 May, and American forces did well in air-to-air engagements. During May and June the ratio of kills was better than one to one in favor of the American forces. Fighter aircrews of the 432d Tactical Reconnaissance Wing, based at Udorn, scored the majority of kills. The wing was the primary counter-air unit in Southeast Asia during 1972. The addition of this role to its mission made it the only composite—strike-interdiction, counter-air, and reconnaissance—wing in the conflict and, more notable, its role made possible the majority of MIG kills. The 432d Wing's counter-air mission was diversified, including ingress MIGCAP, egress CAP, and barrier CAP (different types of combat air patrol).

The entire USAF effort, however, was directed toward strikes against enemy military targets. Com-

bat air patrols were employed toward this end and not to destroy MIG's. Counter-MIG tactics, when employed, generally used the fluid-four formation for all daytime MIGCAP and escort missions, while at night the MIGCAP aircraft flew separate two-plane elements, with the second element in maneuvering radar trail formation.

Ingress CAP's were primarily flown for protection of chaff and chaff escort flights from MIG attack. This required two or three flights of four F-4's each, which preceded the chaff mission aircraft into a target area and remained until the mission aircraft left the hostile zone. MIGCAP flights often arrived at the target scene before strike aircraft and remained until the latter departed.

"On all missions," Maj. Gen. Alton D. Slay* commented, "we mounted at least two target area MIGCAP's, and one or two egress CAP's. The egress CAP was launched so as to arrive on station near the projected North Vietnam exit point of the strike force at about 10 minutes prior to expected earliest egress time."

All egress CAP F-4's were freshly refueled aircraft and able to take over the protection of strike planes from the MIGCAP F-4's, since the latter would be low on fuel upon egressing. Combat air patrol missions, composed of a flight of four aircraft, were responsible for the protection of all types of allied air forces: fighter-bombers, heavy bombers, reconnaissance aircraft, gunships, electronic communications aircraft, and search and rescue aircraft. Egress CAP also was responsible for covering the post-strike reconnaissance flight.

Finally, barrier CAP provided a buffer zone between threat areas and specialized friendly aircraft, including refueling tankers, SAR forces, and EC-121 and EB-66 electronic communications and surveillance aircraft. The barrier CAP flight was usually made up of flights of two F-4's.

All strike formations were escorted by at least one, and sometimes two, flights of F-4's. These aircraft were not limited to the immediate vicinity of the strike force, but were allowed to turn into approaching MIG's—provided advance warning was available.

*Deputy Chief of Staff, Operations, Seventh Air Force, December 1971–August 1972.

The most troublesome MIG tactic was the low approach and zoom attack. Although the MIG's relied almost without exception on hit-and-run tactics—single passes at high speeds—the F-4's, nevertheless, enjoyed a high success rate because of crew aggressiveness.

“Triple-Nickel” Hits Jackpot

USAF pilots scored more victories on MIGCAP flights than on any other type of mission. While on MIGCAP, aircrews flying F-4D's of the “Triple-Nickel” Squadron—the 555th TFS of the 432d TRW—scored the next five USAF victories of the air war to make it six straight for the squadron. Three of these victories came on 10 May, and all of the MIG killers were of the same flight.

Maj. Robert A. Lodge, serving as the flight leader with Capt. Roger C. Locher as his weapon systems officer, was involved in the initial engagement. The account of the victory is told for Major Lodge by Lt. Col. Wayne T. Frye:

Fifty miles south of Yen Bai Captain Locher held two separate hostile contacts on the nose at 40 miles. I then positioned my flight into modified fluid-four formation and set up for the impending

engagement. The MIG's continued down the center of the scope and I accelerated to 1.4 Mach. Twenty nautical miles from the radar contact I began a 5° wing-level climb and armed my missiles. At 13 nautical miles the “in-range” light came on. I waited until the ASE circle began to contract and fired one AIM-7 at a range of 8 nautical miles at the leading MIG element. The missile came off the aircraft and began climbing at a 15–20° angle, tracking straight away. When the missile motor burned out, the missile detonated. I immediately fired the second AIM-7 at 6 nautical miles. It also came off and began climbing at a 20° angle, tracking straight away. The missile contrailed for about 5–8 seconds, and then I observed the missile detonation, followed immediately by a huge reddish-orange fireball. I could not see the MIG visually at this time. I continued my climb and 5 seconds later saw a MIG-21 with the left wing missing, trailing fire with pieces falling off, the aircraft out of control, pass 1,000 feet to the left side of my aircraft. The pilot had already ejected. The flight then engaged the remainder of the flight of bandits.

Colonel Frye signed Lodge's claim statement, because Lodge was shot down by a heat-seeking missile from one of the MIG's shortly after his successful engagement. Captain Locher, who was rescued 23 days later, described the loss of the F-4 after the enemy missile hit:



MIG-21's in flight.



The “Triple-Nickel” Squadron displayed its motto on this sign.

We immediately went out of control, flopping from side to side. Then fire started coming in the back of the cockpit. It seared my canopy with bubbles and I couldn't see out any more. The airplane slowed down and we went into a flat spin.

Locher ejected and came down in "a kind of deep-dished valley." For the next 23 days he subsisted on fruit, nuts, berries, and water from banana trees. After his rescue he and other flight members reconstructed details of the 10 May engagement so that Lodge could also claim the destruction of an enemy aircraft.

The second MIG-21 downed by Lodge's flight came minutes after. Lodge's wingman, 1st Lt. John D. Markle, and his WSO, Capt. Stephen D. Eaves, scored the aerial victory. Lieutenant Markle reports:

Lodge initiated the attack. We engaged a MIG-21 that was a threat to the flight. The MIG was engaged with a full system radar lock-on. Two AIM-7 missiles were launched by us. I observed the second missile to climb slightly and turn right approximately 15°. Soon after missile launch, I visually identified a MIG-21 passing from my left to my right. The AIM-7 continued on a collision course with the MIG-21. Upon impact the missile detonated and a large yellow fireball resulted. The right wing of the MIG departed the aircraft and the airframe immediately began to descend out of control. The kill was witnessed by aircraft 4, 1st Lt. Tommy L. Feezel, aircraft commander, and Capt. Lawrence H. Pettit, weapon systems officer.

The flight's third aerial victory followed immediately. Capt. Richard S. "Steve" Ritchie, aircraft commander, and Capt. Charles B. DeBellevue, weapon systems officer in aircraft 3 secured the first of a string of MIG kills which would bring the coveted distinction of "Ace" and would subsequently make DeBellevue the ranking ace of the Vietnam conflict. Ritchie accounts for his and DeBellevue's initial aerial victory:

Upon reaching our patrol area west of Phu Tho and south of Yen Bai, Red Crown advised us of bandits approaching from the northeast. Shortly thereafter, both Lodge and I obtained a radar



contact. The bandits were declared hostile and our flight engaged the flight of four MIG-21's.

Lodge fired two missiles at the attacking MIG's from a front-quarter aspect, utilizing a full system radar lock-on. A detonation and fireball were seen as one of the missiles impacted the number two MIG. Meanwhile, Markle achieved a radar lock-on on the number three MIG-21 and fired two AIM-7 missiles. Another yellow fireball was observed and the number three MIG began to disintegrate.

At this time, we switched the attack to the number four MIG, which was now a threat to Lodge and Markle, while Lodge pursued the number one MIG. As we converted to the rear, I achieved a radar lock-on and fired two AIM-7's at a range of approximately 6,000 feet. The first missile guided to the target and appeared to pass just under the MIG-21. The second missile guided perfectly and impacted the target, causing another yellow fireball.

As we flew past the falling debris, my weapon systems officer observed a dirty yellow parachute and what is believed to be the MIG-21 pilot.

A MIG-21 downed the following day was not

officially credited to an aircrew until 2 years later. Credit for this victory was retained by the Seventh Air Force, since the circumstances for the kill made it difficult to identify the aircrews involved. It was known that two wings, the 432d TRW and the 388th TFW, had fighter aircraft involved in an intensive engagement on 11 May, and that an F-4D aircrew, using an AIM-7 radar-guided missile, had made the kill. Reexamining operational reports and summaries of air operations, and interviewing the participants, post-battle analysts finally resolved the dilemma, and on 15 July 1974, PACAF awarded credit for the aerial victory to Capt. Stephen E. Nichols, aircraft commander, and 1st Lt. James R. Bell, weapon systems officer, of the "Triple Nickel" squadron.

Nichols and Bell were flying in a group of four F-4D's, providing MIGCAP support for a Linebacker mission against bridge and airfield targets near Hanoi, when the flight encountered MIG-21's, apparently operating under GCI control. A MIG-21, possibly one of two encountered by the flight, had just downed an Iron Hand F-105. A MIG also destroyed the F-4 of the flight leader. Nichols and Bell knocked down one of the MIG's with an AIM-7E missile, but they had to make a hurried exit because of fuel shortage and therefore did not see the Sparrow hit the MIG. Post-kill analysis, however, confirmed that the MIG-21 was destroyed by a Sparrow, and Nichols' was the only U.S. aircraft that shot a Sparrow during the engagement.

On 12 May two senior lieutenant colonels bagged the first MIG-19 for the "Triple Nickel." The aircraft commander, Wayne T. Frye, commander of the squadron, and his weapon systems officer, James P. Cooney, who headed the 432d TRW's operations tactics division, were flying MIGCAP northwest of Yen Bai airfield in a flight of four F-4D's. Maj. Sidney B. Hudson, the flight leader, verified their victory:

I observed four MIG-19's taking off with a left turn out. I proceeded to attack the lead MIG-19 and in the ensuing fight my wingman had the second, third and fourth MIG-19's flushed out in front of him. I fired inside range with my missiles and saw none impact. As I reversed and egressed the area, I observed a large yellow fireball in the area of the missile detonations of aircraft 2.

Colonel Frye's own account provides more details of the skirmish:

The engagement occurred at low level (500-1,000 feet) approximately 2 miles southwest of Yen Bai airfield. Three AIM-7's were fired at the fourth MIG-19 in a flight of four in trail at an approximate range of 2,000 feet. After firing these missiles, I momentarily diverted my attention inside the cockpit to check switchology for my two remaining missiles. When I looked back out, a cloud of debris located where the target had previously been, passed under my aircraft almost immediately. Rate of closure at the time of firing was 250 knots.

Frye later noted that he and Cooney had "probably set a world's record for the total age of an aircrew in an F-4 Phantom for a MIG kill." He was 41 years old and his WSO was 44. Frye also speculated that they were "probably the first two lieutenant colonels in the same airplane to get a MIG." He was correct on both counts.

A flight of F-4E's on 23 May flew to the vicinity of Kep airfield as a chaff flight escort. Once the chaff aircraft had completed their activity, the F-4's switched to MIGCAP. Lt. Col. Lyle L. Beckers and Capt. John Huwe engaged and destroyed a MIG with an AIM-7 missile, while another Phantom, crewed by Capt. James M. Beatty and 1st Lt. James M. Sumner, destroyed a MIG-21 with 20-mm gunfire in the same engagement. These victories occurred during an engagement with eight MIG's.

After the chaff flight departed the area, the F-4's passed a few miles north of Kep airfield and spotted four MIG-21's preparing to take off and two MIG-17's airborne, at 8 o'clock low. Beatty feinted toward the MIG-17's, and they turned tail. Meanwhile, Beckers spotted two MIG-19's south of the field and went after them. He describes his victory:

The MIG's were down around 3,000-4,000 feet, silver in color and very easy to see. They were in an easy left turn heading east, and I was about 7 miles away heading south. I probably had 500 knots and was still accelerating. As I came straight down into them, the clouds hindered my attack, but I also don't think they saw me. The MIG's went behind one of the clouds, and we lost sight momentarily. When I picked them up again,

I was about 2,000 feet away with approximately 75° angle-off. Too much angle-off to fire anything.

I continued my yo-yo, came around to the outside, and then back down at them trying to work for an AIM-7 shot. I pulled in deep at 6 o'clock and descended to 1,500–2,000 feet to get a good look-up angle for the radar. I placed the pipper on the trailing MIG at 2 nautical miles, 10° angle-off, 550 knots, 2-G, and used auto-acquisition to get a full-system radar lock-on. They pulled into a climbing left turn, again trying to get away.

I paused for settling time, then fired two AIM-7's in ripple. The first missile guided to a direct hit with the second missile guiding within 20 feet but failing to detonate. From the time that I spotted the MIG's heading east, turned south, made my first pass, overshot, rolled back and got a kill, the total elapsed time was about 45 seconds.

As the MIG went out of control, Beckers saw five other MIG-19's in a Wagon Wheel over the airfield. He made several passes at them but was unable to down another. Meanwhile, Beatty and Sumner set up cover for their flight leader and observed Beckers' MIG kill. Soon thereafter, while Beckers was trying to get another MIG, Beatty spotted two MIG-21's on their tail. Beatty immediately started after these North Vietnamese and was soon in a position to use his 20-mm cannon. In his account he writes:

I had enough time to let the gunsight settle, and when the pipper got about one airplane length in front of him, I fired. The tracers helped me a great deal. I thought I had missed him until I closed to inside a thousand feet, where I could see my 20-mm was right on. I estimate that I put 50–100 rounds in him, and his plane began to come apart and roll to the left.

On 31 May Phantoms destroyed two more MIG-21's in two separate engagements about 15 minutes apart. Both F-4 flights came from the 432d TRW. The MIG-21's were intercepted in pairs while the two Phantom flights were flying MIGCAP in conjunction with strikes. While one flight continued to provide cover for strike flights attacking targets near

Kep airfield, the other engaged the first set of MIG's. The second-flight Phantoms quickly decided to enter the fray and turned left to join up. During the turn, the element leader, Capt. Bruce G. Leonard, Jr. and Capt. Jeffrey S. Feinstein, his weapon systems officer, observed a MIG-21 at 10 o'clock heading toward his flight.

When Leonard initiated intercept, he relates: "We started a level left turn and observed the MIG-21 pass between the elements. The MIG turned away and disengaged. When clear of the MIG, our flight turned southwest toward our assigned orbit point."

Leonard's flight leader obtained a radar contact and turned 25°; contact was at 25 nautical miles and 20° left. He acquired a visual contact on two MIG-21's, turned left to engage, and fired two AIM-7's, front-quartering head-on and missed.

Captain Feinstein got a radar contact on two aircraft at 6 nautical miles and 20° left. He attempted to lock on but the radar malfunctioned. Captain Feinstein then saw one of the two MIG's that he had on radar come head-on, shooting two air-to-air missiles at our element. We were on the left of the leader and in a left turn. A MIG-21 came from right to left in front of us at about 4,000 feet range. The angle-off was 90°, and I fired one AIM-9 at the MIG with no results. The MIG then went out of view.

The flight turned another 90° and aircraft 3 and 4 were positioned over 1 and 2. We did not observe the leader fire two AIM-7's at another MIG-21. A MIG-21 then came in front of us and was at 12 o'clock, 3,000 feet in range, turning left. We performed a hard left turn through 40° of heading when the MIG-21 rolled out and started to descend. Our aircraft was then at the MIG's 6 o'clock, about 1 nautical mile. We obtained a high tone from the AIM-9 and fired at the MIG-21. The time was 1531 local, 0831 Zulu.

At this time the flight leader called a right turn to 090° and Captain Feinstein called out that there were two MIG-21's at 9 o'clock, 1 nautical mile, turning with us. To maintain flight integrity and cover the flight leader, we had to turn away from the present engagement and could not press the attack further. Because we turned immediately away from the attack, we could not see the missile impact. During the time of the engagement the

flight had continuous SAM radar and missile launch indications. Our wingman observed the flight taking 85-mm antiaircraft fire at the time we were firing.

Meanwhile, the other flight of F-4 Phantoms was engaging MIG-21's and Captains Steve Ritchie and Lawrence H. Pettit destroyed one. Ritchie later stated:

On 31 May 1972 I was the flight leader of a flight of four F-4's assigned to MIGCAP northeast of Thai Nguyen. Shortly after crossing the coast northeast of Haiphong, heading generally northwest, Red Crown advised us of blue bandits 40 nautical miles west-southwest of our position, at a heading of 080°. Red Crown continued to give excellent information on the position of the bandits.

With the bandits at 7 to 8 o'clock, 14 miles range, I began a descending left turn. Shortly thereafter I spotted a flight of two MIG-21's at 10 o'clock high. I continued the left turn and maneuvered to a 7 o'clock position on the number two MIG. The lead MIG broke up and away.



At this time my weapon systems officer, Captain Larry Pettit, achieved a full-system lock-on and I fired four AIM-7 missiles. The first missile corkscrewed off and to the right. The next two missiles detonated early. The fourth missile guided perfectly and impacted the MIG in the forward fuselage area. The fuselage from the wings forward broke off and the remainder of the MIG entered a flat left spin until impacting the ground.

These aerial victories earned for both Ritchie and Feinstein their second kills. Both later gained three more.

MIG's Intensify Threat

Operation Linebacker grew in intensity and enemy resistance remained high. Scores of American fighter-bombers ranged from Hanoi southward to the coastal city of Vinh on 2 June, threatening North Vietnam's supply and transportation system. More than 250 aircraft of all services were involved in these strikes, damaging or destroying bridges, trucks, surface craft, supply warehouses, and storage areas.

During these heavy attacks, a MIG-19 was downed by an F-4E escorting strike aircraft about 40 miles northeast of Hanoi. The Phantom flight from the 58th TFS, 432d TRW, encountered two MIG-19's, one of which the flight leader, Maj. Philip W. Handley and his WSO, 1st Lt. John J. Smallwood, destroyed with 20-mm gunfire. "After approximately 15 minutes on station," said Handley, "aircraft 3 and 4 became separated from the first element during a particularly violent SAM break. At the same time, they hit Bingo fuel and began egress."

Shortly thereafter, while my wingman and I were egressing, we were attacked from 6 o'clock low by a flight of two MIG-19's. After a brief engagement, I shot down the number two MIG-19 with 20-mm cannon fire at a slant range of about 300 feet. The MIG-19 was observed to roll slowly off on his right wing and begin to trail smoke from his left wing root. His nose continued to drop, and he crashed almost vertically into a green meadow 8 seconds after I fired a 300-round



(Top) An AA unit in Hanoi.

(Bottom) A North Vietnamese surface-to-air missile unit.

burst. The kill was witnessed by Capt. Stanley C. Green, aircraft commander, and Capt. Douglas W. Eden, weapon systems officer in number 2.

Linebacker continued unabated except for the period between 14 and 18 June, when bombing of Hanoi was suspended for the duration of a visit to that city by the President of the USSR. Then in late June and continuing into the next month the ratio of kills was reversed in favor of North Vietnam's MIG's.

The problem of losses to enemy air defenses was serious. Even though SAM defenses were extensive and well disciplined, their effectiveness was seriously degraded by friendly chaff, support jamming, ECM pods on U.S. aircraft, and special SAM suppression missions. MIG's, on the other hand, became increasingly effective, instead of becoming less of a threat as anticipated. The North Vietnamese

constantly refined MIG tactics, employed excellent GCI radars, and further improved their warning and identification system of American forces. Nevertheless, USAF fighter aircrews succeeded in destroying seven MIG-21's between 21 June and 29 July.

The first of this series of kills took place on the 21st of June, when a flight of four F-4E's from the 469th TFS at Korat escorted two flights of chaff-dispersing aircraft over Route Package 6 in North Vietnam. Two MIG-21's engaged the U.S. aircraft, one attacking the chaff force and the other pursuing the lead Phantom, flown by Col. Mele Vojvodich, Jr., and Maj. Robert M. Maltbie. "I saw three different MIG's and got off a shot at one of them. I didn't see the missile impact because I was distracted by a MIG-21 on my right," Vojvodich commented. The aircraft in position 3, crewed by Lt. Col. Von R. Christiansen and Maj. Kaye M. Harden, probably saved Vojvodich from destruction. "We were flying escort for two flights of chaff-dispersing aircraft on 21 June 1972," reported Christiansen, "when at least two MIG-21 aircraft attacked the chaff force." He continues:

At about 0649Z, two MIG-21 aircraft were initially sighted at 12 o'clock high to the chaff force, crossing our egress course from left to right. At this time the MIG-21's were two to three thousand feet above the chaff force, partially obscured by a 500-foot-thick broken overcast cloud layer. The chaff force was positioned less than 100 feet below the base of the overcast. As the MIG's came abreast of the chaff force, they executed a hard nose low turn to the left, quickly positioning at 6 o'clock on the chaff force and the lead MIG-21 commenced an attack.

While following his leader through the turn, the number two MIG appeared to sight Vojvodich and his wingman below him. He then pulled high momentarily to gain a favorable position and initiated an attack on the two F-4's. Possibly because our element was positioned high on the left in fluid-four formation, it appeared that the number two MIG did not see me and my wingman.

Upon observing him rapidly closing at 6 o'clock on Vojvodich and his wingman, we called them to break left. The MIG's rate of closure was

such that he continued nearly straight ahead after firing two Atoll missiles at aircraft 2, who managed to evade both of them with his hard turn to the left. By going to maximum power and performing an acceleration maneuver, we were able to stabilize our position at 5 to 6,000 feet behind the number two MIG in a slight descending turn. He was in afterburner power.

After acquiring a full system radar lock-on, we attempted to fire two AIM-7 missiles, but neither AIM-7 missile launched. We then switched to heat and picked up a strong IR [infrared] tone from our second AIM-9 missile when the number two MIG was positioned in the gunsight reticle. Three AIM-9 missiles were ripple-fired at the MIG, who was in a level, gentle bank to the left. The first missile appeared to guide normally, but detonated about 50 feet right of the MIG's tail. Major Harden observed the second missile guide directly into the MIG's tail, causing the aircraft to explode and burn fiercely from the canopy aft. The pilot ejected immediately and was observed to have a yellow parachute. I did not observe the second AIM-9 impact on the MIG, because I immediately transferred my attention to the number one MIG, which was pulling off high after attacking an F-4 of another flight.

We initiated a maximum power pull-up toward the number one MIG and thereafter maneuvered with him at very high speed until achieving a position at his 6 o'clock. During this time, number one MIG executed numerous evasive maneuvers while descending from 20,000 feet to 1,000 feet as we closed for a gun attack. Radar lock-on was obtained and although tracking was by no means perfect, firing was initiated from about 3,000 feet with a short burst. Thereafter, we fired several short bursts while slowly closing range and attempting to refine the tracking solution. Suspecting a gunsight lead prediction problem, we began to aim slightly in front of the MIG and observed strikes on the left wing just as the gun fired out. The engagement was terminated due to Bingo fuel state at that time.

"Colonel Christiansen saved the men in our lead aircraft by telling them to break just at the right time," Major Harden reported. "Two missiles from a MIG exploded close behind them. We turned into

the low MIG and fired two Sidewinders. One of them knocked the tail section off of the MIG and the pilot ejected. The aircraft spun to the ground in flames." In addition, there was another MIG damaged in the engagement. This marked the first confirmed victory by a 388th TFW aircraft since 23 August 1967.

Three MIG-21's became the prey of U.S. Air Force aircrews on 8 July during two separate engagements involving two different squadrons. A flight of four F-4's from the 4th TFS gave that squadron its first MIG victory of the war. The flight was, on that morning, providing escort to a chaff flight in the Hanoi area and had just escorted the aircraft from the threat area. Returning for a sweep, the flight again departed when Red Crown warned that bandits were attacking. Captains Richard F. Hardy and Paul T. Lewinski, in aircraft 3, then engaged and destroyed a MIG-21:

The flight turned into the MIG threat and then turned outbound again. While egressing, aircraft 2 called a break to our element; a MIG-21 was attacking. We broke, and the flight leader and his wingman attacked the first MIG. When aircraft 3 and 4 reversed, a second MIG-21 had just over-shot and we fired an AIM-9 which did not guide due to his entry into a cloud. We attempted to fire three more AIM-9's which did not come off the rails. We locked-on in boresight and fired two AIM-7's. The first AIM-7 guided to a direct hit and the second guided into the wreckage. The MIG's right wing was blown off and the fuselage tumbled end over end. No chute was observed.

The other two MIG-21's destroyed on the same day were downed by the same aircrew: Captains Steve Ritchie and Charles DeBellevue, who were flying the lead F-4E in a flight of four from the 555th TFS. The flight was on MIGCAP in support of a Linebacker strike, flying at medium to low altitude west of Phu Tho and south of Yen Bai. Captain Ritchie provides details of this team's double MIG victory:

Disco and Red Crown advised our flight of bandits southeast of our position, approximately 35-40 nautical miles. The flight headed toward the threat in patrol formation and crossed the Black River on a southerly course. Red Crown



and Disco shortly thereafter advised that the bandits and our flight had merged.

The flight then turned to the north, met two MIG-21's at 10 o'clock, made a slight left turn, and passed the MIG's head-on. I then unloaded and executed a hard left turn as the MIG's turned right. I maneuvered to a 5 o'clock position on the number two MIG, obtained an auto-acquisition boresight radar lock-on, and fired two AIM-7 missiles. The first missile impacted the number two MIG, causing a large yellow fireball as the MIG broke into parts. It continued to disintegrate until impacting the ground.

I then unloaded again for energy and turned hard right in pursuit of the lead MIG-21, who was now in a rear-quarter threatening position on aircraft 4. I maneuvered into a similar position on the lead MIG as was achieved on his wingman previously. Another radar auto-acquisition lock-on was obtained and one AIM-7 missile fired. The missile impacted the MIG, resulting in a large yellow fireball. This MIG also broke into parts and began to disintegrate. The front of the aircraft was observed impacting the ground in a large fireball.

The flight remained in tactical support formation throughout the flight and egressed as a flight of four. For Ritchie these two aerial victories increased his score to four. DeBellevue now had three MIG kills, all earned while flying with Ritchie.

Ten days later, on 18 July, another MIG-21 was destroyed. This one fell victim to Lt. Col. Carl G. Baily and his WSO, Capt. Jeffrey S. Feinstein, of the 13th TFS, 432d TRW. This F-4D team was one of four MIGCAP aircraft protecting strike flights hitting targets near Phuc Yen airfield. Colonel Baily later said of the air battle:

At 0224Z, as our flight was ingressing west of Hanoi, aircraft 4 called out, "Bandits," and broke hard right. This caused the elements to be separated, but I elected to continue inbound as the other flight was requesting our assistance. They were low on fuel and were being pursued by MIG's.

At 0227Z, Captain Feinstein got a radar contact and vectored me and our wingman toward it. At a range of 3 miles I got a visual contact with a single silver MIG.

The WSO locked on the MIG, and Col. Baily fired four AIM-7 missiles as the MIG dived, attempting to separate. They missed their mark, but he quickly followed with an AIM-9, which did not miss. It blew off the MIG's right wing and caused the enemy aircraft to snap-roll to the right. During the second snap it hit the ground and disintegrated.

Baily and Feinstein repeated their performance on 29 July with another MIG-21. They were flying lead in a four-ship F-4 MIGCAP formation which was sent into North Vietnam during the early morning hours to protect forces attacking targets on the Northeast Railway near Kep airfield. Feinstein describes his fourth aerial victory:

At 0211Z, while proceeding to our assigned orbit point near Kep airfield, Red Crown gave the code words for "MIG activity." A minute-and-half later I picked up radar contacts in the vicinity of Phuc Yen airfield.

Red Crown began vectoring our flight toward the southwest on two bandits and I had radar contacts at that position. At 0217Z I obtained a radar lock-on, and the flight began a hard left turn, attempting to close within firing range. Lt.



MIG-killers head for a pre-mission briefing at Udorn. Capts. DeBellevue and Ritchie (front row), and Col. Baily and Capt. Feinstein (back row).

Col. Baily was able to close to 5 miles but could not get in range due to the bandit's high rate of speed. We lost the radar lock-on at 6 miles. After completing the turn, we reacquired another contact which was probably the same bandit.

We called the position of the contact (on the nose for 8 miles) to Red Crown, and Red Crown confirmed that it was a bandit and stated that he had three bandits in front of us. We closed in on an attack as Red Crown continued to call the bandit's position.

At about 4 miles, Lieutenant Kirchner and Captain Rogers had visual contact with a silver MIG and called his position in front of the flight as the MIG went into a descending turn. At 0219Z, Colonel Baily began firing AIM-7 missiles. The first missile did not ignite. The second and third missiles ripple-fired at 0219:10Z at 2¼ miles range, guided down and to the left, bursting into a large fireball at 0219:15Z. This was observed by other members of the companion flight. Lieutenant Kirchner stated that after visually acquiring the MIG, he observed the two missiles guide to the MIG and explode. He observed the MIG to

emerge from the fireball in flames. At 0219:47Z, as we were turning right to egress, Colonel Baily also observed an aircraft well below us, on fire. We continued our turn, and at 0220:20Z seven members of our flight observed an F-4 in a spin at our 9 o'clock position at approximately the same altitude. After a hard reversal turn to check an unidentified single aircraft which I saw at our 6 o'clock, we observed the F-4 crash into a hillside and explode at 0220:45Z. Red Crown was still calling a MIG in our immediate vicinity and the flight egressed after a futile attempt to engage this bandit. All times, ranges, and turns have been verified by tape recorders carried on the flight and by the radar scope film.

"The MIG's were coming at us at a very high rate of speed," Baily later described the aerial victory to newsmen. "They managed to get by us before we engaged them. We turned as hard as we could, started toward them, and got them right in front of us, coming head-on. Jeff [Feinstein] locked-on the MIG and I fired two missiles. They both guided right in and splashed him good."

"The credit all goes to Jeff," he said. "When you get them head-on, the guy with the radar does all the work. I just sat up front and squeezed the trigger."

The same morning Lt. Col. Gene E. Taft and his WSO, Capt. Stanley M. Imaye of the 4th TFS, 366th TFW, also destroyed a MIG-21. Flying an F-4E, they were escorting a chaff force deep into North Vietnam when surface-to-air missiles and MIG-21's threatened the strike force. The two chaff flights withdrew from the strike area while the two F-4 escort flights engaged the MIG's. One got in firing position behind two of the F-4's, and Taft and Imaye maneuvered their aircraft behind the MIG before he could fire. Taft further narrates:

As the MIG approached 11 o'clock, the auto-acquisition switch was activated with no lock-on noted. The GIB went out of boresight to radar in an attempt to lock on. The MIG was called level at that instant. The switch was returned to boresight and auto-acquisition attempted with successful lock-on. The range bar indicated the MIG at approximately 4 o'clock position, 9,000 feet. Four seconds were counted and the trigger

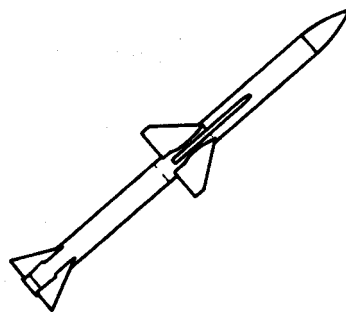
squeezed once. One AIM-7 left the aircraft and tracked smoothly to the MIG. Missile detonation was observed and simultaneously the MIG's wing appeared to separate, fire was observed out of the wing, and the MIG rolled uncontrollably. No chute was observed. No impact was observed. After detonation occurred, our flight rolled off in a fairly tight descending turn. After approximately 150° of turn, an F-4 was observed, out of control, on fire, in an inverted flat spin on the inside of our aircraft. Approximately 5 seconds later two good chutes were noted, and the aircraft impacted on a mountainside. Our flight began an orbit of the area, but aircraft 4 was Bingo fuel and the flight egressed with no other encounters or sightings.

Late in July the U.S. put a more sophisticated MIG warning system into operation, and the kill ratio again turned in favor of the Americans. For the remainder of Linebacker operations, U.S. pilots destroyed four MIG's for every lost Phantom or Thunderchief.

The next aerial victory was unique in that the USAF Phantom was piloted by a Marine, Capt. Lawrence G. Richard, and his weapon systems officer was a naval aviator, Lt. Cdr. Michael J. Ettel. Both were exchange officers attached for duty with the 58th TFS, 432d TRW. They were flying the lead F-4E in a flight of four aircraft on a weather reconnaissance mission in North Vietnam on 12 August. Captain Richard describes the flight's encounter:

As I crossed the Red River, I was informed by Red Crown that bandits were airborne, out of Bullseye heading 180°. At this time I was 35 nautical miles northwest of them heading 020°, proceeding on my fragged route. The bandits then turned to a heading of 360° and commenced an attack. At this time, with the bandits at my 6 o'clock at 30 nautical miles, I turned the flight to a heading of 180° and accelerated the flight. Red Crown continued giving bandit information and I visually acquired two aircraft at my 9:30 about 4 nautical miles, starting a turn to my 6 o'clock.

At this time I did a slice turn to the left, sending my supporting element high. I acquired a boresight lock-on on the lead aircraft, which was



U.S. Sparrow (AIM-7) air-to-air missile

a silver MIG-21. I closed to 1¼ nautical miles with 30° angle-off and fired one AIM-7, which appeared to guide, but missed as the MIG-21 broke hard into the AIM-7 and met me head-on. At this time I unloaded and went after his wingman, who was in about a 2- to 3-G turn. I acquired a boresight lock-on to this MIG-21, which was light green camouflage in color, closed to 1 nautical mile with 20° angle-off and fired another AIM-7 which impacted just forward of the vertical fin. The aircraft pitched up and some pieces of the aircraft broke away. At this time I turned the flight to a heading of 210° and egressed the area. The kill was witnessed by Lt. Col. Lee Williams, aircraft commander, and Maj. Thomas Leach, weapon systems officer on aircraft 3.

The 8th Tactical Fighter Wing, which had figured so prominently in the Rolling Thunder* phase of the war in Southeast Asia, again temporarily entered the MIG-killer business on 15 August. On that day, a chaff-dispensing F-4E from the 336th TFS, crewed by Capt. Fred W. Sheffler and Mark A. Massen, engaged a MIG-21. Temporarily attached to the 8th Wing for combat, the flight of F-4E's was supporting routine Linebacker strikes in Route Package 6. The MIG-21 apparently hesitated, believing that the chaff aircraft carried no air-to-air missiles. Sheffler provides the following account:

Our mission was to provide support for two strike flights targeted with laser-guided bombs

*Nickname assigned to air strikes conducted against targets and lines of communications in NVN. Commencing on 2 March 1965, the program was intended to weaken the enemy's logistics system by striking targets on a continuing basis. Rolling Thunder was suspended on 31 October 1968.

against a thermal power plant and a railroad bridge along the Northwest Railroad at Viet Tri and Phu Tho, respectively. We were the right outside aircraft in a formation of two flights of four. One minute prior to our first target our escort, the other flight, called a single bandit coming down from high 6 o'clock and attacking us on the right.

Our flight began a hard turn to the right in an attempt to negate the enemy's attack. Escort told us that there were now two MIG's in the attack. We continued our turn, trying to visually pick up the MIG's. A camouflaged MIG-21 overshot at this time on my right, no further than one or two thousand feet away. Captain Massen, my weapon systems operator, called for me to auto-acquire.*

I placed my pipper on the MIG and toggled the proper switch on my throttles. We achieved an immediate radar lock-on. I continued our turn to the right, striving to pick up the second MIG. Unable to achieve firing parameters, aircraft 3 gave me the lead, and at the same time Captain Massen cleared me to fire. I made a quick check to see if the MIG-21 was still at my 12 o'clock and then squeezed off an AIM-7 missile. By this time the MIG-21 was about four to five thousand feet in front of me. For the next 10 seconds, until missile impact, I divided my attention between monitoring the AIM-7's flight and checking our 4 to 6 o'clock for his partner.

The missile made two minor corrections in flight; one just prior to impact on the left side, just forward of the tail section. He did not appear to take any evasive action up until the last second, when he hardened up his turn to the left. After impact and explosion, the MIG-21 entered a 45° dive, trailing smoke and flames from his aft section. I estimate his altitude when hit at between 9,000 and 10,000 feet MSL. At this time the second MIG-21 came by on our right in a hard left turn and went between our two flights head-on. We continued our turn and egressed the area at low altitude. Because of the ensuing engagement with the second MIG-21, I was unable to

observe a chute or impact of the MIG-21 with the ground. However, the back-seater of an aircraft of the follow-on strike flight observed a large fire on the side of a hill near the area of the engagement during ingress, and it was still burning during his egress some 15 minutes later.

Four days later, on 19 August, another MIG was destroyed. Capt. Sammy C. White, flying his final Linebacker mission, and his WSO, 1st Lt. Frank J. Bettine, crewed an F-4E in a flight of four chaff-dispersing aircraft. Their joint statement describes how a MIG-21 attacked the escort flight and was promptly dispatched:

Not long after entering North Vietnam, the WSO in aircraft 2, Capt. Forrest Penney, saw a MIG-21 in the flight leader's 6 o'clock position and called for a break. As the F-4E's broke, the MIG-21 faltered momentarily, then elected to disengage. We rolled off into the MIG's 6 o'clock and, following some maneuvering, fired an AIM-7 which tracked on the MIG and detonated. After the missile impacted, the MIG began to smoke and burn, followed by the ejection of the aircraft's pilot. Having reached minimum fuel, we egressed the area.

The First USAF Aces

After 7 years of air-to-air combat in Southeast Asia, the U.S. Air Force finally produced its first ace of the war when Steve Ritchie had his fifth MIG victory confirmed for 28 August 1972. He thereby joined the ranks of fighter aces of past wars. There was a competition being waged between Ritchie and Feinstein, and the latter had tallied his fourth MIG victory on 29 July. Ritchie's fourth had been scored on 8 July. The question was whether Ritchie, a pilot, or Feinstein, a navigator, would become the Air Force's first ace in Southeast Asia. Each had had a potential fifth claim disallowed. Feinstein, flying with Maj. John L. Mesenbourg, had claimed an aerial victory in an engagement on 9 June, but approval was denied by the Seventh Air Force's Enemy Aircraft Claims Evaluation Board because of a lack of sufficient evidence. Ritchie's claim of a MIG-21 on 13 June was also rejected because of insufficient evidence.

*Refers to detecting, identifying and locating the target (MIG) in enough detail so that the pilot can fire the missile. Unable to track the MIG visually, the pilot wants this acquisition to be automatically picked up on radar.

The 28 August skirmish resolved the issue. Ritchie flew the lead aircraft of a MIGCAP flight, with Capt. Charles B. DeBellevue as his WSO, during a Linebacker strike mission. "We acquired a radar lock-on on a MIG-21 that was head-on to us," Ritchie said.

We converted to the stern and fired two AIM-7 missiles during the conversion. These missiles were out of parameters and were fired in an attempt to get the MIG to start a turn. As we rolled out behind the MIG, we fired the two remaining AIM-7's. The third missile missed, but the fourth impacted the MIG. The MIG was seen to explode and start tumbling toward the earth. The kill was witnessed by Captain John Madden, aircraft commander in number 3.

"It was an entirely different situation," Ritchie noted to newsmen. The MIG flew at "a much higher altitude than any of my other MIG kills and at a much greater range. I don't think the MIG pilot ever really saw us. All he saw were those missiles coming at him and that's what helped us finally get him."

The new ace complimented the ground crews who kept the F-4's combat-ready: "There's no way we could have done it without them," he said. "In fact, I got my first and fifth MIG in the same plane. Crew Chief Sergeant Reggie Taylor was the first one up the ladder when the plane landed and you just couldn't believe how happy he was. I think he was more excited than I."

DeBellevue, whose total victories rose to four with this day's kill, commented on teamwork: "The most important thing is for the crew to work well together," he said. "They have to know each other. I know what Steve is thinking on a mission and can almost accomplish whatever he wants before he asks. I was telling him everything he had to know when he wanted it, and did not waste time giving him useless data."

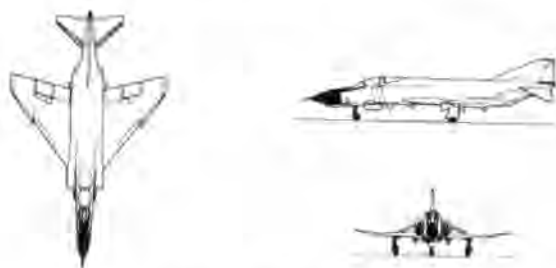
An F-4E of the 388th TFW, one of two F-4's and two F-105G's flying a hunter-killer mission, made the next MIG kill. They were flying SAM suppression in the vicinity of Phuc Yen airfield on 2 September, when a MIG-19 attacked aircraft 2, an F-105. His Atoll air-to-air missile narrowly missed the Thunderchief's left wing by approximately 20

feet. Its aircraft commander, Maj. Thomas J. Coady, flying with Maj. Harold E. Kurz, made a hard right turn, and escaped destruction. The MIG pilot then pressed a cannon attack against the lead aircraft, also an F-105 and crewed by Maj. Edward Y. Cleveland and Capt. Michael B. O'Brien. A hard right turn also saved them. As the MIG broke off, it passed over aircraft 3, an F-4E flown by Maj. Jon I. Lucas and 1st Lt. Douglas G. Malloy. In an inverted position the MIG headed east, probably trying for Phuc Yen.

"He came in from our 4 o'clock position," said Major Lucas, "and I started a left turn to maneuver into firing position." Lucas adds:

The MIG then started a left-descending turn at which time I called for an auto-acquisition. The weapon systems officer, Lieutenant Malloy, went to boresight and confirmed the switch settings. I hit the auto-acquisition switch with the MIG-19 framed in the reticle. Lieutenant Malloy confirmed a good lock-on. I counted 4 seconds and squeezed the trigger. The left aft missile light went out, indicating expenditure of an AIM-7. I started to select Master Arm and Guns to follow up with a gun attack. At that time, approximately 0440Z, a SAM was observed tracking our aircraft, and a turn was initiated into the SAM to negate its track. We then turned back towards the MIG and observed a pastel orange parachute with a man hanging in the harness. Missile impact was not observed due to the turn into the SAM, but Cleveland and his wingman called the MIG-19 burning and spiraling towards the ground and also observed the parachute.

During Linebacker strikes on 9 September, a



Phantom II—F-4E Fighter



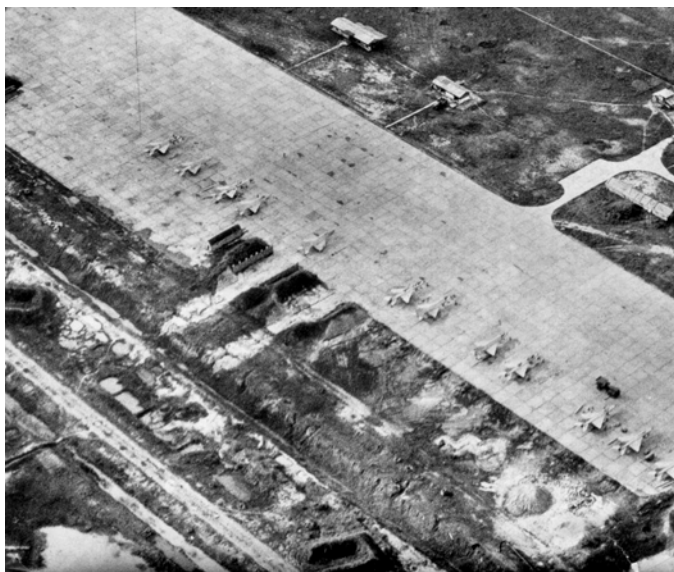
Admiring Capt. Ritchie's fifth star are: (l. to r.) Capt. DeBellevue, Sgt. Reggie Taylor, the aircraft's crew chief; Capt. Ritchie; and Sgt. Ronald W. Buttrey, the aircraft's night crew chief.

flight of four F-4D's on MIGCAP west of Hanoi shot down three MIG's. Two were MIG-19's downed by flight leader Capt. John A. Madden, Jr., and his WSO, Capt. Charles DeBellevue. For Madden, the victories constituted his first and second MIG kills, but for DeBellevue they were numbers five and six, moving him up as the leading MIG destroyer of the war. Before their MIG victories, however, Capt. Calvin B. Tibbett and 1st Lt. William S. Hargrove in aircraft 3 destroyed a MIG-21.

The flight was alerted to the presence of MIG's some 50 miles away. "We knew the MIG's would be returning soon to land at Phuc Yen airfield," Captain Madden later reported. "We just kind of sat back and waited for them." When DeBellevue acquired the MIG's on radar, the flight maneuvered to attack. Madden made the first move:

We got a visual on a MIG about 5 miles out on final approach with his gear and flaps down. Getting a lock on him, I fired my missiles but they missed. We were coming in from the side-rear and slipped up next to that MIG no more than 500 feet apart. He got a visual on us, snatched up his flaps and hit afterburners, accelerating out. It became obvious that I wasn't going to get another shot at the MIG. That's when Captain Tibbett closed in on the MIG.

Captain Tibbett had been watching the engage-



MIG-21's at Phuc Yen.

ment carefully and saw that the two AIM-7 missiles fired by Madden did not guide.

Madden then cleared us to fire, since we were in a good position for an AIM-9 attack. We fired two AIM-9 missiles which appeared not to guide, closed to gun range, and fired the 20-mm cannon. The MIG-21 sustained numerous hits along the fuselage and left wing. The MIG pilot ejected, and the aircraft started a gentle roll and nose-down attitude toward the ground. The altitude was approximately 1,000 feet.

As the flight made a turn to withdraw, two MIG-19's swarmed in for an attack. DeBellevue describes the next two engagements:

We acquired the MIG's on radar and positioned as we picked them up visually. We used a slicing low-speed yo-yo to position behind the MIG-19's and started turning hard with them. We fired one AIM-9 missile, which detonated 25 feet from one of the MIG-19's. We then switched the attack to the other MIG-19 and one turn later we fired an AIM-9 at him.

I observed the missile impact the tail of the MIG. The MIG continued normally for the next few seconds, then began a slow roll and spiraled downward, impacting the ground with a large

fireball. Our altitude was approximately 1,500 feet at the moment of the MIG's impact.

Madden and DeBellevue returned to their base, thinking they had destroyed only the second MIG-19. Only later did investigation reveal that they were the only aircrew to shoot at a MIG-19 which crashed and burned on the runway at Phuc Yen that day. Captains Daleky and Murphy, in number 4 position, were hit by antiaircraft fire as the flight left the battle area and headed back for Udom. They were soon rescued from northern Laos, over which they were forced to bail out. Their report of the MIG-19 engagements, along with photo analysis and debriefing interviews of other flight aircrews helped confirm the destruction of the first as well as the second MIG engaged by Madden and DeBellevue.

Even without the extra kill, Captain DeBellevue was the Air Force's second ace of the war. As events would later demonstrate, he emerged as the leading MIG-killer of the conflict, for no one later matched his score. When asked how he felt about becoming an ace, the navigator commented: "I feel pretty good about it. It's the high point of my career. There's no other job that you have to put out as much for. It's frustrating, and yet when you do shoot down a MIG, it's so rewarding."

The events of the 9th were reenacted 3 days later when aircrews of the 388th TFW downed three MIG-21's. Two were destroyed by aircrews in a flight of four F-4E's escorting chaff flights northeast of Hanoi, in the vicinity of Kep airfield. Three or four MIG's came in from 4 to 6 o'clock and attacked one of the chaff flights as it approached the target area. The lead F-4, crewed by Lt. Col. Lyle L. Beckers and 1st Lt. Thomas M. Griffin, observed a MIG aligning itself to the rear of the chaff flight from which point he could launch a missile. According to Becker's account:

I obtained an auto-acquisition lock-on and attempted to fire two AIM-7 missiles. The MIG-21 fired an Atoll missile at the chaff flight and broke straight down. I pursued and fired two AIM-9 missiles, one of which impacted the MIG's left wing. Flames and smoke were observed coming from the left wing. I then selected guns and proceeded to fire 520 rounds of HEI/tracer. Projectile impacts and additional fire were observed on the



Capt. DeBellevue, USAF's second ace, sits in the cockpit of his F-4D.

fuselage of the MIG. The MIG-21 was last observed in a steep descent, burning.

An Atoll missile from the MIG, however, found its mark and destroyed one of the chaff aircraft before Beckers and his WSO could drive him off. Meanwhile, Maj. Gary L. Retterbush with 1st Lt. Daniel L. Autrey in the back seat of aircraft 2 attacked another MIG-21. "We turned into the MIG's and accomplished a radar lock-on," Retterbush reported. "Two AIM-7's were fired but did not guide. Three AIM-9's were fired, but missed by a matter of feet. We then closed on and downed a MIG-21 with 20-mm cannon, firing approximately 350 rounds. The 20-mm with tracer was observed impacting the fuselage, wing, and canopy, causing fire and smoke."

The MIG went into an uncontrolled climb with its nose 65 degrees up, slowed to 150 knots, then dropped. Major Retterbush reported that as the MIG dropped past him he saw the pilot slumped forward in the cockpit. The cannon had found its mark. As the F-4E's left the battle area, they observed a smoke trail and a large fireball.

Later in the day another F-4* flight from the 388th TFW escorted a strike flight in an attack against the Tuan Quan railroad bridge when two MIG-21's attacked. The first MIG appeared in an 8

*Aircraft 1, 3 and 4 were F-4E's; aircraft 2 was an F-4D.



o'clock position and lined up on the strike flight. The lead aircraft fired one AIM-7 missile ballistically to distract the MIG, then turned in pursuit as the MIG broke away. This "shot across the bow" detonated about 1,000 feet in front of the Phantom. In hot pursuit, the flight leader then fired another AIM-7, followed by three AIM-9 missiles. They all missed. The second AIM-7 detonated 500 feet from the target, and the nearest AIM-9 detonated about 200 feet from the MIG.

The number 2 aircraft, piloted by Capt. Michael J. Mahaffey, with 1st Lt. George I. Shields in the rear seat, had better luck with its ordnance during the engagement. As the flight leader was chasing the first MIG, a second MIG-21 dropped between the two F-4's. "It went right across in front of us," Mahaffey latter commented, "and it looked a lot bigger than I thought a MIG was supposed to look."

We rolled right, tracked, and fired one AIM-9 which guided and impacted the MIG in the tail section, blowing off parts of the aircraft. The MIG went into a spin from 16,000 feet and more pieces fell off the aircraft. It was last seen in a spin below 8,000 feet, about 20 nautical miles southwest of Yen Bai airfield.

Another MIG-21 was destroyed during Linebacker operations on 16 September. The victors were Capt. Calvin B. Tibbett and his WSO, 1st Lt. William S. Hargrove, flying in position 3 in a flight of four F-4E's from the 555th TFS on escort for U.S. strike forces. It was their second aerial victory within a week. Tibbett gives the following account of the engagement:

A MIG-21 was spotted going southeast down the Red River. A low-level chase started and the lead flight, Capt. John A. Madden and Capt. Michael A. Hilliard, fired two radar and four heat-seeking missiles, none of which detonated or appeared to guide.

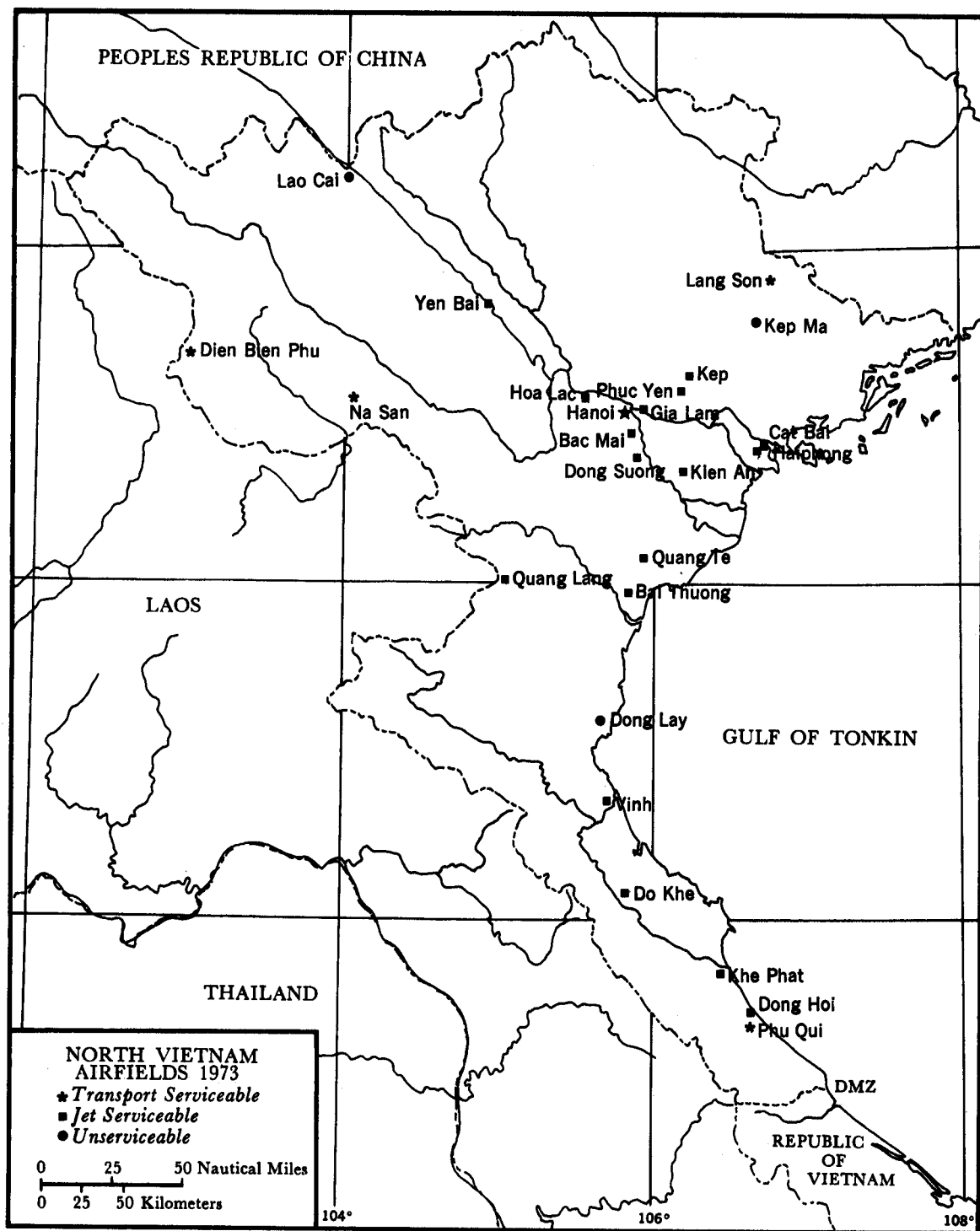
The flight leader cleared us to fire, and we fired four heat missiles, the last of which guided and detonated near the aft portion of the fuselage. The MIG started a turn, then pitched down. The MIG pilot ejected just before the aircraft struck the ground.

Air Force fighter crews scored no additional aerial victories until the first week of October, although Linebacker operations continued uninterrupted. In the meantime, MIG's were destroyed on the ground. On 1 October, for example, the U.S. made some of its heaviest attacks against Phuc Yen, Yen Bai, Vinh, and Quang Lang airfields. At least five MIG's were destroyed and nine others damaged.

The first aerial victory for the month came on 5 October when MIG's from Kep airfield opposed a strike force. An Air Force escort flight of F-4E's dispatched from the 388th TFW engaged the enemy in a heated battle. A MIG-21 was downed by Capt. Richard E. Coe and 1st Lt. Omri K. Webb, III in the lead aircraft. Coe reports:

We received vectors from Disco for two MIG's off Bullseye on ingress to initial point. They seemed to be heading in our direction. Disco gave continuous vectors until the flight we were escorting called MIG's at 8 o'clock high.

The formation began a hard left turn. After two turns I observed two MIG-21's in route formation at 10 o'clock high, at about 3 miles and heading 280°. We began a lazy one-G descending turn to get to 6 o'clock. The auto-acquisition switch was activated with the MIG's still in the pipper. I then



fired one AIM-7. At this time someone called, "Someone has a MIG at 6 o'clock, tracking." We rolled up to check 6 o'clock. I then checked 12 o'clock where I saw a smoke trail entering a black smoke cloud and a large white column exiting the other side. We then broke hard right and on roll-out observed the white column leading down to two large dirt clouds rising from the ground.

The following day two F-4E aircrews of a hunter-killer team destroyed a MIG-19. The first Phantom was manned by Maj. Gordon L. Clouser and 1st Lt. Cecil H. Brunson, and the other by Capt. Charles D. Barton and 1st Lt. George D. Watson. The manner in which this MIG was destroyed was unusual.

Disco warned the flight of approaching MIG's. The flight was then in the vicinity of Thai Nguyen. The F-105 flight leader and his wingman, making up the other half of the flight, moved out of the area as prebriefed while Clouser and Barton turned to make contact with the enemy. Clouser then observed a MIG-21 sliding into a 7 o'clock position; Barton observed a MIG-19 attempting to achieve a 6 o'clock position on the element. Clouser called a hard left break to provide self-protection for the Phantoms and to divert the MIG's from the F-105's. Because of the ordnance on board, the maneuverability of the F-4's was limited, and therefore they jettisoned the ordnance and fuel tanks.

The MIG's were dangerously close to a firing position and the two back-seaters, Brunson and Watson, warned their pilots of the danger. To disrupt enemy tracking, Barton went into a vertical dive in afterburner with a weaving pattern. Meanwhile, Clouser was able to maneuver out of the MIG's range without resorting to a dive. The MIG-19 pilot followed Barton's aircraft, its guns blazing, and Clouser rolled in behind the MIG to create a sandwich. The MIG-21 sandwiched Clouser, creating an F-4/MIG-19/F-4/MIG-21 chain. Barton continued the dive and bottomed out at 300 feet above a valley floor between two mountain peaks. The MIG-19 pilot was apparently so engrossed with the chase that he failed to notice the vertical dive angle until it was too late. His aircraft impacted with the ground. Both F-4E's recovered and the MIG-21 hastily withdrew from the battle. Each F-4E crew

member was subsequently credited with one-half of a MIG kill.

The next MIG fell on 8 October. Maj. Gary L. Retterbush and Capt. Robert H. Jasperson crewed the lead aircraft in a flight of F-4E's dispatched by the 388th TFW. The following is the major's account:

On 8 October 1972, while flying lead on a strike escort mission, we received warnings of MIG's coming in from the north. We jettisoned our tanks and maneuvered behind a MIG-21 who began evasive action. Our infrared missiles failed to fire, so we closed and fired the 20-mm cannon. Several good hits were observed and the MIG burst into flames. The pilot ejected at approximately 1,500 feet before the aircraft impacted the ground.

Another maneuvering action resulted in a third aerial victory for Capt. John A. Madden, Jr., aircraft commander, and a second MIG kill for his WSO, Capt. Lawrence H. Pettit, on 12 October. They were flying MIGCAP in support of Linebacker operations. "We ingressed North Vietnam over Cam Pha on a westerly heading," reported Captain Madden.

At 0311Z, two bandits were airborne from Phuc Yen and heading northeast. We vectored now on a more northerly heading to position ourselves between the MIG's and strike forces.

Red Crown stated that the MIG's were in a port turn, and we then engaged a silver MIG-21 head-on. As the MIG passed abeam, we sliced around in a right turn to get behind and beneath him. Coming out of the right sliding turn, we sighted the MIG-21 in a port turn. We were 90° angle-off and passed within 1,000 feet behind him as we slid to the outside of his turn. We turned back to the left to get behind the MIG. He pulled up, rolled over and Split-S'd into the clouds.

At this time we were 20,000 feet and the cloud layer was solid undercast between 16,000 feet and 18,000 feet. We rolled over and dove after the MIG through the cloud deck. We picked him up underneath and pressed after him. He was last observed in an 80° dive at 9,000 feet, entering a 7/8's cloud deck with unknown base. We broke off our attack just at the top of these clouds and egressed on a heading of 120°.

The MIG crashed. Because the aggressive attack and hot pursuit caused the MIG to execute and prolong a maneuver from which he could not recover, Captains Madden and Pettit submitted a claim for the MIG's destruction.

Aircraft 2, crewed by Capt. George Norwood and 1st Lt. David F. Bland, served as Madden's wingman during these maneuvers, but this aircrew apparently did not submit a claim for a portion of the MIG-21's destruction. The Enemy Aircraft Claims Evaluation Board at Seventh Air Force considered this claim on 16 November but deferred it pending further information. On the 20th the board confirmed the MIG-21's destruction and gave credit for the aerial victory to Madden and Pettit.

USAF's Third Ace

The third and final USAF ace of the war in Southeast Asia obtained his fifth aerial victory on 13 October. More significantly, Capt. Jeffrey S. Feinstein was the second navigator ace. Flying a back-seater for his squadron commander, Lt. Col. Curtis D. Westphal, during a MIGCAP near Kep airfield, Feinstein later recalls, "We received a call that bandits were in the area and heading our way. There were two of them and I got a visual on them when they were about 2 miles off." Colonel Westphal describes the engagement:

At 1321 hours we received initial word that two bandits were airborne from the vicinity of Hanoi, heading north. At 1324 hours our flight, under Red Crown control, turned to engage the MIG's. Shortly thereafter Captain Feinstein obtained radar contact at 17 nautical miles. Red Crown confirmed the contact as being the bandits, and our flight closed on a front quarter attack.

Due to the presence of friendlies in the area, we decided not to fire at that point. After closing to 1 mile, Captain Feinstein obtained a visual contact on one of the two MIG-21's. We turned left to engage. At 1328 we fired three AIM-7 missiles. All eight members of the flight observed the second AIM-7 hit the MIG-21 in the aft section, at which time it burst into flames.

We saw the MIG pilot eject at approximately 5



U.S. Air Force Ace Capt. Feinstein poses on top of his F-4D aircraft.

seconds after missile impact. The entire flight then observed the MIG-21 going down in flames until it disappeared through the undercast.

Air combat on 15 October led to the destruction of three additional MIG-21's by Air Force fighter crews, one from the 388th TFW and the other two from the 432d TRW. The first kill was credited to Maj. Robert L. Holtz and his WSO, 1st Lt. William C. Diehl. The flight had been dispatched by the 388th Wing to escort three flights of F-4 strike aircraft to the vicinity of Viet Tri. Numerous MIG's were engaged by this flight before Holtz finally downed one of them. His claim statement provides a record of their activities:

I and my GIB engaged a number of MIG-21's in the vicinity of Viet Tri and succeeded in destroying one MIG-21.

While escorting a strike package of three flights of F-4's from Ubon we were vectored by Red Crown to two MIG's in my 12 o'clock position. These bandits were picked up visually at about 2 miles and a hard left turn was made to engage as they passed overhead and away at a rapid rate. Seeing that these two were no longer a threat, we started to return to escort duties when my wingman saw and engaged another MIG-21 with



myself flying fighting wing. This MIG headed for the clouds and disappeared.

At this time the strike flights were too far ahead of us to catch, so I called for an orbit in the vicinity of Viet Tri to cover the strike flights on egress. While in this orbit my wingman and I reengaged one more time each, with negative results, until we got separated by numerous F-4's going through our flight after another MIG. While in a right hand turn to rejoin my wingman I circled a cloud and noted a white parachute about 3,000 to 4,000 feet AGL.* At this time I told Lieutenant Diehl to mark the time and position in case it was one of our pilots.

I then noted a silver MIG-21 orbiting the descending parachute about the same altitude (3,000 to 4,000 feet) and within a 30° cone of my nose to the right. The MIG was not maneuvering but instead was in a lazy right bank of about 20° and about 3,000 feet ahead. I fired an AIM-9 which came off the rail, did a slow roll and then went straight up the MIG's tail and exploded, blowing pieces of tail section and almost one complete

elevator off the aircraft. The MIG rolled violently to the right and started towards the ground, nose down at about 20° to 30° and on fire. At this time I disengaged and egressed the area.

The second aerial victory of the day was achieved by Captains Gary M. Rubus and his WSO, James L. Hendrickson, of the 432d TRW. The flight was providing inbound MIGCAP in support of a Linebacker mission at the time. Captain Rubus tells of the kill:

Northwest of Bullseye, while under Red Crown control, our flight vectored south against a pair of MIG-21's. A radar contact was established at a distance of 16 nautical miles, followed by a visual contact shortly thereafter. I fired an AIM-7 at a range of 4 nautical miles which detonated prematurely in front of my aircraft. A second AIM-7 was fired at a range of 4,500 feet which did not guide. I closed to cannon range and fired a burst from approximately 1,100 feet, followed by a second burst from approximately 800 feet. Both bursts impacted the MIG-21, and shortly thereafter I observed the pilot eject. The MIG-21 was trailing gray smoke, rolled left, and impacted the ground about 2 nautical miles beyond the point where the pilot ejected.

The flight lead, flown by Lt. Col. Carl Funk and Maj. James Malaney, had attempted to attack the MIG first, but had cleared Rubus to fire when Funk's radar lock broke twice in succession. Rubus attributed his kill to overall teamwork in the engagement. After he downed the MIG-21, Red Crown advised the flight that four more MIG's were airborne and coming their way, but Funk's flight had reached Bingo fuel level and had to retreat for home.

Meanwhile, the strike flights which Funk's aircraft had been assigned to protect were unable to reach their primary target: a fuel storage area in the Thai Nguyen area. The strike aircraft, therefore, hit the alternate target: Yen Bai airfield. At least one MIG was destroyed and two were damaged on the ground during this attack.

Another F-4 flight was also dispatched by the 432d TRW for MIGCAP in support of this Linebacker mission. Two members of this flight, Majors Ivy J. McCoy and Frederick W. Brown,

*Above ground level.

WSO, made the third MIG-21 kill of the day. McCoy records the action:

Red Crown informed us that the other MIG-CAP was engaged with MIG's and for us to remain with the strike flight. Red Crown called new bandits airborne from Phuc Yen and vectored us 096° towards them. Red Crown estimated their altitude at 12,000. We continued the vectors until we merged. Having no visual contact, we made a 180° left turn and continued towards bandits.

On a heading of 040° contrails were observed by myself at 1 o'clock. Red Crown informed me that they were probably my bandits. My wingman called bandits visual at 2 o'clock. I turned and visually acquired a MIG-21 in a right descending turn. I spiraled down with the MIG-21, calling for Major Brown to lock on. I then fired three AIM-7's during an elapsed time of 23 seconds.

The first two missiles I did not observe. The third fell away to the left. The MIG was continuing down in a right 20° bank turn. I then selected heat and fired three AIM-9's. The third missile was visually acquired by myself at 200-300 feet aft of the MIG-21 and was observed to fly up the tailpipe of the MIG-21. The entire aft section of the MIG-21 was a fireball and was disintegrating. This occurred at 1425:40 hours. The timing is precise. Col. Robert E. Wayne, my wingman in aircraft 2, observed the missile impacting the MIG-21 and verified that the entire aft section of the MIG-21 was one large fireball. Capt. Glenn A. Proffitt in aircraft 3 observed the missile impacting and the entire aft section of the MIG coming apart. Immediately after missile impact he observed the MIG pilot eject and also observed chute deployment. Our flight then egressed as a flight of four.

Operation Linebacker came to an end on 22 October 1972, and many of the fighter squadrons which had been temporarily deployed to Southeast Asia were returned to their home bases or sent elsewhere in the Far East. Linebacker's demise was premature, however, for it soon became apparent that the North Vietnamese had no intention of stopping wholesale infiltration into South Vietnam so long as American aircraft remained south of the 20th parallel.

President Nixon, on 18 December, gave the order

to attack the enemy in his home territory once again, this time with a concentrated force unprecedented in the Vietnam conflict. The new operation—actually a resumption of the previous campaign—was coded Linebacker II.

Primary targets for Linebacker II consisted of rail complexes, storage facilities and supply areas, power plants, radio broadcasting stations, air bases, and SAM sites in the area around Hanoi and Haiphong. Beginning with 18 December, except for a standdown on Christmas Day when no missions were flown, targets were attacked day and night. Enemy air defenses posed a formidable obstacle to the attacking forces. But during this phase, SAM's posed the major threat. All of the B-52 bombers lost during this phase of the war were downed by surface-to-air missiles.

Score Two for B-52 Gunners

With the resumption of Linebacker operations, USAF fighter aircrews and—for the first time in the air war—gunners aboard B-52 bombers, accounted for five MIG-21 kills.*

The first victory credited to a gunner came on the night of 18 December. S/Sgt. Samuel O. Turner, normally stationed at March AFB, California, but on temporary duty with the 307th Strategic Wing based at U-Tapao airfield, Thailand, was the tail gunner aboard a B-52D, part of the heavy bomber force hitting targets in the Hanoi area. Turner describes the engagement:

We were a few ships back from the lead aircraft. As we approached our target area, numerous surface-to-air missiles began coming up and exploding around us. We did not divert or turn back. We had our target and planned to hit it, regardless.

As we drew nearer to the target the intensity of the SAM's picked up. They were lighting up the sky. They seemed to be everywhere. We released our bombs over the target and had just proceeded outbound from the target when we learned that

*During the Korean War, there were 27 victories recorded by B-29 gunners.



A North Vietnamese SAM fired at USAF strike aircraft northwest of Hanoi.

there were MIG aircraft airborne near a particular reference point.

Our navigator told us the reference point was in our area and before long we learned the enemy fighter had us on its radar. As he closed on us I also picked him up on my radar when he was a few miles from our aircraft.

A few seconds later, the fighter locked on to us. As the MIG closed in, I also locked on him. He came in low in a rapid climb. While tracking the first MIG, I picked up a second enemy aircraft at 8 o'clock at a range of about 7½ miles. He appeared stabilized—not attacking us, obviously allowing the other fighter room to maneuver and conduct his run first.

As the attacking MIG came into firing range, I fired a burst. There was a gigantic explosion to the rear of the aircraft. I looked out the window but was unable to see directly where the MIG would have been. I looked back at my radar scope. Except for the one airplane out at 8 o'clock, there was nothing. And within 15 seconds, even he broke away and we lost contact with him.

Turner's MIG kill was witnessed by another gunner, M/Sgt. Lewis E. LeBlanc, who confirmed the kill. LeBlanc saw a fireball at the MIG-21's approximate range and azimuth.

The mission of protecting the heavy bomber fleet



A SAM burst recorded on camera.

was generally assigned to F-4 MIGCAP flights which accompanied every bomber wave over North Vietnam. One MIGCAP aircrew demonstrated unusual aggressiveness and persistence and scored a victory without even hitting the MIG. This rare feat was achieved by Capt. Gary L. Sholders and his WSO, 1st Lt. Eldon D. Binkley, who were the lead aircraft on 21/22 December. Sholders explains their accomplishment:

Our flight dropped off the tanker at 1948Z and proceeded north toward the assigned orbit point. Upon contact with Red Crown, the flight was



Gen. John C. Meyer, commander-in-chief, SAC, awards the Silver Star to S/Sgt. Samuel O. Turner, the first B-52 gunner to shoot down an enemy aircraft.

advised of enemy aircraft activity west of Hanoi. Red Crown began vectoring at 2003Z.

We elected not to pursue the bandit immediately because his altitude was below an overcast which covered virtually all of the Hanoi area. Our flight established a left orbit at approximately 60 miles from Hanoi. We remained in this orbit until approximately 2018Z, when Red Crown advised that the bandit had climbed to 16,000 feet.

We made a hard left turn to 100°, established immediate radar contact with a single enemy aircraft crossing right to left, range 18 miles. Clearance to fire was obtained from Red Crown, and we rolled into a 5-mile trail position on the bandit. The bandit then engaged his after-burner and began a steep climb. We obtained a lock-on using boresight mode, and closed to approximately 3 miles when the radar broke lock at approximately 2022Z.

Red Crown advised our flight shortly thereafter that the bandit was south at 10 miles. We then turned to reengage. The flight remained within 8 miles of the bandit in a maneuvering engagement, using intermittent radar returns and vectors from Red Crown, until approximately 2033Z.

We were unable to obtain a radar lock-on during this period of time. Red Crown advised the flight at 2033Z that the bandit was south at 7 miles, heading home. We then turned southeast, attempting to reacquire the bandit heading toward Hanoi; no contact was made on this heading. We then made a right turn to the northwest and immediately acquired radar contact with an enemy aircraft at 25 miles on the nose, apparently heading for Yen Bai airfield.

We pursued the bandit, closing to approximately 20 miles as the bandit appeared to be orbiting Yen Bai. The bandit then turned northeast. Using radar we were able to close to approximately 7 miles. We pursued the bandit until approximately 2046Z, when the engagement was terminated for fuel considerations. At the termination of the engagement, the bandit was on the nose at 7 miles. Our position at that time was approximately 010°, 60 miles from Hanoi. Shortly after termination of the engagement, one of the controlling agencies called a bandit north of Hanoi.

Intelligence sources confirmed (on 24 December) that an enemy aircraft went down in the early morning hours of 22 December 1972. Ours was the only flight in the area that engaged an enemy aircraft for any length of time on 21/22 December; in addition, the only flight that pursued an enemy aircraft after he had apparently attempted a landing at Yen Bai airfield. On the strength of the aforementioned evidence, we claim one enemy aircraft destroyed due to continued pursuit which resulted in fuel starvation for the enemy aircraft.

Lt. Col. James E. Brunson and Maj. Ralph S. Pickett, destroyed a MIG-21 on 22 December. Their flight was escorting strike aircraft in Route Package 6. According to Brunson (the flight leader), two MIG's were encountered:

After pre-strike refueling, the flight—the ingress MIGCAP in this Linebacker II mission—proceeded north toward Phu Tho en route to their assigned CAP area near Kep airfield . . . Two bandits started climbing out to the northwest of Hanoi. Red Crown was controlling the flight as they crossed into North Vietnam. Red Crown reported the MIG's as heading 290° and climbing through 26,000 feet. Red Crown gave our flight a vector of 020° and called the MIG's 30° right, 46 miles, at 29,000 feet, with friendlies between our flight and the MIG's.

The MIG's turned south toward us and the friendlies. Red Crown vectored us for a head-on intercept. Red Crown called the MIG's at 020° and 16 miles from us when the flight leader got a radar lock-on in that position and asked for clearance to fire. Red Crown cleared him to fire if a visual identification was made, as friendly aircraft were still in the area.

Our flight jettisoned the centerline fuel tanks and accelerated. The MIG was about 10,000 feet higher than the flight, and as aircraft 1 started his pull-up to center the radar steering dot, he saw a silver MIG-21 above him.

The flight leader put the MIG in his gunsight piper and fired four AIM-7 missiles in rapid succession with full radar lock-on, maintaining a steep climb toward the MIG. Both the aircraft commander and weapon systems officer observed



B-52 in flight.

one of the AIM-7 missiles detonate in the tail section of the MIG-21, causing the tail section and large pieces . . . to separate. The MIG went into an uncontrollable spin. No bail-out . . . was observed.

The flight was still in good formation and turned to engage the second MIG in the flight, which was observed by aircraft 3. This MIG escaped and the flight returned to base due to fuel.

Airman First Class Albert E. Moore, a B-52 gunner, won credit for the next MIG. A tail gunner during a bombing raid on the Thai Nguyen railroad yards on 24 December, he acquired a fast-moving bogey on his radar scope. He notified his crew to dispense chaff and flares, got target lock-on at 4,000 yards, and as the bandit closed to 2,000 yards, opened fire. He continued firing until the blip blossomed on his scope, then disappeared. His feat was witnessed by T/Sgt. Clarence W. Chute, also a gunner, who saw the MIG-21 "on fire and falling away."

U.S. strikes resumed once again on the 26th. Two days later, a MIG-21 fell prey to Maj. Harry L.

McKee and his WSO, Capt. John E. Dubler, who were on MIGCAP duty. They met a MIG-21 west of Hanoi and promptly downed it. "Red Crown called the position of a bandit heading west," said Maj. McKee:

Captain Dubler made radar contact with the bandit at 90 nautical miles range at approximately 2150 hours. Red Crown called our position as being 270° and 92 nautical miles from Bullseye at 2156.30. . . . we were in trail with the MIG and had radar contact 30° left at 11 nautical miles.

We were cleared to close by Red Crown and a full system lock-on was made at 10 nautical miles. My wingman [Capt. Kimzey W. Rhine] called 'locked on' shortly thereafter.

Both aircraft fired on my verbal command with the radar dot centered. I fired two AIM-7 missiles at 2157:20; Rhine fired one AIM-7 at the same time. Order of firing was aircraft 1, one AIM-7; then aircraft 2, one AIM-7; then aircraft 1, second AIM-7. We all observed a large fireball approximately 4 nautical miles distant at 12 o'clock at 2157:30. Missile firing was at maximum ASE

circle expansion. . . . It appeared that all three AIM-7's guided. Further, it appeared that the first missile impacted the MIG, followed immediately by impact of the missile fired by Rhine.

At missile firing our airspeed was Mach 1.05, altitude 30,500 feet, and heading 010°. Moments later I observed a fireball on the ground in the vicinity of the shoot-down. We continued to operate as a flight of two, in a MIGCAP capacity, until 2235 hours, whereupon we egressed . . .

Major McKee may have intended to have his wingmen, Captains Rhine and James W. Ogilvie in aircraft 2, share in the aerial victory. Seventh Air Force's claims evaluation board—though initially viewing this MIG kill as a joint effort—decided to credit only McKee and Dubler.

Linebacker II achieved the desired political results, and on 29 December 1972 President Nixon ended massive raids above the 20th parallel. Fighting continued south of the bomb line, and American pilots were permitted to cross the parallel in pursuit of North Vietnamese aircraft attacking B-52's and other U.S. aircraft. Such an incident took place at 0230 hours on 8 January 1973 and resulted in the destruction of a MIG-21 by Capt. Paul D. Howman and his WSO, 1st Lt. Lawrence W. Kullman, of the 432d TRW. This victory was the only USAF MIG kill in 1973 and the last of the war. "We were flying a MIGCAP in Route Package 3, 80 miles southwest of Hanoi," relates Howman:

. . . when we received a MIG warning from Red Crown at 1930Z [0230 hours, 8 January local time]. The bandit call put the MIG 240° and 14 nautical miles from Bullseye, which was approximately 65 nautical miles north-northeast of our position.

After the second bandit call at 1932Z, Red Crown vectored us 330° and called the MIG at 020° and 60 nautical miles from our position.

We continued the intercept until we were 020° and 26 nautical miles from the MIG. At this time, Red Crown gave us clearance to fire as well as a vector of 026°. During this entire time we had radar contacts on the bandit. We descended and obtained a visual contact with the MIG's afterburner at 10 nautical miles, and a full system radar lock-on at 6 nautical miles.



Crew boards B-52.

They fired two missiles. The first detonated approximately 50 to 100 feet from the MIG, but the second hit its target. The MIG burst into flames and broke into three distinct pieces.

A few days later, a Presidential order halted all bombing of North Vietnam, and on 29 January 1973, the Vietnam cease-fire went into effect.





IV

The Men: Their Units, Tools, and Tactics

Only two enemy aircraft, both MIG-17's, fell to USAF fighter aircrews during 1965, for North Vietnam had yet to commit its full MIG force in its active air defense system. With intensified MIG opposition to USAF air strikes during 1966, the number of engagements increased and the score of aerial victories rose: there were 17 confirmed enemy losses (12 MIG-17's and 5 MIG-21's) to Air Force aircrews that year. The first significant year in the air-to-air war was 1967, during which 59 enemy aircraft (42 MIG-17's and 17 MIG-21's) fell to USAF aerial combatants. Air Force aircrews began 1968 with 8 kills (5 MIG-17's and 3 MIG-21's) in the first two months, but these were the last aerial victories of the year. President Johnson restricted all aerial strikes and protective operations to regions below the 19th parallel. The North Vietnamese seldom ventured south of the bomb line.

There were no USAF aerial victories between 1968 and 1972. But the air war then moved northward again, as American strike forces raided in reprisal for increased enemy activity, and the North Vietnamese Air Force employed its aerial power to counteract the increasing threat. During this phase, which continued into the beginning of the next year when the last Air Force aerial victory was recorded,

the enemy lost 51 aircraft (8 MIG-19's and 43 MIG-21's) to USAF fighter and bomber crews.

The MIG-Killers

Of the confirmed total of 137 kills by USAF fliers, official credit was awarded to 207 individuals. Pilots of single-place F-105D aircraft earned 25 victories; two-man aircrews of F-4C, F-4D, F-4E, and F-105F aircraft earned 108. One victory credit was shared by F-105F and F-4D aircrews, and one by two F-4E's. Gunners aboard B-52D heavy bombers earned two aerial victories in the last stages of the war.

The 137 victories have been compiled and are presented here in two lists (Tables 1 and 2). The numerous claims for the destruction of enemy aircraft which were never confirmed are not included in the lists. The first presents all USAF aerial victories in chronological order; the second lists alphabetically the USAF or attached fliers who earned aerial victories. There is some duplication of information between the lists, as there is between the lists and the combat narratives presented in earlier chapters. Information has been reduced to tabular form primarily as a convenience to those who desire a quick reference or an overall picture, without wading through the discussions of each engagement.

(Left) F-105 refuels in flight.

TABLE 1.—CHRONOLOGICAL ORDER

<i>Date</i>	<i>Type Enemy Acraft</i>	<i>Type USAF Acraft</i>	<i>Primary USAF Weapon Used</i>	<i>USAF Squadron</i>	<i>Parent Unit</i>	<i>Aircrew Personnel</i>	<i>Crew Position</i>	<i>Official Credit</i>
<i>1965</i>								
10 Jul	MIG-17	F-4C	AIM-9	45 TFS	2 AD	Cpt Thomas S Roberts Cpt Ronald C Anderson	AC P	1.0 1.0
10 Jul	MIG-17	F-4C	AIM-9	45 TFS	2 AD	Cpt Kenneth E Holcombe Cpt Arthur C Clark	AC P	1.0 1.0
<i>1966</i>								
23 Apr	MIG-17	F-4C	AIM-9	555 TFS	8 TFW	Cpt Max F Cameron 1Lt Robert E Evans	AC P	1.0 1.0
23 Apr	MIG-17	F-4C	AIM-7	555 TFS	8 TFW	Cpt Robert E Blake 1Lt S W George	AC P	1.0 1.0
26 Apr	MIG-21	F-4C	AIM-9	480 TFS	35 TFW	Maj Paul J Gilmore 1Lt William T Smith	AC P	1.0 1.0
29 Apr	MIG-17	F-4C	AIM-9	555 TFS	8 TFW	Cpt William B D Dowell 1Lt Halbert E Gossard	AC P	1.0 1.0
29 Apr	MIG-17	F-4C	maneuvering	555 TFS	8 TFW	Cpt Larry R Keith 1Lt Robert A Bleakley	AC P	1.0 1.0
30 Apr	MIG-17	F-4C	AIM-9	555 TFS	8 TFW	Cpt Lawrence H Golberg 1Lt Gerald D Hardgrave	AC P	1.0 1.0
12 May	MIG-17	F-4C	AIM-9	390 TFS	35 TFW	Maj Wilbur R Dudley 1Lt Imants Kringelis	AC P	1.0 1.0
29 Jun	MIG-17	F-105D	20mm		388 TFW	Maj Fred L Tracy	P	1.0
14 Jul	MIG-21	F-4C	AIM-9	480 TFS	35 TFW	Cpt William J Swendner 1Lt Duane A Buttell Jr	AC P	1.0 1.0
14 Jul	MIG-21	F-4C	AIM-9	480 TFS	35 TFW	1Lt Ronald G Martin 1Lt Richard N Krieps	AC P	1.0 1.0
18 Aug	MIG-17	F-105D	20mm	34 TFS	388 TFW	Maj Kenneth T Blank	P	1.0
16 Sep	MIG-17	F-4C	AIM-9	555 TFS	8 TFW	1Lt Jerry W Jameson 1Lt Douglas B Rose	AC P	1.0 1.0
21 Sep	MIG-17	F-105D	20mm	421 TFS	388 TFW	1Lt Karl W Richter	P	1.0
21 Sep	MIG-17	F-105D	20mm	333 TFS	355 TFW	1Lt Fred A Wilson Jr	P	1.0

05 Nov	MIG-21	F-4C	AIM-7	480 TFS	366 TFW	Maj James E Tuck 1Lt John J Rabeni Jr	AC P	1.0 1.0
05 Nov	MIG-21	F-4C	AIM-9	480 TFS	366 TFW	1Lt Wilbur J Latham Jr 1Lt Klaus J Klause	AC P	1.0 1.0
04 Dec	MIG-17	F-105D	20mm	469 TFS	388 TFW	Maj Roy S Dickey	P	1.0
1967								
02 Jan	MIG-21	F-4C	AIM-7	555 TFS	8 TFW	1Lt Ralph F Wetterhahn 1Lt Jerry K Sharp	AC P	1.0 1.0
02 Jan	MIG-21	F-4C	AIM-9	555 TFS	8 TFW	Cpt Walter S Radeker III 1Lt James E Murray III	AC P	1.0 1.0
02 Jan	MIG-21	F-4C	AIM-9	555 TFS	8 TFW	Col Robin Olds 1Lt Charles C Clifton	AC P	1.0 1.0
02 Jan	MIG-21	F-4C	AIM-9	555 TFS	8 TFW	Cpt Everett T Raspberry Jr 1Lt Robert W Western	AC P	1.0 1.0
02 Jan	MIG-21	F-4C	AIM-7	433 TFS	8 TFW	Maj Philip P Combies 1Lt Lee R Dutton	AC P	1.0 1.0
02 Jan	MIG-21	F-4C	AIM-7	433 TFS	8 TFW	Cpt John B Stone 1Lt Clifton P Dunnegan Jr	AC P	1.0 1.0
02 Jan	MIG-21	F-4C	AIM-7	433 TFS	8 TFW	1Lt Lawrence J Glynn Jr 1Lt Lawrence E Cary	AC P	1.0 1.0
06 Jan	MIG-21	F-4C	AIM-7	555 TFS	8 TFW	Cpt Richard M Pascoe 1Lt Norman E Wells	AC P	1.0 1.0
06 Jan	MIG-21	F-4C	AIM-7	555 TFS	8 TFW	Maj Thomas M Hirsch 1Lt Roger J Strasswimmer	AC P	1.0 1.0
10 Mar	MIG-17	F-105D	20mm	354 TFS	355 TFW	Cpt Max C Brestel	P	1.0
10 Mar	MIG-17	F-105D	20mm	354 TFS	355 TFW	Cpt Max C Brestel	P	1.0
26 Mar	MIG-17	F-105D	20mm	333 TFS	355 TFW	Col Robert R Scott	P	1.0
19 Apr	MIG-17	F-105F	20mm	357 TFS	355 TFW	Maj Leo K Thorsness Cpt Harold E Johnson	P EWO	1.0 1.0
19 Apr	MIG-17	F-105D	20mm	354 TFS	355 TFW	Maj Frederick G Tolman	P	1.0
19 Apr	MIG-17	F-105D	20mm	354 TFS	355 TFW	Maj Jack W Hunt	P	1.0
19 Apr	MIG-17	F-105D	20mm	354 TFS	355 TFW	Cpt William E Eskew	P	1.0
23 Apr	MIG-21	F-4C	AIM-7	389 TFS	366 TFW	Maj Robert D Anderson Cpt Fred D Kjer	AC P	1.0 1.0
26 Apr	MIG-21	F-4C	AIM-7	389 TFS	366 TFW	Maj Rolland W Moore Jr 1Lt James F Sears	AC P	1.0 1.0

TABLE 1.—CHRONOLOGICAL ORDER—Continued

<i>Date</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Primary USAF Weapon Used</i>	<i>USAF Squadron</i>	<i>Parent Unit</i>	<i>Aircrew Personnel</i>	<i>Crew Position</i>	<i>Official Credit</i>
28 Apr	MIG-17	F-105D	20mm	357 TFS	355 TFW	Maj Harry E Higgins	P	1.0
28 Apr	MIG-17	F-105D	20mm	357 TFS	355 TFW	LtC Arthur F Dennis	P	1.0
30 Apr	MIG-17	F-105D	20mm	333 TFS	355 TFW	Cpt Thomas C Lessan	P	1.0
01 May	MIG-17	F-4C	maneuvering	390 TFS	366 TFW	Maj Robert G Dilger 1Lt Mack Thies	AC P	1.0 1.0
04 May	MIG-21	F-4C	AIM-9	555 TFS	8 TFW	Col Robin Olds 1Lt William D Lavever	AC P	1.0 1.0
12 May	MIG-17	F-105D	20mm	333 TFS	355 TFW	Cpt Jacques A Suzanne	P	1.0
13 May	MIG-17	F-105D	20mm	354 TFS	355 TFW	LtC Philip C Gast	P	1.0
13 May	MIG-17	F-105D	20mm	354 TFS	355 TFW	Cpt Charles W Couch	P	1.0
13 May	MIG-17	F-105D	AIM-9	333 TFS	355 TFW	Maj Robert G Rilling	P	1.0
13 May	MIG-17	F-105D	AIM-9	333 TFS	355 TFW	Maj Carl D Osborne	P	1.0
13 May	MIG-17	F-4C	AIM-9	433 TFS	8 TFW	Maj William L Kirk 1Lt Stephen A Wayne	AC P	1.0 1.0
13 May	MIG-17	F-4C	AIM-7	433 TFS	8 TFW	LtC Fred A Haeffner 1Lt Michael R Bever	AC P	1.0 1.0
13 May	MIG-17	F-105D	20mm	44 TFS	388 TFW	Maj Maurice E Seaver Jr	P	1.0
14 May	MIG-17	F-4C	20mm	480 TFS	366 TFW	Maj James A Hargrove Jr 1Lt Stephen H DeMuth	AC P	1.0 1.0
14 May	MIG-17	F-4C	20mm	480 TFS	366 TFW	Cpt James T Craig Jr 1Lt James T Talley	AC P	1.0 1.0
14 May	MIG-17	F-4C	AIM-7	480 TFS	366 TFW	Maj Samuel O Bakke Cpt Robert W Lambert	AC P	1.0 1.0
20 May	MIG-21	F-4C	AIM-7	389 TFS	366 TFW	LtC Robert F Titus 1Lt Milan Zimer	AC P	1.0 1.0
20 May	MIG-21	F-4C	AIM-9	389 TFS	366 TFW	Maj Robert D Janca 1Lt William E Roberts Jr	AC P	1.0 1.0
20 May	MIG-17	F-4C	AIM-9	433 TFS	8 TFW	Maj John R Pardo 1Lt Stephen A Wayne	AC P	1.0 1.0

20 May	MIG-17	F-4C	AIM-7	433 TFS	8 TFW	Col Robin Olds 1Lt Stephen B Croker	AC P	1.0 1.0
20 May	MIG-17	F-4C	AIM-9	433 TFS	8 TFW	Maj Philip P Combies 1Lt Daniel L Lafferty	AC P	1.0 1.0
20 May	MIG-17	F-4C	AIM-9	433 TFS	8 TFW	Col Robin Olds 1Lt Stephen B Croker	AC P	1.0 1.0
22 May	MIG-21	F-4C	AIM-9	389 TFS	366 TFW	LtC Robert F Titus 1Lt Milan Zimer	AC P	1.0 1.0
22 May	MIG-21	F-4C	20mm	389 TFS	366 TFW	LtC Robert F Titus 1Lt Milan Zimer	AC P	1.0 1.0
03 Jun	MIG-17	F-105D	AIM-9/20mm	469 TFS	388 TFW	Cpt Larry D Wiggins	P	1.0
03 Jun	MIG-17	F-105D	20mm	13 TFS	388 TFW	Maj Ralph L Kuster Jr	P	1.0
05 Jun	MIG-17	F-4D	AIM-7	555 TFS	8 TFW	Maj Everett T Raspberry Jr Cpt Francis M Gullick	AC P	1.0 1.0
05 Jun	MIG-17	F-4C	20mm	480 TFS	366 TFW	Maj Durwood K Priester Cpt John E Pankhurst	AC P	1.0 1.0
05 Jun	MIG-17	F-4C	AIM-9	555 TFS	8 TFW	Cpt Richard M Pascoe Cpt Norman E Wells	AC P	1.0 1.0
23 Aug	MIG-17	F-105D	20mm	34 TFS	388 TFW	1Lt David B Waldrop III	P	1.0
18 Oct	MIG-17	F-105D	20mm	333 TFS	355 TFW	Maj Donald M Russell	P	1.0
24 Oct	MIG-21	F-4D	20mm	433 TFS	8 TFW	Maj William L Kirk 1Lt Theodore R Bongartz	AC P	1.0 1.0
26 Oct	MIG-17	F-4D	AIM-7	555 TFS	8 TFW	Cpt John D Logeman Jr 1Lt Frederick E McCoy II	AC P	1.0 1.0
26 Oct	MIG-17	F-4D	AIM-7	555 TFS	8 TFW	Cpt William S Gordon III 1Lt James H Monsees	AC P	1.0 1.0
26 Oct	MIG-17	F-4D	AIM-4	555 TFS	8 TFW	Cpt Larry D Cobb Cpt Alan A Lavoy	AC P	1.0 1.0
27 Oct	MIG-17	F-105D	20mm	354 TFS	355 TFW	Cpt Gene I Basel	P	1.0
06 Nov	MIG-17	F-4D	20mm	435 TFS	8 TFW	Cpt Darrell D Simmonds 1Lt George H McKinney Jr	AC P	1.0 1.0
06 Nov	MIG-17	F-4D	20mm	435 TFS	8 TFW	Cpt Darrell D Simmonds 1Lt George H McKinney Jr	AC P	1.0 1.0
17 Dec	MIG-17	F-4D	AIM-4	13 TFS	432 TRW	Cpt Doyle D Baker (USMC) 1Lt John D Ryan Jr	AC P	1.0 1.0

TABLE 1.—CHRONOLOGICAL ORDER—Continued

<i>Date</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Primary USAF Weapon Used</i>	<i>USAF Squadron</i>	<i>Parent Unit</i>	<i>Aircrew Personnel</i>	<i>Crew Position</i>	<i>Official Credit</i>
19 Dec	MIG-17	F-4D	20mm	435 TFS	8 TFW	Maj Joseph D Moore	AC	0.5
		F-105F	20mm	333 TFS	355 TFW	1Lt George H McKinney Jr	P	0.5
						Maj William M Dalton	P	0.5
						Maj James L Graham	EWO	0.5
19 Dec	MIG-17	F-105F	20mm	357 TFS	355 TFW	Cpt Philip M Drew	P	1.0
						Maj William H Wheeler	EWO	1.0
1968								
03 Jan	MIG-17	F-4D	AIM-4	435 TFS	8 TFW	LtC Clayton K Squier	AC	1.0
						1Lt Michael D Mukdoon	P	1.0
03 Jan	MIG-17	F-4D	20mm	433 TFS	8 TFW	Maj Bernard J Bogoslofski	AC	1.0
						Cpt Richard L Huskey	P	1.0
18 Jan	MIG-17	F-4D	AIM-4	435 TFS	8 TFW	Maj Kenneth A Simonet	AC	1.0
						1Lt Wayne O Smith	P	1.0
05 Feb	MIG-21	F-4D	AIM-4	13 TFS	432 TRW	Cpt Robert G Hill	AC	1.0
						1Lt Bruce V Huneke	P	1.0
06 Feb	MIG-21	F-4D	AIM-7	433 TFS	8 TFW	Cpt Robert H Boles	AC	1.0
						1Lt Robert B Battista	P	1.0
12 Feb	MIG-21	F-4D	AIM-7	435 TFS	8 TFW	LtC Alfred E Lang Jr	AC	1.0
						1Lt Randy P Moss	P	1.0
14 Feb	MIG-17	F-4D	20mm	555 TFS	8 TFW	Maj Rex D Howerton	AC	1.0
						1Lt Ted L Voigt II	P	1.0
14 Feb	MIG-17	F-4D	AIM-7	435 TFS	8 TFW	Col David O Williams Jr	AC	1.0
						1Lt James P Feighny Jr	P	1.0
1972								
21 Feb	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Maj Robert A Lodge	AC	1.0
						1Lt Roger C Locher	WSO	1.0
01 Mar	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	LtC Joseph W Kittinger Jr	AC	1.0
						1Lt Leigh A Hodgdon	WSO	1.0
30 Mar	MIG-21	F-4D	AIM-7	13 TFS	432 TRW	Cpt Frederick S Olmsted Jr	AC	1.0
						Cpt Gerald R Volloy	WSO	1.0
16 Apr	MIG-21	F-4D	AIM-7	13 TFS	432 TRW	Cpt Frederick S Olmsted Jr	AC	1.0
						Cpt Stuart W Maas	WSO	1.0

16 Apr	MIG-21	F-4D	AIM-7	13 TFS	432 TRW	Maj Edward D Cherry Cpt Jeffrey S Feinstein	AC WSO	1.0 1.0
16 Apr	MIG-21	F-4D	AIM-7	523 TFS	432 TRW	Cpt James C Null Cpt Michael D Vahue	AC WSO	1.0 1.0
08 May	MIG-19	F-4D	AIM-7	13 TFS	432 TRW	Maj Barton P Crews Cpt Keith W Jones Jr	AC WSO	1.0 1.0
08 May	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Maj Robert A Lodge Cpt Roger C Locher	AC WSO	1.0 1.0
10 May	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Maj Robert A Lodge Cpt Roger C Locher	AC WSO	1.0 1.0
10 May	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	1Lt John D Markle Cpt Stephen D Eaves	AC WSO	1.0 1.0
10 May	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Cpt Richard S Ritchie Cpt Charles B DeBellevue	AC WSO	1.0 1.0
11 May	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Cpt Stephen E Nichols 1Lt James R Bell	AC WSO	1.0 1.0
12 May	MIG-19	F-4D	AIM-7	555 TFS	432 TRW	LtC Wayne T Frye LtC James P Cooney	AC WSO	1.0 1.0
23 May	MIG-19	F-4E	AIM-7	35 TFS	366 TFW	LtC Lyle L Beckers Cpt John F Huwe	AC WSO	1.0 1.0
23 May	MIG-21	F-4E	20mm	35 TFS	366 TFW	Cpt James M Beatty Jr 1Lt James M Sumner	AC WSO	1.0 1.0
31 May	MIG-21	F-4E	AIM-9	13 TFS	432 TRW	Cpt Bruce G Leonard Jr Cpt Jeffrey S Feinstein	AC WSO	1.0 1.0
31 May	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Cpt Richard S Ritchie Cpt Lawrence H Pettit	AC WSO	1.0 1.0
02 Jun	MIG-19	F-4E	20mm	58 TFS	432 TRW	Maj Philip W Handley 1Lt John J Smallwood	AC WSO	1.0 1.0
21 Jun	MIG-21	F-4E	AIM-9	469 TFS	388 TFW	LtC Von R Christiansen Maj Kaye M Harden	AC WSO	1.0 1.0
08 Jul	MIG-21	F-4E	AIM-7	4 TFS	366 TFW	Cpt Richard F Hardy Cpt Paul T Lewinski	AC WSO	1.0 1.0
08 Jul	MIG-21	F-4E	AIM-7	555 TFS	432 TRW	Cpt Richard S Ritchie Cpt Charles B DeBellevue	AC WSO	1.0 1.0
08 Jul	MIG-21	F-4E	AIM-7	555 TFS	432 TRW	Cpt Richard S Ritchie Cpt Charles B DeBellevue	AC WSO	1.0 1.0

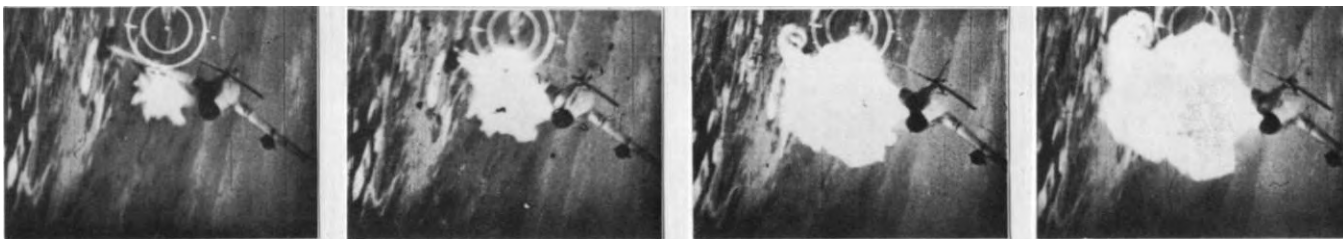
TABLE 1.—CHRONOLOGICAL ORDER—Continued

<i>Date</i>	<i>Type Enemy Acraft</i>	<i>Type USAF Acraft</i>	<i>Primary USAF Weapon Used</i>	<i>USAF Squadron</i>	<i>Parent Unit</i>	<i>Aircraft Personnel</i>	<i>Crew Position</i>	<i>Official Credit</i>
18 Jul	MIG-21	F-4D	AIM-9	13 TFS	432 TRW	LtC Carl G Baily Cpt Jeffrey S Feinstein	AC WSO	1.0 1.0
29 Jul	MIG-21	F-4D	AIM-7	13 TFS	432 TRW	LtC Carl G Baily Cpt Jeffrey S Feinstein	AC WSO	1.0 1.0
29 Jul	MIG-21	F-4E	AIM-7	4 TFS	366 TFW	LtC Gene E Taft Cpt Stanley M Imaye	AC WSO	1.0 1.0
12 Aug	MIG-21	F-4E	AIM-7	58 TFS	432 TRW	Cpt Lawrence G Richard (USMC) LtCdr Michael J Ettel (USN)	AC WSO	1.0 1.0
15 Aug	MIG-21	F-4E	AIM-7	336 TFS	8 TFW	Cpt Fred W Sheffler Cpt Mark A Massen	AC WSO	1.0 1.0
19 Aug	MIG-21	F-4E	AIM-7	4 TFS	366 TFW	Cpt Sammy C White 1Lt Frank J Bettine	AC WSO	1.0 1.0
28 Aug	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Cpt Richard S Ritchie Cpt Charles B DeBellevue	AC WSO	1.0 1.0
02 Sep	MIG-19	F-4E	AIM-7	34 TFS 35 TFS	388 TFW 388 TFW	Maj Jon I Lucas 1Lt Douglas G Malloy	AC WSO	1.0 1.0
09 Sep	MIG-21	F-4D	20mm	555 TFS	432 TRW	Cpt Calvin B Tibbett 1Lt William S Hargrove	AC WSO	1.0 1.0
09 Sep	MIG-19	F-4D	AIM-9	555 TFS	432 TRW	Cpt John A Madden Jr Cpt Charles B DeBellevue	AC WSO	1.0 1.0
09 Sep	MIG-19	F-4D	AIM-9	555 TFS	432 TRW	Cpt John A Madden Jr Cpt Charles B DeBellevue	AC WSO	1.0 1.0
12 Sep	MIG-21	F-4E	AIM-9/20mm	35 TFS	388 TFW	LtC Lyle L Beckers 1Lt Thomas M Griffin	AC WSO	1.0 1.0
12 Sep	MIG-21	F-4E	20mm	35 TFS	388 TFW	Maj Gary L Retterbush 1Lt Daniel L Autrey	AC WSO	1.0 1.0
12 Sep	MIG-21	F-4D	AIM-9	469 TFS	388 TFW	Cpt Michael J Mahaffey 1Lt George I Shields	AC WSO	1.0 1.0
16 Sep	MIG-21	F-4E	AIM-9	555 TFS	432 TRW	Cpt Calvin B Tibbett 1Lt William S Hargrove	AC WSO	1.0 1.0
05 Oct	MIG-21	F-4E	AIM-7	34 TFS	388 TFW	Cpt Richard E Coe 1Lt Omri K Webb III	AC WSO	1.0 1.0

06 Oct	MIG-19	F-4E	maneuvering	34 TFS	388 TFW	Maj Gordon L Clouser	AC	0.5
		F-4E	maneuvering	34 TFS	388 TFW	1Lt Cecil H Brunson	WSO	0.5
						Cpt Charles D Barton	AC	0.5
						1Lt George D Watson	WSO	0.5
08 Oct	MIG-21	F-4E	20mm	35 TFS	388 TFW	Maj Gary L Retterbush	AC	1.0
						Cpt Robert H Jaspersen	WSO	1.0
12 Oct	MIG-21	F-4D	maneuvering	555 TFS	432 TRW	Cpt John A Madden Jr	AC	1.0
						Cpt Lawrence H Pettit	WSO	1.0
13 Oct	MIG-21	F-4D	AIM-7	13 TFS	432 TRW	LtC Curtis D Westphal	AC	1.0
						Cpt Jeffrey S Feinstein	WSO	1.0
15 Oct	MIG-21	F-4E	AIM-9	34 TFS	388 TFW	Maj Robert L Holtz	AC	1.0
						1Lt William C Diehl	WSO	1.0
15 Oct	MIG-21	F-4E	20mm	307 TFS	432 TRW	Cpt Gary M Rubus	AC	1.0
						Cpt James L Hendrickson	WSO	1.0
15 Oct	MIG-21	F-4D	AIM-9	523 TFS	432 TRW	Maj Ivy J McCoy Jr	AC	1.0
						Maj Frederick W Brown	WSO	1.0
18 Dec	MIG-21	B-52D	.50 cal		307 SW	SSgt Samuel O Turner	G	1.0
22 Dec	MIG-21	F-4D	maneuvering	555 TFS	432 TRW	Cpt Gary L Sholders	AC	1.0
						1Lt Eldon D Binkley	WSO	1.0
22 Dec	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	LtC James E Brunson	AC	1.0
						Maj Ralph S Pickett	WSO	1.0
24 Dec	MIG-21	B-52D	.50 cal		307 SW	A1C Albert E Moore	G	1.0
28 Dec	MIG-21	F-4D	AIM-7	555 TFS	432 TRW	Maj Harry L McKee Jr	AC	1.0
						Cpt John E Dubler	WSO	1.0
1973								
08 Jan	MIG-21	F-4D	AIM-7	4 TFS	432 TRW	Cpt Paul D Howman	AC	1.0
						1Lt Lawrence W Kullman	WSO	1.0



Last Thuds in Vietnam, a photo taken by Maj. Don Kutyna of his "Polish Glider."



A MIG kill recorded on camera.

TABLE 2.—ALPHABETICAL ORDER

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Anderson, Robert D, Maj AC, Tulsa, Oklahoma	389 TFS	366 TFW	23 Apr 67	1.0	MIG-21	F-4C	Chicago 03	AIM-7
Anderson, Ronald C, Cpt P, Fairbanks, Alaska	45 TFS	2 AD	10 Jul 65	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Autrey, Daniel L, 1Lt WSO, Hialeah, Florida	35 TFS	388 TFW	12 Sep 72	1.0	MIG-21	F-4E	Finch 03	20mm
Baily, Carl G, LtC AC, Denver, Colorado	13 TFS	432 TRW	18 Jul 72 29 Jul 72	1.0 1.0	MIG-21 MIG-21	F-4D F-4D	Snug 01 Cadillac 01	AIM-9 AIM-7
Baker, Doyle D, Cpt (USMC) AC	13 TFS	432 TRW	17 Dec 67	1.0	MIG-17	F-4D	Gambit 03	AIM-4
Bakke, Samuel O, Maj AC, Fort Morgan, Colorado	480 TFS	366 TFW	14 May 67	1.0	MIG-17	F-4C	Elgin 01	AIM-7
Barton, Charles D, Cpt AC, Greenville, SC	34 TFS	388 TFW	06 Oct 72	0.5	MIG-19	F-4E	Eagle 04	Maneuvering
Basel, Gene I, Cpt P, Lakeside, California	354 TFS	355 TFW	27 Oct 67	1.0	MIG-17	F-105D	Bison 02	20mm
Battista, Robert B, 1Lt P, Montgomery, Alabama	433 TFS	8 TFW	06 Feb 68	1.0	MIG-21	F-4D	Buick 04	AIM-7
Beatty, James M Jr, Cpt AC, Eau Claire, Pa.	35 TFS	366 TFW	23 May 72	1.0	MIG-21	F-4E	Balter 03	20mm
Beckers, Lyle L, LtC AC, Gregory, SD	35 TFS 35 TFS	366 TFW 388 TFW	23 May 72 12 Sep 72	1.0 1.0	MIG-19 MIG-21	F-4E F-4E	Balter 01 Finch 01	AIM-7 AIM-9/20mm
Bell, James R, 1Lt WSO, Springfield, Ohio	555 TFS	432 TRW	11 May 72	1.0	MIG-21	F-4D	Gopher 02	AIM-7
Bettine, Frank J, 1Lt WSO, Hartshorne, Oklahoma	4 TFS	366 TFW	19 Aug 72	1.0	MIG-21	F-4E	Pistol 03	AIM-7
Bever, Michael R, 1Lt P, Kansas City, Missouri	433 TFS	8 TFW	13 May 67	1.0	MIG-17	F-4C	Harpoon 03	AIM-7
Binkley, Eldon D, 1Lt WSO, Winston-Salem, NC	555 TFS	432 TRW	22 Dec 72	1.0	MIG-21	F-4D	Bucket 01	Maneuvering
Blake, Robert E, Cpt AC, Presque Isle, Maine	555 TFS	8 TFW	23 Apr 66	1.0	MIG-17	F-4C	Unknown 04	AIM-7

TABLE 2.—ALPHABETICAL ORDER (cont'd)

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Blank, Kenneth T, Maj P, Franklin, Nebraska	34 TFS	388 TFW	18 Aug 66	1.0	MIG-17	F-105D	Honda 02	20mm
Bleakley, Robert A, 1Lt P, Cedar Rapids, Iowa	555 TFS	8 TFW	29 Apr 66	1.0	MIG-17	F-4C	Unknown 01	Maneuvering
Bogoslofski, Bernard J, Maj AC, Granby, Connecticut	433 TFS	8 TFW	03 Jan 68	1.0	MIG-17	F-4D	Tampa 01	20mm
Boles, Robert H, Cpt AC, Lexington, SC	433 TFS	8 TFW	06 Feb 68	1.0	MIG-21	F-4D	Buick 04	AIM-7
Bongartz, Theodore R, 1Lt P, Catonsville, Maryland	433 TFS	8 TFW	24 Oct 67	1.0	MIG-21	F-4D	Buick 01	20mm
Brestel, Max C, Cpt P, Chappell, Nebraska	354 TFS	355 TFW	10 Mar 67 10 Mar 67	1.0 1.0	MIG-17 MIG-17	F-105D F-105D	Kangaroo 03 Kangaroo 03	20mm 20mm
Brown, Frederick W, Maj WSO, Grand View, Wash.	523 TFS	432 TRW	15 Oct 72	1.0	MIG-21	F-4D	Chevy 01	AIM-9
Brunson, Cecil H, 1Lt WSO, Memphis, Tennessee	34 TFS	388 TFW	06 Oct 72	0.5	MIG-19	F-4E	Eagle 03	Maneuvering
Brunson, James E, LtC AC, Eddyville, Kentucky	555 TFS	432 TRW	22 Dec 72	1.0	MIG-21	F-4D	Buick 01	AIM-7
Buttell, Duane A Jr, 1Lt P, Chillicothe, Illinois	480 TFS	35 TFW	14 Jul 66	1.0	MIG-21	F-4C	Unknown 01	AIM-9
Cameron, Max F, Cpt AC, Stanford, NC	555 TFS	8 TFW	23 Apr 66	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Cary, Lawrence E, 1Lt P, Pawnee City, Nebraska	433 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Rambler 02	AIM-7
Cherry, Edward D, Maj AC, Marietta, Georgia	13 TFS	432 TRW	16 Apr 72	1.0	MIG-21	F-4D	Basco 03	AIM-7
Christiansen, Von R, LtC AC, Seattle, Washington	469 TFS	388 TFW	21 Jun 72	1.0	MIG-21	F-4E	Iceman 03	AIM-9
Clark, Arthur C, Cpt P, McAllen, Texas	45 TFS	2 AD	10 Jul 65	1.0	MIG-17	F-4C	Unknown 03	AIM-9
Clifton, Charles C, 1Lt P, Fort Wayne, Indiana	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Olds 01	AIM-9

Clouser, Gordon L, Maj AC, Norman, Oklahoma	34 TFS	388 TFW	06 Oct 72	0.5	MIG-19	F-4E	Eagle 03	Maneuvering
Cobb, Larry D, Cpt AC, Lambert, Missouri	555 TFS	8 TFW	26 Oct 67	1.0	MIG-17	F-4D	Ford 04	AIM-4
Coe, Richard E, Cpt AC, East Orange, NJ	34 TFS	388 TFW	05 Oct 72	1.0	MIG-21	F-4E	Robin 01	AIM-7
Combies, Philip P, Maj AC, Norwich, Connecticut	433 TFS	8 TFW	02 Jan 67 20 May 67	1.0 1.0	MIG-21 MIG-17	F-4C F-4C	Rambler 04 Ballot 01	AIM-7 AIM-9
Cooney, James P, LtC WSO, Newburgh, New York	555 TFS	432 TRW	12 May 72	1.0	MIG-19	F-4D	Harlow 02	AIM-7
Couch, Charles W, Cpt P, Caseyville, Illinois	354 TFS	355 TFW	13 May 67	1.0	MIG-17	F-105D	Chevrolet 03	20mm
Craig, James T Jr, Cpt AC, Abilene, Texas	480 TFS	366 TFW	14 May 67	1.0	MIG-17	F-4C	Speedo 03	20mm
Crews, Barton P, Maj AC, Fort Lauderdale, Fla.	13 TFS	432 TRW	08 May 72	1.0	MIG-19	F-4D	Galore 03	AIM-7
Croker, Stephen B, 1Lt P, Middletown, Delaware	433 TFS	8 TFW	20 May 67 20 May 67	1.0 1.0	MIG-17 MIG-17	F-4C F-4C	Tampa 01 Tampa 01	AIM-7 AIM-9
Dalton, William M, Maj P, Stephens City, Virginia	333 TFS	355 TFW	19 Dec 67	0.5	MIG-17	F-105F	Otter 02	20mm
DeBellevue, Charles B, Cpt WSO, Lafayette, Louisiana	555 TFS	432 TRW	10 May 72 08 Jul 72 08 Jul 72 28 Aug 72 09 Sep 72 09 Sep 72	1.0 1.0 1.0 1.0 1.0 1.0	MIG-21 MIG-21 MIG-21 MIG-21 MIG-19 MIG-19	F-4D F-4E F-4E F-4D F-4D F-4D	Oyster 03 Paula 01 Paula 01 Buick 01 Olds 01 Olds 01	AIM-7 AIM-7 AIM-7 AIM-7 AIM-9 AIM-9
DeMuth, Stephen H, 1Lt P, Medina, Ohio	480 TFS	366 TFW	14 May 67	1.0	MIG-17	F-4C	Speedo 01	20mm
Dennis, Arthur F, LtC P, Sherman, Texas	357 TFS	355 TFW	28 Apr 67	1.0	MIG-17	F-105D	Atlanta 01	20mm
Dickey, Roy S, Maj P, Ashland, Kansas	469 TFS	388 TFW	04 Dec 66	1.0	MIG-17	F-105D	Eglin 04	20mm
Diehl, William C, 1Lt WSO, Tampa, Florida	34 TFS	388 TFW	15 Oct 72	1.0	MIG-21	F-4E	Parrot 03	AIM-9
Dilger, Robert G, Maj AC, Tampa, Florida	390 TFS	366 TFW	01 May 67	1.0	MIG-17	F-4C	Stinger 01	Maneuvering
Dowell, William B D, Cpt AC, Tampa, Florida	555 TFS	8 TFW	29 Apr 66	1.0	MIG-17	F-4C	Unknown 03	AIM-9

TABLE 2.—ALPHABETICAL ORDER (cont'd)

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Drew, Philip M, Cpt P, Alexandria, Louisiana	357 TFS	355 TFW	19 Dec 67	1.0	MIG-17	F-105F	Otter 03	20mm
Dubler, John E, Cpt WSO, Omaha, Nebraska	555 TFS	432 TRW	28 Dec 72	1.0	MIG-21	F-4D	List 01	AIM-7
Dudley, Wilbur R, Maj AC, Alamogordo, NM	390 TFS	35 TFW	12 May 66	1.0	MIG-17	F-4C	Unknown 03	AIM-9
Dunnegan, Clifton P Jr, 1Lt P, Winston-Salem, NC	433 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Rambler 01	AIM-7
Dutton, Lee R, 1Lt P, Wyoming, Illinois	433 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Rambler 04	AIM-7
Eaves, Stephen D, Cpt WSO, Honolulu, Hawaii	555 TFS	432 TRW	10 May 72	1.0	MIG-21	F-4D	Oyster 02	AIM-7
Eskew, William E, Cpt P, Boonville, Indiana	354 TFS	355 TFW	19 Apr 67	1.0	MIG-17	F-105D	Panda 01	20mm
Ettel, Michael J, LtCdr (USN) WSO, St Paul, Minn.	58 TFS	432 TRW	12 Aug 72	1.0	MIG-21	F-4E	Dodge 01	AIM-7
Evans, Robert E, 1Lt P, Haina, Hawaii	555 TFS	8 TFW	23 Apr 66	1.0	MIG-17	F-4C	Unknown 03	AIM-9
Feighny, James P Jr, 1Lt P, Laramie, Wyoming	435 TFS	8 TFW	14 Feb 68	1.0	MIG-17	F-4D	Killer 01	AIM-7
Feinstein, Jeffrey S, Cpt WSO, East Troy, Wisconsin	13 TFS	432 TRW	16 Apr 72	1.0	MIG-21	F-4D	Basco 03	AIM-7
			31 May 72	1.0	MIG-21	F-4E	Gopher 03	AIM-9
			18 Jul 72	1.0	MIG-21	F-4D	Snug 01	AIM-9
			29 Jul 72	1.0	MIG-21	F-4D	Cadillac 01	AIM-7
			13 Oct 72	1.0	MIG-21	F-4D	Olds 01	AIM-7
Frye, Wayne T, LtC AC, Maysville, Kentucky	555 TFS	432 TRW	12 May 72	1.0	MIG-19	F-4D	Harlow 02	AIM-7
Gast, Philip C, LtC P, Ewing, Missouri	354 TFS	355 TFW	13 May 67	1.0	MIG-17	F-105D	Chevrolet 01	20mm
George, S W, 1Lt P, Canadian, Oklahoma	555 TFS	8 TFW	23 Apr 66	1.0	MIG-17	F-4C	Unknown 04	AIM-7
Gilmore, Paul J, Maj AC, Alamogordo, NM	480 TFS	35 TFW	26 Apr 66	1.0	MIG-21	F-4C	Unknown 01	AIM-9

Glynn, Lawrence J Jr, 1Lt AC, Arlington, Massachusetts	433 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Rambler 02	AIM-7
Golberg, Lawrence H, Cpt AC, Duluth, Minnesota	555 TFS	8 TFW	30 Apr 66	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Gordon, William S III, Cpt AC, Wethersfield, Conn.	555 TFS	8 TFW	26 Oct 67	1.0	MIG-17	F-4D	Ford 03	AIM-7
Gossard, Halbert E, 1Lt P, Oklahoma City, Oklahoma	555 TFS	8 TFW	29 Apr 66	1.0	MIG-17	F-4C	Unknown 03	AIM-9
Graham, James L, Maj EWO, Lancaster, Pennsylvania	333 TFS	355 TFW	19 Dec 67	0.5	MIG-17	F-105F	Otter 02	20mm
Griffin, Thomas M, 1Lt WSO, New Orleans, Louisiana	35 TFS	388 TFW	12 Sep 72	1.0	MIG-21	F-4E	Finch 01	AIM-9/20mm
Gullick, Francis M, Cpt P, Albuquerque, New Mexico	555 TFS	8 TFW	05 Jun 67	1.0	MIG-17	F-4D	Drill 01	AIM-7
Haeffner, Fred A, LtC AC, Fargo, North Dakota	433 TFS	8 TFW	13 May 67	1.0	MIG-17	F-4C	Harpoon 03	AIM-7
Handley, Philip W, Maj AC, Wellington, Texas	58 TFS	432 TRW	02 Jun 72	1.0	MIG-19	F-4E	Brenda 01	20mm
Harden, Kaye M, Maj WSO, Jacksonville, Florida	469 TFS	388 TFW	21 Jun 72	1.0	MIG-21	F-4E	Iceman 03	AIM-9
Hardgrave, Gerald D, 1Lt P, Jackson, Tennessee	555 TFS	8 TFW	30 Apr 66	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Hardy, Richard F, Cpt AC, Chicago, Illinois	4 TFS	366 TFW	08 Jul 72	1.0	MIG-21	F-4E	Brenda 03	AIM-7
Hargrove, James A Jr, Maj AC, Garden City Beach, SC	480 TFS	366 TFW	14 May 67	1.0	MIG-17	F-4C	Speedo 01	20mm
Hargrove, William S, 1Lt WSO, Harlingen, Texas	555 TFS	432 TRW	09 Sep 72 16 Sep 72	1.0 1.0	MIG-21 MIG-21	F-4D F-4E	Olds 03 Chevy 03	20mm AIM-9
Hendrickson, James L, Cpt WSO, Columbus, Ohio	307 TFS	432 TRW	15 Oct 72	1.0	MIG-21	F-4E	Buick 03	20mm
Higgins, Harry E, Maj P, Alexandria, Indiana	357 TFS	355 TFW	28 Apr 67	1.0	MIG-17	F-105D	Spitfire 01	20mm
Hill, Robert G, Cpt AC, Tucson, Arizona	13 TFS	432 TRW	05 Feb 68	1.0	MIG-21	F-4D	Gambit 03	AIM-4
Hirsch, Thomas M, Maj AC, Rockford, Illinois	555 TFS	8 TFW	06 Jan 67	1.0	MIG-21	F-4C	Crab 02	AIM-7

TABLE 2.—ALPHABETICAL ORDER (cont'd)

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Hodgdon, Leigh A, 1Lt WSO, Kingsport, Pennsylvania	555 TFS	432 TRW	01 Mar 72	1.0	MIG-21	F-4D	Falcon 54	AIM-7
Holcombe, Kenneth E, Cpt AC, Detroit, Michigan	45 TFS	2 AD	10 Jun 65	1.0	MIG-17	F-4C	Unknown 03	AIM-9
Holtz, Robert L, Maj AC, Milwaukee, Wisconsin	34 TFS	388 TFW	15 Oct 72	1.0	MIG-21	F-4E	Parrot 03	AIM-9
Howerton, Rex D, Maj AC, Oklahoma City, Oklahoma	555 TFS	8 TFW	14 Feb 68	1.0	MIG-17	F-4D	Nash 03	20mm
Howman, Paul D, Cpt AC, Wooster, Ohio	4 TFS	432 TRW	08 Jan 73	1.0	MIG-21	F-4D	Crafty 01	AIM-7
Huncke, Bruce V, 1Lt P, Hanford, California	13 TFS	432 TRW	05 Feb 68	1.0	MIG-21	F-4D	Gambit 03	AIM-4
Hunt, Jack W, Maj P, Freeport, Texas	354 TFS	355 TFW	19 Apr 67	1.0	MIG-17	F-105D	Nitro 01	20mm
Huskey, Richard L, Cpt P, Cleveland, Tennessee	433 TFS	8 TFW	03 Jan 68	1.0	MIG-17	F-4D	Tampa 01	20mm
Huwe, John F, Cpt WSO, Dell Rapids, SD	35 TFS	366 TFW	23 May 72	1.0	MIG-19	F-4E	Balter 01	AIM-7
Imaye, Stanley M, Cpt WSO, Honolulu, Hawaii	4 TFS	366 TFW	29 Jul 72	1.0	MIG-21	F-4E	Pistol 01	AIM-7
Jameson, Jerry W, 1Lt AC, Middletown, Indiana	555 TFS	8 TFW	16 Sep 66	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Janca, Robert D, Maj AC, Hampton, Virginia	389 TFS	366 TFW	20 May 67	1.0	MIG-21	F-4C	Elgin 01	AIM-9
Jasperson, Robert H, Cpt WSO, Minneapolis, Minn.	35 TFS	388 TFW	08 Oct 72	1.0	MIG-21	F-4E	Lark 01	20mm
Johnson, Harold E, Cpt EWO, Blakeburg, Iowa	357 TFS	355 TFW	19 Apr 67	1.0	MIG-17	F-105F	Kingfish 01	20mm
Jones, Keith W Jr, Cpt WSO, Flen Ellyn, Illinois	13 TFS	432 TRW	08 May 72	1.0	MIG-19	F-4D	Galore 03	AIM-7
Keith, Larry R, Cpt AC, Peoria, Illinois	555 TFS	8 TFW	29 Apr 66	1.0	MIG-17	F-4C	Unknown 01	Maneuvering

Kirk, William L, Maj AC, Rayville, Louisiana	433 TFS	8 TFW	13 May 67 24 Oct 67	1.0 1.0	MIG-17 MIG-21	F-4C F-4D	Harpoon 01 Buick 01	AIM-9 20mm
Kittinger, Joseph W Jr, LtC AC, Orlando, Florida	555 TFS	432 TRW	01 Mar 72	1.0	MIG-21	F-4D	Falcon 54	AIM-7
Kjer, Fred D, Cpt P, Allen, Nebraska	389 TFS	366 TFW	23 Apr 67	1.0	MIG-21	F-4C	Chicago 03	AIM-7
Klaue, Klaus J, 1Lt P, Franklin, Pennsylvania	480 TFS	366 TFW	05 Nov 66	1.0	MIG-21	F-4C	Opal 02	AIM-9
Krieps, Richard N, 1Lt P, Chesterton, Indiana	480 TFS	35 TFW	14 Jul 66	1.0	MIG-21	F-4C	Unknown 02	AIM-9
Kringelis, Imants, 1Lt P, Lake Zurich, Illinois	390 TFS	35 TFW	12 May 66	1.0	MIG-17	F-4C	Unknown 03	AIM-9
Kullman, Lawrence W, 1Lt WSO, Hartley, Delaware	4 TFS	432 TRW	08 Jan 73	1.0	MIG-21	F-4D	Crafty 01	AIM-7
Kuster, Ralph L Jr, Maj P, St. Louis, Missouri	13 TFS	388 TFW	03 Jun 67	1.0	MIG-17	F-105D	Hambone 02	20mm
Lafever, William D, 1Lt P, Losantville, Indiana	555 TFS	8 TFW	04 May 67	1.0	MIG-21	F-4C	Flamingo 01	AIM-9
Lafferty, Daniel L, 1Lt P, Eddyville, Illinois	433 TFS	8 TFW	20 May 67	1.0	MIG-17	F-4C	Ballot 01	AIM-9
Lambert, Robert W, Cpt P, Virginia Beach, Virginia	480 TFS	366 TFW	14 May 67	1.0	MIG-17	F-4C	Elgin 01	AIM-7
Lang, Alfred E Jr, LtC AC, East Orange, NJ	435 TFS	8 TFW	12 Feb 68	1.0	MIG-21	F-4D	Buick 01	AIM-7
Latham, Wilbur J Jr, 1Lt AC, Eagle Grove, Iowa	480 TFS	366 TFW	05 Nov 66	1.0	MIG-21	F-4C	Opal 02	AIM-9
Lavoy, Alan A, Cpt P, Norwalk, Connecticut	555 TFS	8 TFW	26 Oct 67	1.0	MIG-17	F-4D	Ford 04	AIM-4
Leonard, Bruce G Jr, Cpt AC, Greensboro, NC	13 TFS	432 TRW	31 May 72	1.0	MIG-21	F-4E	Gopher 03	AIM-9
Lesan, Thomas C, Cpt P, Lebanon, Ohio	333 TFS	355 TFW	30 Apr 67	1.0	MIG-17	F-105D	Rattler 01	20mm
Lewinski, Paul T, Cpt WSO, Schenectady, New York	4 TFS	366 TFW	08 Jul 72	1.0	MIG-21	F-4E	Brenda 03	AIM-7
Locher, Roger C, 1Lt/Cpt WSO, Sabetha, Kansas	555 TFS	432 TRW	21 Feb 72 08 May 72 10 May 72	1.0 1.0 1.0	MIG-21 MIG-21 MIG-21	F-4D F-4D F-4D	Falcon 62 Oyster 01 Oyster 01	AIM-7 AIM-7 AIM-7

TABLE 2.—ALPHABETICAL ORDER (cont'd)

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Lodge, Robert A, Maj AC, Columbus, Ohio	555 TFS	432 TRW	21 Feb 72	1.0	MIG-21	F-4D	Falcon 62	AIM-7
			08 May 72	1.0	MIG-21	F-4D	Oyster 01	AIM-7
			10 May 72	1.0	MIG-21	F-4D	Oyster 01	AIM-7
Logeman, John D Jr, Cpt AC, Fond Du Lac, Wisconsin	555 TFS	8 TFW	26 Oct 67	1.0	MIG-17	F-4D	Ford 01	AIM-7
Lucas, Jon I, Maj AC, Steubenville, Ohio	34 TFS	388 TFW	02 Sep 72	1.0	MIG-19	F-4E	Eagle 03	AIM-7
Maas, Stuart W, Cpt WSO, Williamsburg, Ohio	13 TFS	432 TRW	16 Apr 72	1.0	MIG-21	F-4D	Basco 01	AIM-7
Madden, John A, Jr, Cpt AC, Jackson, Mississippi	555 TFS	432 TRW	09 Sep 72	1.0	MIG-19	F-4D	Olds 01	AIM-9
			09 Sep 72	1.0	MIG-19	F-4D	Olds 01	AIM-9
			12 Oct 72	1.0	MIG-21	F-4D	Vega 01	Maneuvering
Mahaffey, Michael J, Cpt AC, Patterson, California	469 TFS	388 TFW	12 Sep 72	1.0	MIG-21	F-4D	Robin 02	AIM-9
Malloy, Douglas G, 1Lt WSO, Dayton, Ohio	35 TFS	388 TFW	02 Sep 72	1.0	MIG-19	F-4E	Eagle 03	AIM-7
Markle, John D, 1Lt AC, Hutchinson, Kansas	555 TFS	432 TRW	10 May 72	1.0	MIG-21	F-4D	Oyster 02	AIM-7
Martin, Ronald G, 1Lt AC, Lake Villa, Illinois	480 TFS	35 TFW	14 Jul 66	1.0	MIG-21	F-4C	Unknown 02	AIM-9
Massen, Mark A, Cpt WSO, Downey, California	336 TFS	8 TFW	15 Aug 72	1.0	MIG-21	F-4E	Date 04	AIM-7
McCoy, Frederick E II, 1Lt P, Sheboygan, Wisconsin	555 TFS	8 TFW	26 Oct 67	1.0	MIG-17	F-4D	Ford 01	AIM-7
McCoy, Ivy J Jr, Maj AC, Baton Rouge, Louisiana	523 TFS	432 TRW	15 Oct 72	1.0	MIG-21	F-4D	Chevy 01	AIM-9
McKee, Harry L Jr, Maj AC, Austin, Texas	555 TFS	432 TRW	28 Dec 72	1.0	MIG-21	F-4D	List 01	AIM-7
McKinney, George H Jr, 1Lt P, Bessemer, Alabama	435 TFS	8 TFW	06 Nov 67	1.0	MIG-17	F-4D	Sapphire 01	20mm
			06 Nov 67	1.0	MIG-17	F-4D	Sapphire 01	20mm
			19 Dec 67	0.5	MIG-17	F-4D	Nash 01	20mm
Monsees, James H, 1Lt P, Santa Clara, California	555 TFS	8 TFW	26 Oct 67	1.0	MIG-17	F-4D	Ford 03	AIM-7

Moore, Albert E, A1C G, San Bernadino, California		307 SW	24 Dec 72	1.0	MIG-21	B-52D	Ruby III	.50 caliber
Moore, Joseph D, Maj AC, Spartanburg, SC	435 TFS	8 TFW	19 Dec 67	0.5	MIG-17	F-4D	Nash 01	20mm
Moore, Rolland W Jr, Maj AC, Barberton, Ohio	389 TFS	366 TFW	26 Apr 67	1.0	MIG-21	F-4C	Cactus 01	AIM-7
Moss, Randy P, 1Lt P, Great Falls, SC	435 TFS	8 TFW	12 Feb 68	1.0	MIG-21	F-4D	Buick 01	AIM-7
Muldoon, Michael D, 1Lt P, Perry, New York	435 TFS	8 TFW	03 Jan 68	1.0	MIG-17	F-4D	Olds 01	AIM-4
Murray, James E III, 1Lt P, McKeesport, Pennsylvania	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Olds 04	AIM-9
Nichols, Stephen E, Cpt AC, Durham, NC	555 TRS	432 TRW	11 May 72	1.0	MIG-21	F-4D	Gopher 02	AIM-7
Null, James C, Cpt AC, Oklahoma City, Oklahoma	523 TFS	432 TRW	16 Apr 72	1.0	MIG-21	F-4D	Papa 03	AIM-7
Olds, Robin, Col AC, Washington, DC	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Olds 01	AIM-9
			04 May 67	1.0	MIG-21	F-4C	Flamingo 01	AIM-9
	433 TFS	8 TFW	20 May 67	1.0	MIG-17	F-4C	Tampa 01	AIM-7
			20 May 67	1.0	MIG-17	F-4C	Tampa 01	AIM-9
Olmsted, Frederick S Jr, Cpt AC, San Diego, CA	13 TFS	432 TRW	30 Mar 72	1.0	MIG-21	F-4D	Papa 01	AIM-7
			16 Apr 72	1.0	MIG-21	F-4D	Basco 01	AIM-7
Osborne, Carl D, Maj P, Potlatch, Idaho	333 TFS	355 TFW	13 May 67	1.0	MIG-17	F-105D	Random 03	AIM-9
Pankhurst, John E, Cpt P, Midland, Michigan	480 TFS	366 TFW	05 Jun 67	1.0	MIG-17	F-4C	Oakland 01	20mm
Pardo, John R, Maj AC, Hearne, Texas	433 TFS	8 TFW	20 May 67	1.0	MIG-17	F-4C	Tampa 03	AIM-9
Pascoe, Richard M, Cpt AC, Lakeside, California	555 TFS	8 TFW	06 Jan 67	1.0	MIG-21	F-4C	Crab 01	AIM-7
			05 Jun 67	1.0	MIG-17	F-4C	Chicago 02	AIM-9
Pettit, Lawrence H, Cpt WSO, Jackson Heights, NY	555 TFS	432 TRW	31 May 72	1.0	MIG-21	F-4D	Icebag 01	AIM-7
			12 Oct 72	1.0	MIG-21	F-4D	Vega 01	Maneuvering
Pickett, Ralph S, Maj WSO, Beaulaville, NC	555 TFS	432 TRW	22 Dec 72	1.0	MIG-21	F-4D	Buick 01	AIM-7
Priester, Durwood K, Maj AC, Hampton, SC	480 TFS	366 TFW	05 Jun 67	1.0	MIG-17	F-4C	Oakland 01	20mm

TABLE 2.—ALPHABETICAL ORDER (cont'd)

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Rabeni, John J Jr, 1Lt P, Southboro, Massachusetts	480 TFS	366 TFW	05 Nov 66	1.0	MIG-21	F-4C	Opal 01	AIM-7
Radeker, Walter S III, Cpt AC, Asheville, NC	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Olds 04	AIM-9
Raspberry, Everett T Jr, Cpt AC, Fort Walton Beach, Fla.	555 TFS	8 TFW	02 Jan 67 05 Jun 67	1.0 1.0	MIG-21 MIG-17	F-4C F-4D	Ford 02 Drill 01	AIM-9 AIM-7
Retterbush, Gary L, Maj AC, Lebanon, Indiana	35 TFS	388 TFW	12 Sep 72 08 Oct 72	1.0 1.0	MIG-21 MIG-21	F-4E F-4E	Finch 03 Lark 01	20mm 20mm
Richard, Lawrence G, Cpt, (USMC) AC, Lansdale, Pa.	58 TFS	432 TRW	12 Aug 72	1.0	MIG-21	F-4E	Dodge 01	AIM-7
Richter, Karl W, 1Lt P, Holly, Michigan	421 TFS	388 TFW	21 Sep 66	1.0	MIG-17	F-105D	Ford 03	20mm
Rilling, Robert G, Maj P, South Berwick, Maine	333 TFS	355 TFW	13 May 67	1.0	MIG-17	F-105D	Random 01	AIM-9
Ritchie, Richard S, Cpt AC, Reidsville, NC	555 TFS	432 TRW	10 May 72 31 May 72 08 Jul 72 08 Jul 72 28 Aug 72	1.0 1.0 1.0 1.0 1.0	MIG-21 MIG-21 MIG-21 MIG-21 MIG-21	F-4D F-4D F-4E F-4E F-4D	Oyster 03 Icebag 01 Paula 01 Paula 01 Buick 01	AIM-7 AIM-7 AIM-7 AIM-7 AIM-7
Roberts, Thomas S, Cpt AC, LaGrange, Georgia	45 TFS	2 AD	10 Jul 65	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Roberts, William E Jr, 1Lt P, Quitman, Oklahoma	389 TFS	366 TFW	20 May 67	1.0	MIG-21	F-4C	Elgin 01	AIM-9
Rose, Douglas B, 1Lt P, Chicago, Ill.	555 TFS	8 TFW	16 Sep 66	1.0	MIG-17	F-4C	Unknown 04	AIM-9
Rubus, Gary M, Cpt AC, Banning, California	307 TFS	432 TRW	15 Oct 72	1.0	MIG-21	F-4E	Buick 03	20mm
Russell, Donald M, Maj P, Westbrook, Maine	333 TFS	355 TFW	18 Oct 67	1.0	MIG-17	F-105D	Wildcat 04	20mm
Ryan, John D Jr, 1Lt P, Pasadena, TX	13 TFS	432 TRW	17 Dec 67	1.0	MIG-17	F-4D	Gambit 03	AIM-4
Scott, Robert R, Col P, Des Moines, Iowa	333 TFS	355 TFW	26 Mar 67	1.0	MIG-17	F-105D	Leech 01	20mm

Sears, James F, 1Lt P, Milan, Missouri	389 TFS	366 TFW	26 Apr 67	1.0	MIG-21	F-4C	Cactus 01	AIM-7
Seaver, Maurice E Jr, Maj P, Highland, California	44 TFS	388 TFW	13 May 67	1.0	MIG-17	F-105D	Kimona 02	20mm
Sharp, Jerry K, 1Lt P, Corpus Christi, Texas	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Olds 02	AIM-7
Sheffler, Fred W, Cpt AC, Akron, Ohio	336 TFS	8 TFW	15 Aug 72	1.0	MIG-21	F-4E	Date 04	AIM-7
Shields, George I, 1Lt WSO, Georgetown, Conn.	469 TFS	388 TFW	12 Sep 72	1.0	MIG-21	F-4D	Robin 02	AIM-9
Sholders, Gary L, Cpt AC, Lebanon, Oregon	555 TFS	432 TRW	22 Dec 72	1.0	MIG-21	F-4D	Bucket 01	Maneuvering
Simmonds, Darrell D, Cpt AC, Vernon, Texas	435 TFS	8 TFW	06 Nov 67 06 Nov 67	1.0 1.0	MIG-17 MIG-17	F-4D F-4D	Sapphire 01 Sapphire 01	20mm 20mm
Simonet, Kenneth A, Maj AC, Chicago, Illinois	435 TFS	8 TFW	18 Jan 68	1.0	MIG-17	F-4D	Otter 01	AIM-4
Smallwood, John J, 1Lt WSO, Atlanta, Georgia	58 TFS	432 TRW	02 Jun 72	1.0	MIG-19	F-4E	Brenda 01	20mm
Smith, Wayne O, 1Lt P, Clearwater, Florida	435 TFS	8 TFW	18 Jan 68	1.0	MIG-17	F-4D	Otter 01	AIM-4
Smith, William T, 1Lt P, Wayne, Pennsylvania	480 TFS	35 TFW	26 Apr 66	1.0	MIG-21	F-4C	Unknown 01	AIM-9
Squier, Clayton K, LtC AC, Oakland, California	435 TFS	8 TFW	03 Jan 68	1.0	MIG-17	F-4D	Olds 01	AIM-4
Stone, John B, Cpt AC, Coffeeville, Miss.	433 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Rambler 01	AIM-7
Strasswimmer, Roger J, 1Lt P, Bronx, New York	555 TFS	8 TFW	06 Jan 67	1.0	MIG-21	F-4C	Crab 02	AIM-7
Sumner, James M, 1Lt WSO, Manchester, Missouri	35 TFS	366 TFW	23 May 72	1.0	MIG-21	F-4E	Balter 03	20mm
Suzanne, Jacques A, Cpt P, Lake Placid, New York	333 TFS	355 TFW	12 May 67	1.0	MIG-17	F-105D	Crossbow 01	20mm
Swendner, William J, Cpt AC, Alamogordo, NM	480 TFS	35 TFW	14 Jul 66	1.0	MIG-21	F-4C	Unknown 01	AIM-9
Taft, Gene E, LtC AC, Ventura, California	4 TFS	366 TFW	29 Jul 72	1.0	MIG-21	F-4E	Pistol 01	AIM-7

TABLE 2.—ALPHABETICAL ORDER (cont'd)

<i>Individual/Rank Crew Position/Home Town</i>	<i>USAF Sqdn.</i>	<i>Parent Unit</i>	<i>Date</i>	<i>Cr.</i>	<i>Type Enemy Acft.</i>	<i>Type USAF Acft.</i>	<i>Radio Call Sign</i>	<i>Primary USAF Weapon Used</i>
Talley, James T, 1Lt P, Nixon, Texas	480 TFS	366 TFW	14 May 67	1.0	MIG-17	F-4C	Speedo 03	20mm
Thies, Mack, 1Lt P, Houston, Texas	390 TFS	366 TFW	01 May 67	1.0	MIG-17	F-4C	Stinger 01	Maneuvering
Thorsness, Leo K, Maj P, Las Vegas, Nevada	357 TFS	355 TFW	19 Apr 67	1.0	MIG-17	F-105F	Kingfish 01	20mm
Tibbett, Calvin B, Cpt AC, Waynesville, Missouri	555 TFS	432 TRW	09 Sep 72	1.0	MIG-21	F-4D	Olds 03	20mm
			16 Sep 72	1.0	MIG-21	F-4E	Chevy 03	AIM-9
Titus, Robert F, LtC AC, Hampton, Virginia	389 TFS	366 TFW	20 May 67	1.0	MIG-21	F-4C	Elgin 03	AIM-7
			22 May 67	1.0	MIG-21	F-4C	Wander 01	AIM-9
			22 May 67	1.0	MIG-21	F-4C	Wander 01	20mm
Tolman, Frederick G, Maj P, Portland, Maine	354 TFS	355 TFW	19 Apr 67	1.0	MIG-17	F-105D	Nitro 03	20mm
Tracy, Fred L, Maj P, Goldsboro, NC		388 TFW	29 Jun 66	1.0	MIG-17	F-105D	Unknown 02	20mm
Tuck, James E, Maj AC, Virgilina, Virginia	480 TFS	366 TFW	05 Nov 66	1.0	MIG-21	F-4C	Opal 01	AIM-7
Turner, Samuel O, SSgt G, Atlanta, Georgia		307 SW	18 Dec 72	1.0	MIG-21	B-52D	Brown III	.50 caliber
Vahue, Michael D, Cpt WSO, Battle Creek, Michigan	523 TFS	432 TRW	16 Apr 72	1.0	MIG-21	F-4D	Papa 03	AIM-7
Voigt, Ted L II, 1Lt P, Nelsonville Ohio	555 TFS	8 TFW	14 Feb 68	1.0	MIG-17	F-4D	Nash 03	20mm
Volloy, Gerald R, Cpt WSO, Cincinnati, Ohio	13 TFS	432 TRW	30 Mar 72	1.0	MIG-21	F-4D	Papa 01	AIM-7
Waldrop, David B III, 1Lt P, Nashville, Tennessee	34 TFS	388 TFW	23 Aug 67	1.0	MIG-17	F-105D	Crossbow 03	20mm
Watson, George D, 1Lt WSO, Trenton, Missouri	34 TFS	388 TFW	06 Oct 72	0.5	MIG-19	F-4E	Eagle 04	Maneuvering
Wayne, Stephen A, 1Lt P, Fairmount, Indiana	433 TFS	8 TFW	13 May 67	1.0	MIG-17	F-4C	Harpoon 01	AIM-9
			20 May 67	1.0	MIG-17	F-4C	Tampa 03	AIM-9

Webb, Omri K III, 1Lt WSO, Leesville, SC	34 TFS	388 TFW	05 Oct 72	1.0	MIG-21	F-4E	Robin 01	AIM-7
Wells, Norman E, 1Lt/Cpt P, Redwood City, California	555 TFS	8 TFW	06 Jan 67 05 Jun 67	1.0 1.0	MIG-21 MIG-17	F-4C F-4C	Crab 01 Chicago 02	AIM-7 AIM-9
Western, Robert W, 1Lt P, Carrollton, Alabama	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Ford 02	AIM-9
Westphal, Curtis D, LtC AC, Bonduel, Wisconsin	13 TFS	432 TRW	13 Oct 72	1.0	MIG-21	F-4D	Olds 01	AIM-7
Wetterhahn, Ralph F, 1Lt AC, New York City, NY	555 TFS	8 TFW	02 Jan 67	1.0	MIG-21	F-4C	Olds 02	AIM-7
Wheeler, William H, Maj EWO, Fort Walton Beach, Fla.	357 TFS	355 TFW	19 Dec 67	1.0	MIG-17	F-105F	Otter 03	20mm
White, Sammy C, Cpt AC, Hot Springs, Arkansas	4 TFS	366 TFW	19 Aug 72	1.0	MIG-21	F-4E	Pistol 03	AIM-7
Wiggins, Larry D, Cpt P, Houston, Texas	469 TFS	388 TFW	03 Jun 67	1.0	MIG-17	F-105D	Hambone 03	AIM-9/20mm
Williams, David O Jr, Col AC, Rockport, Texas	435 TFS	8 TFW	14 Feb 68	1.0	MIG-17	F-4D	Killer 01	AIM-7
Wilson, Fred A Jr, 1Lt P, Mobile, Alabama	333 TFS	355 TFW	21 Sep 66	1.0	MIG-17	F-105D	Vegas 02	20mm
Zimer, Milan, 1Lt P, Canton, Ohio	389 TFS	366 TFW	20 May 67 22 May 67 22 May 67	1.0 1.0 1.0	MIG-21 MIG-21 MIG-21	F-4C F-4C F-4C	Elgin 03 Wander 01 Wander 01	AIM-7 AIM-9 20mm

140

PACAF

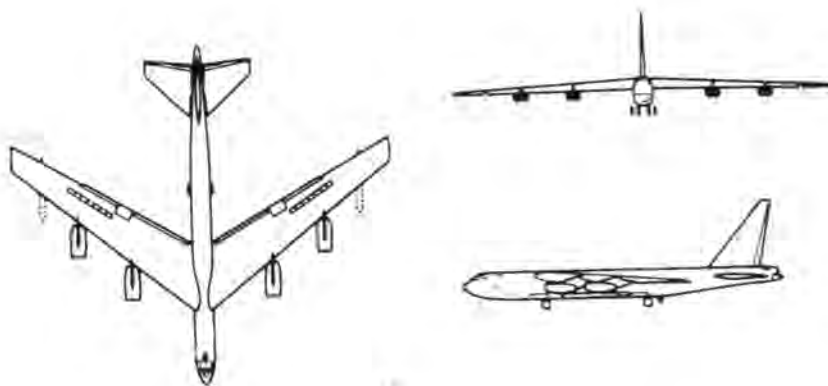


Their Units

The pilots, electronic warfare and weapon systems officers, gunners, and others involved directly or indirectly in the aerial conflict in Southeast Asia were organized into hundreds of USAF units, ranging in structure from flights upward through squadrons, groups, wings, divisions, and numbered air forces under PACAF. The mission of these units was to support the strike forces, which were primarily the tactical squadrons directly engaged in air-to-ground combat operations. Only those tactical units with a combat mission in Southeast Asia were directly involved in and credited with the destruction of 137 MIG's. These credits were awarded to 21 USAF tactical fighter squadrons flying F-4C/D/E's and F-105D/F's, the 307th Strategic Wing flying B-52D's, and the 388th Tactical Fighter Wing flying F-105D's. Most of the combat men credited with victories belonged then to the squadrons, although a few were assigned directly to the wings.

The composition, organization, and command of these combat elements are based on principles set down by the War Department in the 1920's. These principles reflect both peacetime and wartime contingencies, and they have been adapted over the years to keep abreast of the great strides in aviation technology. Accordingly, many of the squadrons participating in the Southeast Asia war boast of records as well in the Korean War and World War II, and some even trace their origins to World War I.

The official lineage and data on assignments, stations, aircraft and missiles, operations, service streamers, campaigns, and emblems prior to the operations in Southeast Asia can be found in *Air Force Combat Units of World War II* or in *Combat Squadrons of the Air Force, World War II* (USGPO, 1961 and 1969), edited by Maurer Maurer. Information in the following table contains only data covering the units just prior to and during their assignments in Southeast Asia.



B-52C/D Bomber

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT

<i>Organizational Action</i>	<i>Date</i>	<i>Assignment</i>	<i>Location</i>	<i>Operations</i>
Seventh Air Force				
Activated	Mar 66	Pacific Air Forces		Took over conduct of air operations in SEA from the inactivated 2d Air Division. 135 of the 137 USAF aerial victories were made by Seventh Air Force components.
Organized	Apr 66		Tan Son Nhut AB, RVN	
Moved	Mar 73		Nakhon Phanom AB, Thailand	
2d Air Division				
	Mar 54	US Air Forces in Europe	Saudi Arabia	No combat components assigned. Supervised US facilities.
Reassigned; moved	Sep 62	Pacific Air Forces	Tan Son Nhut AB, RVN	Directed USAF operations in SEA, Sep 62-Apr 66. Replaced by Seventh Air Force. 2 of the USAF aerial victories were by a component of 2d AD.
Reassigned	Oct 62	Thirteenth Air Force		
Discontinued	Apr 66			
8th Tactical Fighter Wing				
	Jul 64	831st Air Division	George AFB, Calif.	Tactical operations in the U S. Air combat in SEA, Dec 65-Jan 73. Earned 38.5 aerial victories, 23 Apr 65–15 Aug 72.
Reassigned; moved	Dec 65	Thirteenth Air Force	Ubon AB, Thailand	
Attached	Dec 65	2d Air Division		
Attached	Apr 66	Seventh Air Force		
35th Tactical Fighter Wing				
Activated	Mar 66	Pacific Air Forces		Air combat in SEA, Apr 66–Jul 71. Earned 4 aerial victories, 26 Apr–14 Jul 66.
Organized	Apr 66	Seventh Air Force	Da Nang AB, RVN	
Moved	Oct 66		Phan Rang AB, RVN	
Inactivated	Jul 71			
307th Strategic Wing				
Activated	Apr 70	Eighth Air Force	U-Tapao AB, Thailand	Air combat in SEA, Apr 70–Dec 72. Earned 2 aerial victories, Dec 72.
355th Tactical Fighter Wing				
Constituted and activated	Apr 62	Tactical Air Command		TAC operations and exercises to Nov 65. Combat in SEA, Nov 65–Oct 70. Earned 19.5 aerial victories, 21 Sep 66–19 Dec 67.
Organized	Jul 62	831st Air Division	George AFB, Calif.	
Reassigned; moved	Jul 64	835th Air Division	McConnell AFB, Kans.	
Reassigned; moved	Nov 65	Thirteenth Air Force	Takhli AB, Thailand	
Attached	Nov 65	2d Air Division		
Attached	Apr 66	Seventh Air Force		
Inactivated	Dec 70			



Seventh Air Force



2d Air Division



*8th Tactical
Fighter Wing*



*355th Tactical
Fighter Wing*



*307th Strategic
Wing*



*35th Tactical
Fighter Wing*

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT—Continued

<i>Organizational Action</i>	<i>Date</i>	<i>Assignment</i>	<i>Location</i>	<i>Operations</i>
366th Tactical Fighter Wing				
	Oct 64	832d Air Division	Holloman AFB, NM	TAC operations and exercises, to Mar 66.
Reassigned; moved	Mar 66	2d Air Division	Phan Rang AB, RVN	Combat in SEA, Mar 66–Oct 72. Earned
Reassigned	Apr 66	Seventh Air Force		18 aerial victories, 5 Nov 66–19 Aug 72.
Moved	Oct 66		Da Nang AB, RVN	
Reassigned; moved	Jun 72	Thirteenth Air Force	Takhli AB, Thailand	
Reassigned; moved	Oct 72	832d Air Division	Mountain Home AFB, Idaho	
388th Tactical Fighter Wing				
Activated	Mar 66	Pacific Air Forces		
Organized	Apr 66	Thirteenth Air Force	Korat AB, Thailand	Combat in SEA, Apr 66–Jan 73. Earned 17
				aerial victories, 29 Jul 66–15 Oct 72.
432d Tactical Reconnaissance Wing				
Activated	Aug 66	Pacific Air Forces		
Organized	Sep 66	Thirteenth Air Force	Udon AB, Thailand	Combat in SEA, Sep 66–Jan 73. Earned
Redesignated 432d Tactical Fighter Wing	Nov 74			36 aerial victories, 17 Dec 67–8 Jan 73.
4th Tactical Fighter Squadron				
	Jun 65	33d Tactical Fighter Wing	Eglin AFB, Fla.	
Reassigned; moved	Apr 69	366th Tactical Fighter Wing	Da Nang AB, RVN	Combat operations in SEA, Apr 69–Jan 73.
Moved	Jun 72		Takhli AB, Thailand	Earned 4 aerial victories, 8 Jul 72–8 Jan 73.
Reassigned; moved	Oct 72	432d Tactical Reconnaissance Wing	Udon AB, Thailand	
13th Tactical Fighter Squadron				
Constituted and activated	May 66	Pacific Air Forces		
Organized	May 66	18th Tactical Fighter Wing	Korat AB, Thailand	Combat operations in SEA, May 66–Jan 73.
Attached	May 66	388th Tactical Fighter Wing		Earned 11 aerial victories, 3 Jun 67–13 Oct 72.
Reassigned; moved (attachment ends)	Oct 67	432d Tactical Reconnaissance Wing	Udon AB, Thailand	
34th Tactical Fighter Squadron				
Activated	May 66	Pacific Air Forces		
Organized	May 66	41st Air Division	Korat AB, Thailand	Combat operations in SEA, May 66–Jan 73.
Attached	May 66	388th Tactical Fighter Wing		Earned 5.5 aerial victories, 18 Aug 66–15
Reassigned (no change in attachment)	Jan 68	347th Tactical Fighter Wing		Oct 72.
Reassigned (attachment ends)	Mar 71	388th Tactical Fighter Wing		



***366th Tactical
Fighter Wing***



***388th Tactical
Fighter Wing***



***452d Tactical
Reconnaissance
Wing***



***4th Tactical
Fighter Squadron***

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT—Continued

Organizational Action	Date	Assignment	Location	Operations
35th Tactical Fighter Squadron				
	Jun 64	41st Air Division	Yokota AB, Japan	Tactical air operations and air defense in Japan and Korea, 1953-71. Flew combat operations in SEA, Sep-Nov 64, from mid-Oct to mid-Nov 65 as a unit and by augmenting other squadrons in 1966 and 1967, and as a unit again from Apr to Oct 1972. Earned 5.5 aerial victories, 23 May-8 Oct 72.
Deployed; attached	Sep 64	2d Air Division	Korat AB, Thailand	
Returned (attachment ends)	Nov 64		Yokota AB, Japan	
Reassigned	Apr 65	6441st Tactical Fighter Wing		
Deployed; attached	May 65	2d Air Division	Takhli AB, Thailand	
Returned (attachment ends)	Jun 65		Yokota AB, Japan	
Deployed; attached	Oct 65	2d Air Division	Takhli AB, Thailand	
Returned (attachment ends)	Nov 65		Yokota AB, Japan	
Reassigned	Nov 66	41st Air Division		
Reassigned	Jan 68	347th Tactical Fighter Wing		
Deployed for 11 short periods	Jun 68-Jan 71		Osan AB, Korea Yokota AB, Japan	
Reassigned; moved	Mar 71	3d Tactical Fighter Wing	Kunsan AB, Korea	
Deployed; attached	Apr 72	366th Tactical Fighter Wing	Da Nang AB, RVN	
Deployed; attached	Jun 72	388th Tactical Fighter Wing	Korat AB, Thailand	
Returned (attachment ends)	Oct 72		Kunsan AB, Korea	
44th Tactical Fighter Squadron				
		18th Tactical Fighter Wing	Kadena AB, Okinawa	Carried out FEAF (later, PACAF) operations, Sep 47-Apr 67. Combat operations in SEA, Apr 67-Mar 71. Earned 1 aerial victory, 13 May 67.
Reassigned; moved	Apr 67	388th Tactical Fighter Wing	Korat AB, Thailand	
Reassigned; moved	Oct 69	355th Tactical Fighter Wing	Takhli AB, Thailand	
Reassigned	Dec 70	Thirteenth Air Force		
Reassigned; moved	Mar 71	18th Tactical Fighter Wing	Kadena AB, Okinawa	
45th Tactical Fighter Squadron				
Activated	Apr 62	Tactical Air Command		TAC operations, Oct 62-Jun 71. Combat operations in SEA, Apr-Aug 65. Earned first 2 aerial victories of the conflict, Jul 65.
Organized	May 62	15th Tactical Fighter Wing	MacDill AFB, Fla.	
Attached	May 62	12th Tactical Fighter Wing		
Attachment ends	Jul 62	15th Tactical Fighter Wing		
Deployed; attached	Apr 65	2d Air Division	Ubon AB, Thailand	
Returned (attachment ends)	Aug 65		MacDill AFB, Fla.	
58th Tactical Fighter Squadron				
Activated	Sep 70	33d Tactical Fighter Wing	Eglin AFB, Fla.	TAC operations, Sep 70-. Combat operations in SEA, Apr-Oct 72. Earned 2 aerial victories, 2 Jun-12 Aug 72.
Deployed; attached	Apr 72	432d Tactical Reconnaissance Wing	Udon AB, Thailand	
Returned (attachment ends)	Oct 72		Eglin AFB, Fla.	



*35th Tactical
Fighter Squadron*



*44th Tactical
Fighter Squadron*



*45th Tactical
Fighter Squadron*



*58th Tactical
Fighter Squadron*

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT—Continued

<i>Organizational Action</i>	<i>Date</i>	<i>Assignment</i>	<i>Location</i>	<i>Operations</i>
307th Tactical Fighter Squadron				
	Jun 62	Tactical Air Command	Homestead AFB, Fla.	TAC operations, 1962–65. Combat operations in SEA, Jun–Dec 65. TAC operations, 1966. USAFE operations, 1966–71. TAC operations, 1971–. Combat in SEA, Jul–Oct 72. Earned 1 aerial victory, 15 Oct 72.
Deployed; attached	Jun 65	2d Air Division	Bien Hoa AB, RVN	
Attached	Jul 65	6251st Tactical Fighter Wing		
Attached	Nov 65	3d Tactical Fighter Wing		
Returned (attachment ends)	Dec 65		Homestead AFB, Fla.	
Reassigned; moved	Apr 66	401st Tactical Fighter Wing	Torreon AB, Spain	
Reassigned; moved	Jul 71	31st Tactical Fighter Wing	Homestead AFB, Fla.	
Deployed; attached	Jul 72	432d Tactical Reconnaissance Wing	Udon AB, Thailand	
Returned (attachment ends)	Oct 72		Homestead AFB, Fla.	
333d Tactical Fighter Squadron				
	Jul 58	4th Tactical Fighter Wing	Seymour Johnson AFB, NC	Combat operations in SEA, Dec 65–Oct 70. Earned 7.5 aerial victories, 21 Sep 66–19 Dec 67.
Reassigned; moved	Dec 65	355th Tactical Fighter Wing	Takhli AB, Thailand	
Reassigned; moved	Oct 70	23d Tactical Fighter Wing	McConnell AFB, Kans.	
336th Tactical Fighter Squadron				
	Dec 57	4th Tactical Fighter Wing	Seymour Johnson AFB, NC	Combat operations in SEA, Apr–Sep 72. Earned 1 aerial victory, 15 Aug 72.
Deployed; attached	Apr 72	8th Tactical Fighter Wing	Udon AB, Thailand	
Returned (attachment ends)	Sep 72		Seymour Johnson AFB, NC	
354th Tactical Fighter Squadron				
	Oct 64	355th Tactical Fighter Wing	McConnell AFB, Kans.	Combat operations in SEA, Mar–Jun 65 and Dec 65–Oct 70. Earned 8 aerial victories, 10 Mar–27 Oct 67.
Deployed; attached	Mar 65	18th TFW; 2d Air Division	Kadena AB, Okinawa and Korat AB, Thailand	
Returned (attachment ends)	Jun 65		McConnell AFB, Kans.	
Reassigned	Nov 65	835th Air Division		
Reassigned; moved	Nov 65	355th Tactical Fighter Wing	Takhli AB, Thailand	
Reassigned	Dec 70	Thirteenth Air Force		
Reassigned; moved	Apr 71	4453d Combat Crew Training Wing	Davis-Monthan AFB, Ariz.	
357th Tactical Fighter Squadron				
Activated	Apr 62	Tactical Air Command		Combat operations in SEA, Jun–Nov 65 and Feb 66–Sep 70. Earned 4 aerial victories, 19 Apr–19 Dec 67.
Organized	Jul 62	355th Tactical Fighter Wing	George AFB, Calif.	
Moved	Jul 64		McConnell AFB, Kans.	
Deployed; attached	Jun 65	2d Air Division	Korat AB, Thailand	
Returned (attachment ends)	Nov 65	835th Air Division	McConnell AFB, Kans.	
Reassigned; moved	Jan 66	355th Tactical Fighter Wing	Takhli AB, Thailand	
Inactivated	Dec 70			



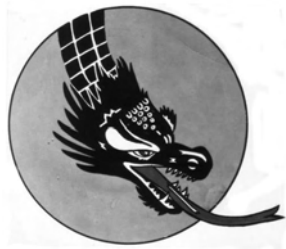
***307th Tactical
Fighter Squadron***



***336th Tactical
Fighter Squadron***



***354th Tactical
Fighter Squadron***



***357th Tactical
Fighter Squadron***

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT—Continued

<i>Organizational Action</i>	<i>Date</i>	<i>Assignment</i>	<i>Location</i>	<i>Operations</i>
389th Tactical Fighter Squadron				
	Jul 63	366th Tactical Fighter Wing	Holloman AFB, NM	
Moved	Mar 66		Phan Rang AB, RVN	Combat operations in SEA, Mar 66–Oct 71.
Moved	Oct 66		Da Nang AB, RVN	Earned 6 aerial victories, 23 Apr 67–22
Reassigned; moved	Jun 69	37th Tactical Fighter Wing	Phu Cat AB, RVN	May 67.
Reassigned	Mar 70	12th Tactical Fighter Wing		
Reassigned; moved	Oct 71	347th Tactical Fighter Wing	Mountain Home AFB, Idaho	
390th Tactical Fighter Squadron				
	Jul 63	366th Tactical Fighter Wing	Holloman AFB, NM	
Moved	Oct 65		Clark AB, Philippines	Combat operations in SEA, Nov 65–Jun 72.
Reassigned; moved	Oct 65	6252d Tactical Fighter Wing	Da Nang AB, RVN	Earned 2 aerial victories, 12 May 66–1 May 67.
Reassigned	Apr 66	35th Tactical Fighter Wing		
Reassigned	Oct 66	366th Tactical Fighter Wing		
Reassigned; moved	Jun 72	347th Tactical Fighter Wing	Mountain Home AFB, Idaho	
421st Tactical Fighter Squadron				
	Nov 65	835th Air Division	McConnell AFB, Kans.	
Reassigned; moved	Nov 65	6234th Tactical Fighter Wing	Korat AB, Thailand	Combat operations in SEA, Nov 65–Apr 67.
Reassigned	Apr 66	388th Tactical Fighter Wing		Earned 1 aerial victory, 21 Sep 66. TAC
Reassigned; moved	Apr 67	15th Tactical Fighter Wing	MacDill AFB, Fla.	operations, Apr 67–Apr 69. Deployed in
Reassigned; moved	Jul 67	4531st Tactical Fighter Wing	Homestead AFB, Fla.	Korea, Apr–Jun 69. Combat operations in
Reassigned; moved	Dec 67	23d Tactical Fighter Wing	McConnell AFB, Kans.	SEA, Jun 69–Jan 73.
Reassigned; moved	Apr 69	366th Tactical Fighter Wing	Da Nang AB, RVN	
Attached (en route to SEA)	Apr 69	457th Tactical Fighter Wing	Kunsan AB, Korea	
Arrived (attachment ends)	Jun 69	366th Tactical Fighter Wing	Da Nang AB, RVN	
Moved	Jun 72		Takhli AB, Thailand	
Reassigned; moved	Oct 72	432d Tactical Reconnaissance Wing	Udon AB, Thailand	
433d Tactical Fighter Squadron				
Activated	Jul 64	Tactical Air Command		
Organized	Jul 64	8th Tactical Fighter Wing	George AFB, Calif.	Combat operations in SEA, Dec 65–Jan 73.
Moved	Dec 65		Udon AB, Thailand	Earned 12 aerial victories, 2 Jan 67–6 Feb 68.
435th Tactical Fighter Squadron				
	Jul 58	8th Tactical Fighter Wing	George AFB, Calif.	Combat operations in SEA, Jul 66–Jan 73.
Moved	Jul 66		Udon AB, Thailand	Earned 6.5 aerial victories, 6 Nov 67–14 Feb 68.
Moved	Jul 67		Udon AB, Thailand	



*389th Tactical
Fighter Squadron*



*390th Tactical
Fighter Squadron*



*421st Tactical
Fighter Squadron*



*433d Tactical
Fighter Squadron*



*435th Tactical
Fighter Squadron*

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT—Continued

<i>Organizational Action</i>	<i>Date</i>	<i>Assignment</i>	<i>Location</i>	<i>Operations</i>
469th Tactical Fighter Squadron				
	Jul 64	355th Tactical Fighter Wing	McConnell AFB, Kans.	
Deployed	Nov 64		Yokota AB, Japan	
Deployed	Dec 64		Kadena AB, Okinawa	
Deployed; attached	Jan 65	2d Air Division	Korat AB, Thailand	Combat operations in SEA, Nov 65–Oct 72.
Returned (attachment ends)	Mar 65		McConnell AFB, Kans.	Earned 4 aerial victories, 4 Dec 66–12 Sep 72.
Reassigned; moved	Nov 65	6234th Tactical Fighter Wing	Korat AB, Thailand	
Reassigned	Apr 66	388th Tactical Fighter Wing		
Inactivated	Oct 72			
480th Tactical Fighter Squadron				
	Jul 63	366th Tactical Fighter Wing	Holloman AFB, NM	
Reassigned; moved	Feb 66	2d Air Division	Da Nang AB, RVN	Combat operations in SEA, Feb 66–Nov 71.
Attached	Feb 66	6252d Tactical Fighter Wing		Earned 9 aerial victories, 26 Apr 66–5 Jun 67.
Reassigned	Apr 66	Seventh Air force		
Attached	Apr 66	6252d Tactical Fighter Wing		
Attached	Apr 66	35th Tactical Fighter Wing		
Reassigned (attachment ends)	Jun 66	35th Tactical Fighter Wing		
Reassigned	Oct 66	366th Tactical Fighter Wing		
Reassigned; moved	Apr 69	37th Tactical Fighter Wing	Phu Cat AB, RVN	
Reassigned	Mar 70	12th Tactical Fighter Wing		
Inactivated	Nov 71			
523d Tactical Fighter Squadron				
	Jun 65	27th Tactical Fighter Wing	Cannon AFB, NM	
Reassigned; moved	Nov 65	405th Fighter Wing	Clark AB, Philippines	Combat operations in SEA, Apr–Oct 72.
Air echelon attached	Apr 72	432d Tactical Reconnaissance Wing	Udon AB, Thailand	Earned 2 aerial victories, 16 Apr–15 Oct 72.
Air echelon returned (atchmt ends)	Oct 72		Clark AB, Philippines	
Reassigned; moved	Aug 73	27th Tactical Fighter Wing	Cannon AFB, NM	



*469th Tactical
Fighter Squadron*



*480th Tactical
Fighter Squadron*



*523d Tactical
Fighter Squadron*

TABLE 3—UNITS CREDITED WITH THE DESTRUCTION OF MIG'S IN AIR-TO-AIR COMBAT—Continued

<i>Organizational Action</i>	<i>Date</i>	<i>Assignment</i>	<i>Location</i>	<i>Operations</i>
555th Tactical Fighter Squadron				
Activated and organized	Jan 64	12th Tactical Fighter Wing	MacDill AFB, Fla.	
Deployed; attached	Dec 64	51st Fighter-Interceptor Wing	Naha AB, Okinawa	
Returned (attachment ends)	Mar 65		MacDill AFB, Fla.	
Deployed; attached	Dec 65	51st Fighter-Interceptor Wing	Naha AB, Okinawa	
Attached	Feb 66	8th Tactical Fighter Wing	Udon AB, Thailand	Combat operations in SEA, Feb 66–Jan 73. Earned 39 aerial victories, 23 Apr 66–28 Dec 72.
Reassigned (attachment continues)	Mar 66	Thirteenth Air Force		
Reassigned	Mar 66	8th Tactical Fighter Wing		
Moved	Jul 66		Udon AB, Thailand	
Moved	May 68		Udon AB, Thailand	
Reassigned	Jun 68	432d Tactical Reconnaissance Wing		
Reassigned; moved	Jul 74	58th Tactical Fighter Training Wing	Luke AFB, Ariz.	

*555th Tactical
Fighter Squadron*

Aircraft and Armament

Numerous aircraft types and missile systems were employed by the U.S. Air Force in Vietnam. However, three basic aircraft coupled with three basic missiles and 20-millimeter or .50-caliber guns were responsible for the MIG's destroyed by the Air Force.

Aircraft employed were the F-4 Phantom in the C, D, and E series; the D and F series of the F-105 Thunderchief; and the B-52D Stratofortress.

The Thunderchiefs accounted for 27½ MIG-17's. The F-105 was basically a single purpose aircraft—one of the few in the Air Force inventory—intended primarily for low-level, air-to-ground operations. Its air-to-air capability was only secondary. An all-weather fighter-bomber, the F-105 was capable of delivering conventional as well as nuclear and thermonuclear weapons.

Two Thunderchief series were introduced into Vietnam: the single-seat F-105D and the two-seat F-105F. Speed, maneuverability, and aerial firepower qualified them for use in counter-air, close-support, and interdiction roles in either limited or general war situations.

Both series of this aircraft were capable of low- and high-level bomber missions, in any weather, day or night, and over any type of terrain. The pilot was able to fly a complete mission on instruments, while never observing the ground, except for takeoff and landing maneuvers.

Standard installed armament was a 20-millimeter (20-mm) automatic multi-barrel gun, the Vulcan, capable of firing 6,000 rounds a minute. Additionally, the F-105 could carry sixteen 750-pound bombs and clusters of rockets, or guided and unguided missiles.

The main elements of the aircraft's weapon delivery system were its toss-bomb computer, a monopulse search and ranging radar, and a display to feed information to the pilot. When releasing bombs, this system automatically computed release times, automatically released, and even maneuvered the aircraft during the delivery if the pilot desired. This system, called the Thunderstick fire control system, also handled the problems of air-to-air and air-to-ground attacks with missiles or guns.

F-105F's were used in a mission support role on

bombing raids. Called Wild Weasel, they protected bomber aircraft by detecting and attacking enemy surface-to-air (SAM) missile sites with their specialized electronic-countermeasure (ECM) systems and radar tracking air-to-ground missiles.

The Thunderchiefs had a wing span of 34 feet 11 inches. They were capable of speeds from Mach 1.11 at sea level to Mach 2.1 above 36,000 feet. Each model could carry a bomb load of 12,000 pounds and had an unrefueled range of 2,000 miles.

Phantom aircraft downed a total of 107½ MIGs: 33½ MIG-17's, 8 MIG-19's, and 66 MIG-21's.

The F-4 Phantom began its career as a single-place, all-weather fighter with the U.S. Navy. It quickly evolved into a sophisticated multi-mission fighter-bomber. In 1962 the Tactical Air Command selected the C model for operational use.

Brought in large numbers into the Air Force inventory, the basic aircraft underwent very few modifications. One major change was the installation of a full set of flight controls in the rear cockpit, since the Air Force desired to man the aircraft with two pilots, unlike the Navy which had a crew composed of a pilot and radar operator. Another alteration was the addition of an inertial-guidance system which told the pilot his latitude and longitude at any given time. These and other minor modifications increased the aircraft's air-to-ground capability.

The D-model of the Phantom was further improved with the installation of a lead computing sight and a central air data computer to handle bombing and navigation. These systems allowed the computation problem and weapon release to be handled automatically in all bombing modes—dive, level, and night, or all-weather—and thus further improved the air-to-ground capability of the aircraft.

The F-4E, as the earlier models, could perform air superiority, close-air, and interdiction missions using either conventional or nuclear munitions. Changes made in this version included the addition of an internally mounted 20-millimeter gun in the nose, an improved fire control system, and engines with increased thrust. A miniature radar installed in the nose enabled retention of the radar-guided Sparrow (AIM-7) missile system in addition to the multi-barrel cannon, which was based on the Gatling concept and was similar to that used in the Thunderchief. The C and D models used 20-millimeter guns

housed in SUU-16 and SUU-23 gun pods, respectively.

The F-4 had some unusual features as well. It was able to fly at speeds as low as 150 to 165 miles per hour, which permitted loitering over a ground combat area or short landings. It also had a "dash" speed in excess of 1,600 miles per hour. This aircraft was capable of carrying twice the weapons payload of a World War II B-17.

The F-4 of Vietnam fame had a 38-foot 5-inch wing span; it was 58 feet 3 inches long. It had a range of over 1,000 miles without refueling and could carry a bomb load of 14,000 pounds.

The B-52D's downed two MIG-21's. This aircraft was a strategic heavy bomber powered by eight jet engines. It was used for conventional bombing. It had four .50-caliber machine guns mounted in the tail section. The B-52 was a large aircraft with a wing span of 195 feet and a length of 156 feet. It was capable of speeds of 650 miles per hour, had an unrefueled range of 6,000 miles, and could carry up to 85 of the 500-lb. or 42 of the 750-lb. bombs in the weapons bay plus 12 of the 750-lb. bombs on each of two under-wing pylons.

Three basic air-to-air missiles were responsible for MIG kills: the AIM-4, AIM-7, and AIM-9. The AIM-4 Falcon, used on F-4D aircraft, downed five MIG's—four MIG-17's and one MIG-21. Amongst the smallest missiles in service, the Falcon family consisted of several different series of missiles guided either by radar or by a heat-seeking (infrared) homing device. Series changes improved the capabilities of the Falcon. Performance against high-speed maneuvering targets was increased; an all-aspect attack capability was achieved, enabling the missile to attack from all angles, and accuracy and resistance to electronic-countermeasures (ECM) were improved. A new solid fuel, two-level thrust rocket motor provided a lighter launching thrust followed by a lower-level thrust to sustain missile velocity; and more powerful high-explosive warheads were fitted. Falcons ranged in size from 6 feet 6 inches to 7 feet 2 inches and were capable of speeds from Mach 2 to Mach 4. All models had an effective range of more than 5 miles.

The AIM-7 Sparrow, used by F-4's, accounted for 50 MIG kills—more than any other missile.

Eight were MIG-17's, four were MIG-19's, and 38 were MIG-21's.

Sparrow was a solid fuel, radar-homing, air-to-air guided missile with a high-explosive warhead. It could be used against high-performance aircraft under all-weather conditions and from all angles, including head-on. The AIM-7 used in Southeast Asia had a supersonic capability, and aircraft flying either subsonic or supersonic speeds could launch the missile. First used by the U.S. Navy in 1958, the Sparrow later became part of the primary armament on USAF and USMC fighters.

Later models of the Sparrow had significantly greater performance capabilities than the earlier model because of a series of engineering and design changes. These included an advanced fire control system consisting essentially of a radar in the nose of the aircraft which carried it, a fire control computer, and cockpit displays and controls. The radar searched for, acquired, and tracked the target; the information was then fed to the computer which generated signals enabling the pilot to attack targets with great success. The Sparrows, about 12 feet long, could fly farther than 10 miles.

AIM-9 Sidewinders downed 33 MIG's: 14 MIG-17's, 2 MIG-19's, and 17 MIG-21's.

Sidewinder was one of the simplest and least costly guided weapons produced in quantity. It had few electronic components and less than 2 dozen moving parts. It required little training to handle and assemble. Powered by a single-stage, solid-propellant rocket, this supersonic air-to-air missile was developed by the U.S. Navy for fleet defense and was later adopted by the U.S. Air Force for Century series and F-4 aircraft. Series B, D, and E of this missile used a passive guidance system which homed in on the engine exhaust of a target aircraft. Series C utilized a semiactive radar guidance system. Sidewinders were approximately 9 feet 4 inches long, capable of speeds up to Mach 2.5. They had an effective range of more than 2 miles.

Table 4 outlines the MIG kills made by the combined use of these weapons and weapon systems.

North Vietnam received its primary weapon systems in large part from the Soviet Union. These weapons included the MIG-17, MIG-19, and MIG-21 aircraft which employed the Atoll and Al-

TABLE 4.—AIRCRAFT & WEAPONS COMBINATIONS USED IN MIG VICTORIES

USAF Aircraft	Weapons/Tactics	MIG-17	MIG-19	MIG-21	Total
F-4C	AIM-7 Sparrow	4	0	10	14
	AIM-9 Sidewinder	12	0	10	22
	20-mm gunfire	3	0	1	4
	Maneuvering tactics	2	0	0	2
		21	0	21	42
F-4D	AIM-4 Falcon	4	0	1	5
	AIM-7 Sparrow	4	2	20	26
	AIM-9 Sidewinder	0	2	3	5
	20-mm gunfire	4	0	2	6
	Maneuvering tactics	0	0	2	2
	12	4	28	44	
F-4E	AIM-7 Sparrow	0	2	8	10
	AIM-9 Sidewinder	0	0	4	4
	AIM-9/20-mm gunfire (combined)	0	0	1	1
	20-mm gunfire	0	1	4	5
	Maneuvering tactics (2 F-4E's)	0	1	0	1
	0	4	17	21	
F-4D/F-105F	20-mm gunfire	1	0	0	1
		1	0	0	1
F-105D	20-mm gunfire	22	0	0	22
	AIM-9 Sidewinder	2	0	0	2
	AIM-9/20-mm gunfire (combined)	1	0	0	1
		25	0	0	25
F-105F	20-mm gunfire	2	0	0	2
		2	0	0	2
B-52D	50-caliber gunfire	0	0	2	2
		0	0	2	2
GRAND TOTAL		61	8	68	137

kali missiles, and an internal cannon.

The MIG-17 Fresco was an advanced version of the MIG-15. The newer model had a short afterburner, a redesigned wing with a mean-sweep angle of 42°, an extended inboard leading edge sections, large trailing-edge root fairings, modified flaps, and rounded tips. A single-seat aircraft with one power plant, it was used as a day-interceptor in the A and B series, a fighter-bomber in the C series, and a limited all-weather and night-fighter in the D and E series.

The C series, the most widely used variant of the day-fighter, carried a 37-mm cannon under the lower starboard nose and two 23-mm cannons under the lower port nose. A supplementary 23-mm gun

package could be installed at the wing-tank position. Four underwing packs of eight 55-mm air-to-air rockets, or a total of 100 lbs. of bombs could also be carried. Normally, two external fuel tanks were also fitted.

The standard all-weather version of this aircraft was in the D series. Armament was revised to three 23-mm cannons and thirty-two 55-mm rockets in external pods below the wings.

The E model was equipped with a scan-intercept radar carried in an extended lip over the intake; a small fixed scanner was mounted in a conical housing on the intake dividing wall. The cockpit windshield extended farther forward than on the other models. A typical intercept load would consist



(Clockwise, starting with Top Left) Sgt. Donald F. Clements (left) and AIC Greg E. Sniegowski load an SUU-23 gun pod at Phu Cat Air Base, South Vietnam.



Sgt. John F. Host and AIC William B. Bokshar guide an SUU-23 20-mm Vulcan cannon into the gun services shop for overhauling.

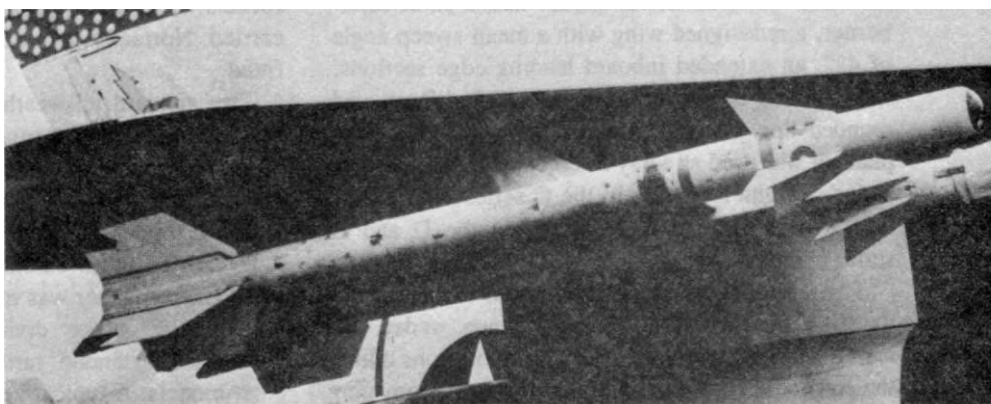
AIC Gary P. Mincer (l. to r.), Sgt. Vernon E. Kisinger, AIC Lonnie J. Hartfield, and Sgt. Phineas T. Barry prepare to load a Sparrow missile on an F-4 at Cam Ranh Bay Air Base.



F-105 Thunderchiefs of the 388th TFW stand ready for night maintenance at Korat Air Base, Thailand.

Two Sidewinder missiles mounted under the wing of an F-105

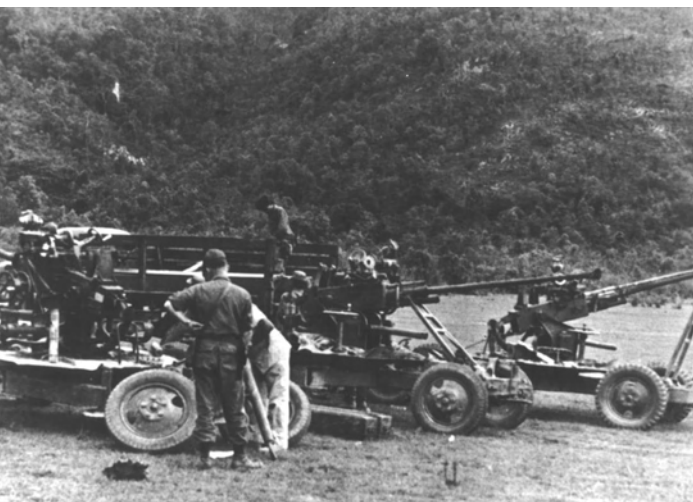
Sgt. James E. Faison carefully unpacks a Sidewinder air-to-air missile at Da Nang Air Base, South Vietnam.





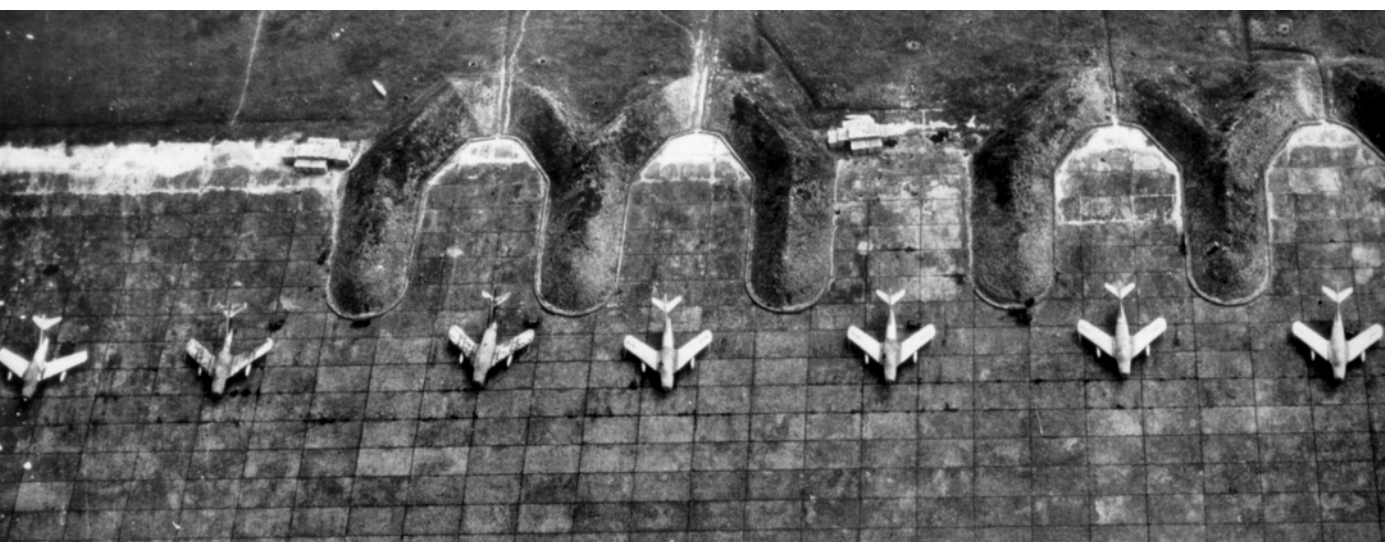
(Top Left) North Vietnamese Air Force pilots discuss mission.

(Top Right) A North Vietnamese SA-2 Guideline missile unit hastens to respond to an alert.



(Center) A North Vietnamese crew unloads a 37-mm AA Gun used against USAF fighters.

(Bottom) MIG-17's parked on the runway of Kien An Airfield, North Vietnam.



of two or four Alkali radar-guided missiles or four pods each containing eight 55-mm missiles. It could be armed with two 23-mm and one 37-mm cannons. Four 210-mm missiles could also be carried for ground attacks.

The MIG-19 Farmer was a single-seat, mid-wing, twin-jet fighter. Its wings and slab-shaped tail surfaces were swept back more than 40°, and it had a short fuselage, flat on both top and bottom. This aircraft was a logical development from previous MIG series, but the engines differed. It has two axial flow jet engines, while earlier MIG's had centrifugal jets.

Guns were installed in the wings of the Farmer and armament used by various series of this aircraft consisted of a 37-mm cannon mounted below the starboard side of the nose; a 23-mm cannon mounted at the wing root; a 30-mm cannon mounted at the wing root; 55-mm unguided air-to-air rockets carried in pods below the wings; and pylon-mounted beam-riding missiles.

MIG-19's were used as day fighters, night fighters, interceptors, and all-weather fighters. They were about 38 ft. long, had a maximum speed of Mach 1.3, and a range of 750 miles without refueling.

The original MIG-21 was known as the Faceplate but later models were designated the Fishbed. Faceplate differed substantially in design from the Fishbed model. Its wings were swept extremely; the Fishbed model had a mid-set delta wing.

Armament used by the MIG-21 included a 37-mm cannon, 50-mm air-to-air rockets which were pod-mounted, 55-mm rockets mounted on the wings, Atoll missiles attached by underwing pylons, and 30-mm cannon in long fairings on the fuselage.

This aircraft was a fairly simple interceptor and proved to be an all-around good performer, fully capable of challenging all but the very latest U.S. fighters. Even the most sophisticated American fighters did not dismiss the MIG-21 lightly. In its various model series, it played such roles as all-weather interceptor, day point-defense interceptor, and clear-weather fighter. Within the various series, Faceplate and Fishbed ranged in length from 49 feet to 54.4 feet, in wingspan from 25 to 38.8 feet. They carried loads from 20,500 to 31,240 pounds, unre-

fueled range was from 700 to 1,000 miles, and speed was about Mach 2.3.

The North Vietnamese Air Force used the Atoll air-to-air missile, which was similar to the U.S. AIM-9 Sidewinder in dimensions and weight. It was widely employed on MIG-21's. Propelled by a solid-propellant rocket motor, it carried a conventional high explosive warhead. Structurally, the Atoll had diametrically opposed pairs of forward control surfaces, linked, and working in unison for missile steering. The rear surfaces incorporated small tabs with inserted gyroscopic wheels driven by airstream. These apparently stayed locked until after launch, when they came into play to provide either more stability or a measure of control augmentation for steering. This missile was about 2.8 meters long; the forward control surfaces were 45 centimeters long, and the tail plane 53 centimeters long.

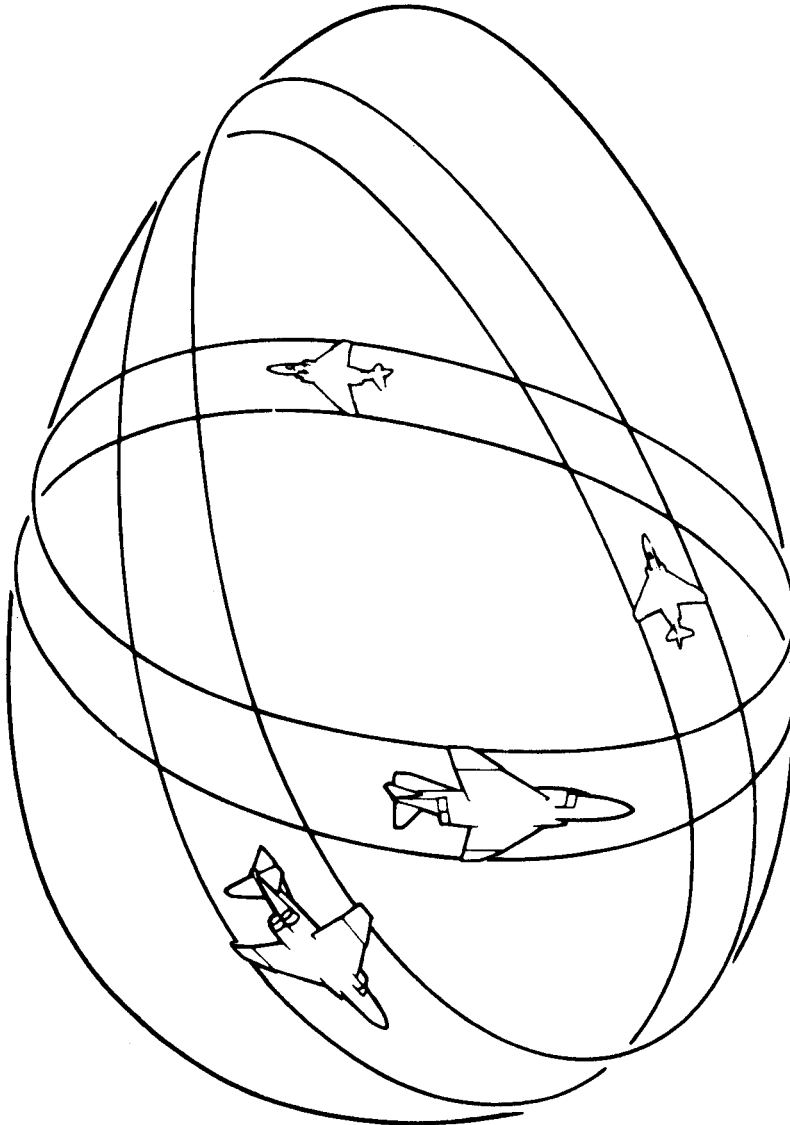
Their Tactics

The MIG-killers in Southeast Asia needed more than excellent aircraft and armament to score the 137 confirmed victories. To gain a tactical advantage from which to fire their weapons in air-to-air encounters they needed to know how to maneuver their aircraft. Because an aircraft can fly freely in space, it would seem that there are an infinite number of maneuvering situations and solutions to a given tactical encounter. Such however is not the case. Because of the pull of gravity and aircraft performance, the number and types of maneuvers are circumscribed within a "field of maneuver"—shaped like an elongated sphere. The size and shape of this sphere are determined by the turn and speed characteristics of the aircraft and the pull of gravity.

While the ability to perform basic fighter maneuvers is important, it is secondary to judgment. And the only true way to develop the quality of judgment necessary to excel in air-to-air combat is by training against aircraft of varied performance capability. This means that a pilot must know the enemy's capability as well as his own in order to decide when and how to perform each maneuver.

If a comparison of kills to losses in air combat could be used to illustrate superior performance, the ratio of more than two MIG kills for each loss would

FIELD OF MANEUVER



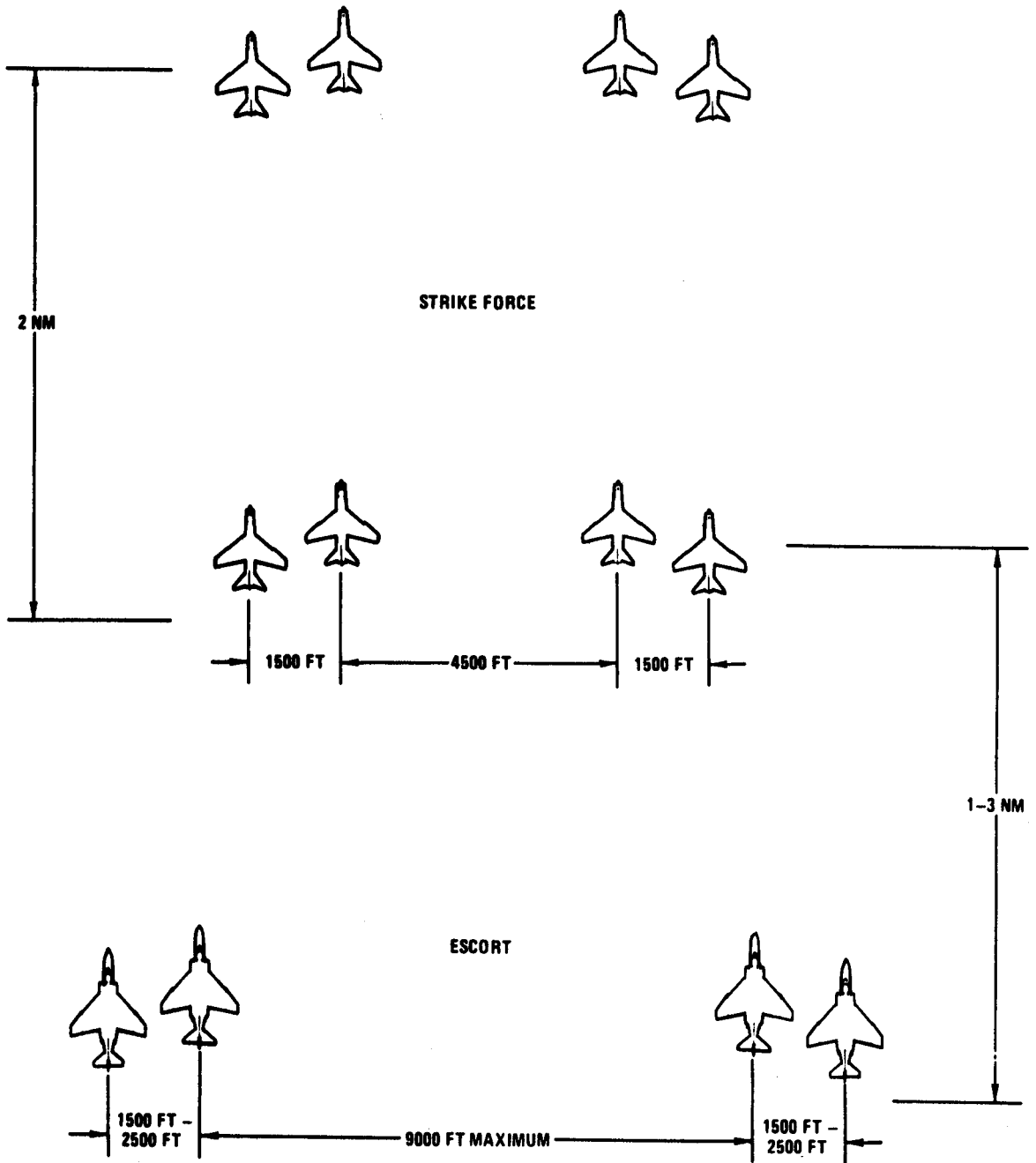
show sounder judgment or better U.S. aircraft, possibly both, in favor of the MIG-killers.

Some of the maneuvers and tactics which the USAF pilots used in Southeast Asia are described and illustrated in this section.

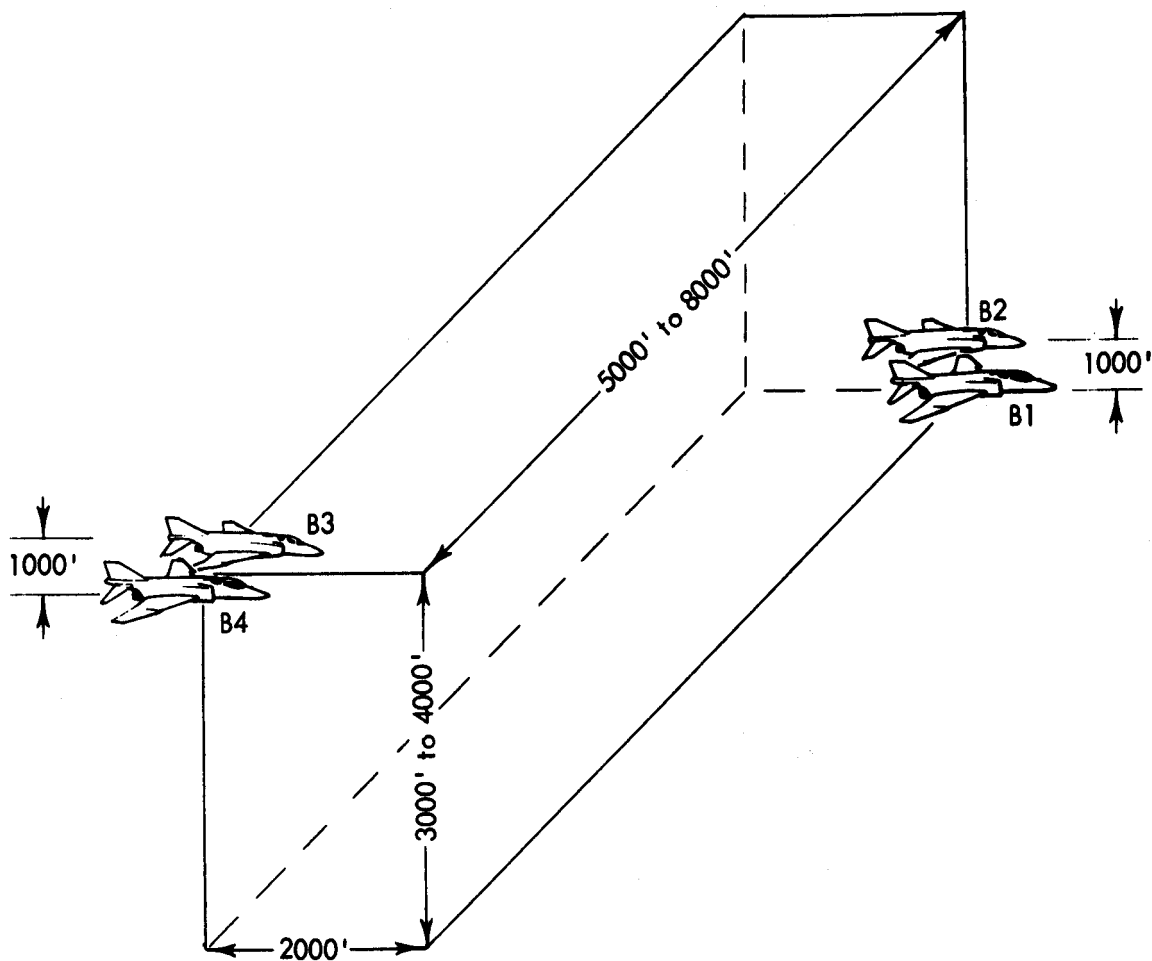
Escort Formations

The purpose of escort tactics was to provide protection for escorted aircraft as well as for the escorts. The tactics employed in Southeast Asia depended on

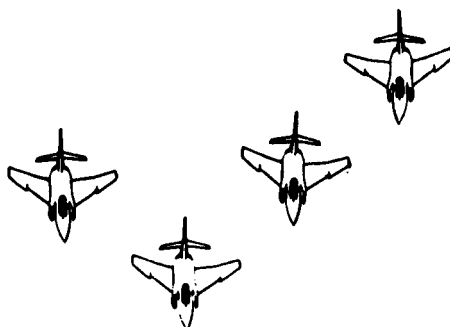
BASIC ESCORT FORMATION



FLUID FOUR



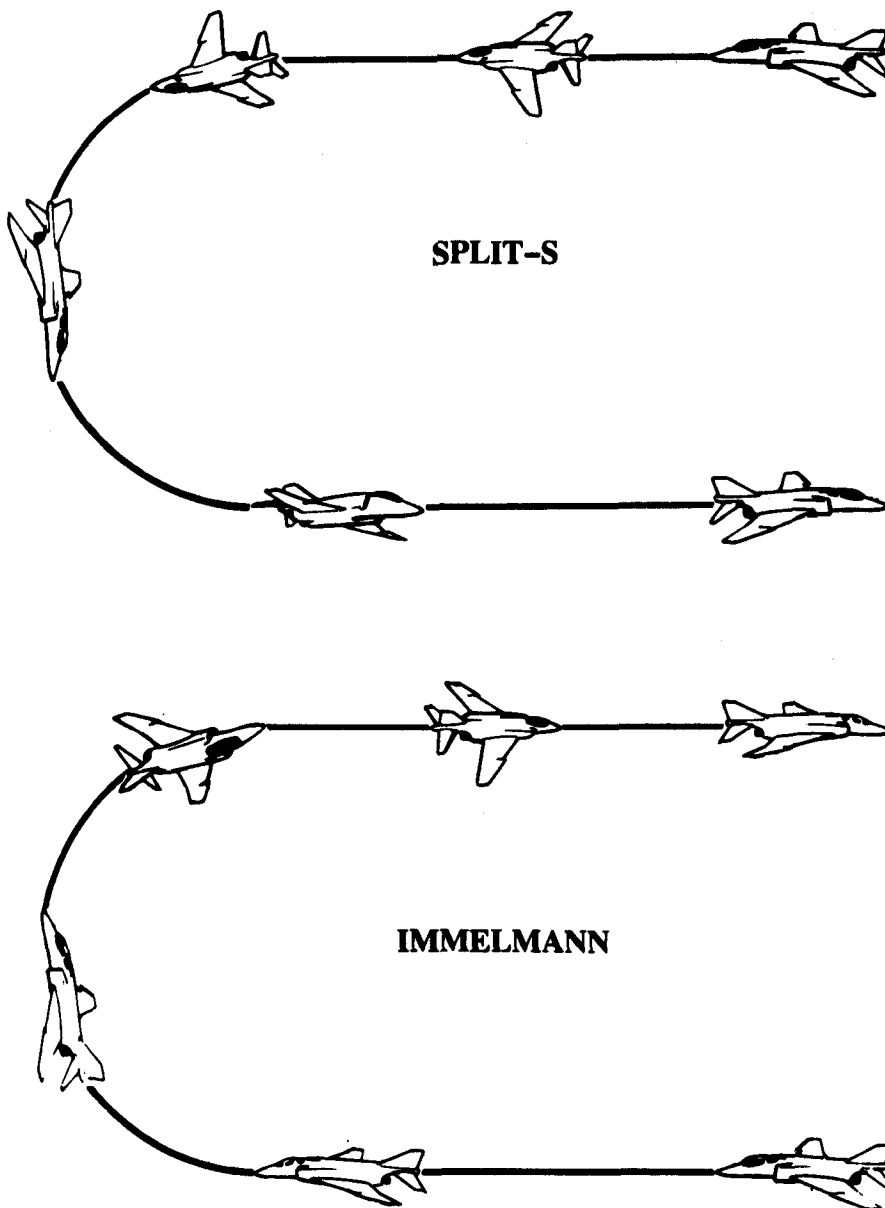
FINGERTIP OR FINGER FOUR (All at Same Elevation)



the size and speed of the escorted force and on the anticipated tactics of the enemy. Obviously, tactics for each escort mission had to be tailored to fit specific requirements.

Fighter escort formations essentially were dictated by the strike force formations. When escort aircraft had equal or better performance characteristics than the force being escorted, a variety of escort forma-

tions could be developed. Generally, the escort would prefer to fly a fluid formation approximately 2 miles behind the force. To obtain most protection from a four-ship escort, the force formations would spread the elements no more than 4,500 ft. apart with wingmen 1,500 ft. out. The strike flight would spread 7,500 ft. wide and would be managed by an escort flight utilizing a maximum of 9,000 ft. be-



tween elements, maintaining line abreast with wingmen 1,500 to 2,500 ft. out and 0-30° back.

In case of chaff flights, escorts placed themselves high or outside during chaff bomb delivery to avoid falling canisters. Weather conditions too dictated a different position for better visual coverage.

Fluid-Four Formation

The fluid-four formation consists of a four-ship formation, an optimum for air-to-air combat. It is offensive, maneuverable, and has good mutual support. It was employed during daylight hours only and any time counter-air activity was anticipated. The lookout capability with four aircraft allows sizing the formation to cope with any threat expected. This means that even in some surface-to-air missile environments the formation can be sized to provide ECM coverage and yet retain air-to-air capability. The fluid-four formation consists of two elements. The second element maneuvers off the flight leader's element so as to provide mutual support both from positioning and lookout. The wingmen fly off the flight and element leaders, and they position themselves to provide the best coverage for the entire formation. The fulfillment of each individual's responsibility allows the flight to conduct offensive operations with security from a lethal 6 o'clock attack.

Split-S

This maneuver produces a 180° rotation about the aircraft's longitudinal axis followed by a 180° change of heading in the vertical plane.

Immelmann

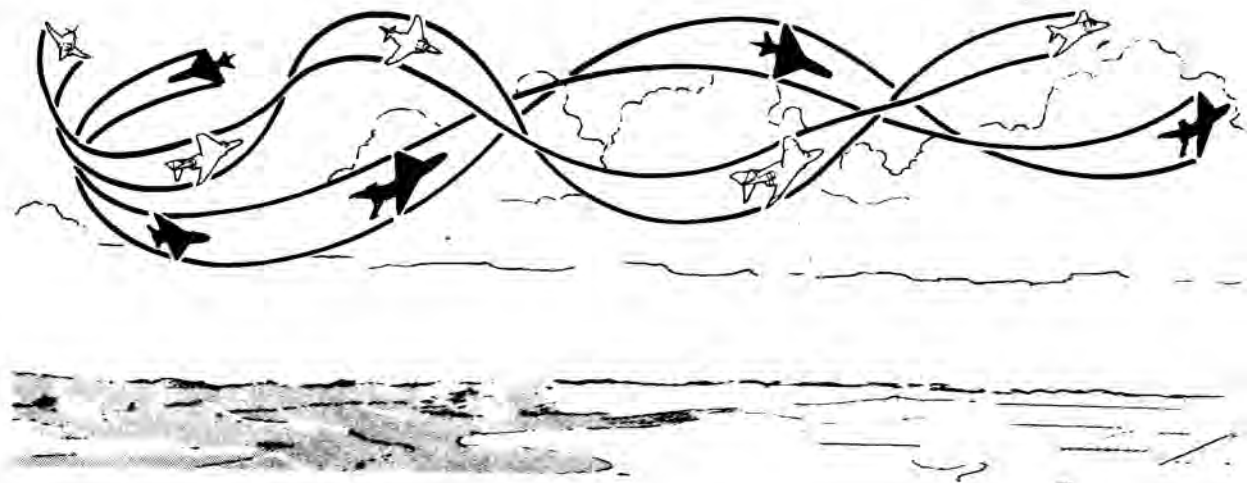
Maneuver in which the aircraft completes the first half of a loop and then rolls over to an upright position, thus changing direction 180° with a simultaneous gain in altitude.

Scissors Maneuver

This maneuver is a series of turn reversals performed in an effort to achieve an offensive position after an attacker has been forced into a flight path overshoot. Once the attacker has overshoot, he is outside the defender's turn radius and will not be able to get back inside unless the defender continues his turn. By reversing his turn, the defender presents a high angle-off to the attacker and will force another flight path overshoot if the attacker continues the attack. As the scissors progresses, the attacker should be forced to the 12 o'clock position.

An advantage should be achieved as soon as possible, since the rapid loss of energy associated with this maneuver may preclude a true firing position and place the defender in a vulnerable position for

SCISSORS



VERTICAL ROLLING SCISSORS



another attacker. In aircraft with equal performance capabilities, if the attacker overshoots and presses the attack, the defender would reverse his turn to continue the engagement. By maintaining his original defensive turn, the defender eventually solves the attacker's positioning problem. The most critical factor in using the scissors maneuver is judging when to perform the initial reversal. A reversal too soon may solve the attacker's overshoot problem. A reversal too late will allow the attacker to stem his lateral separation and retain an offensive position.

Vertical Rolling Scissors

The vertical rolling scissors is a defensive, descending, rolling maneuver in the vertical plane. The purpose of the maneuver is to gain an offensive advantage if the enemy overshoots a flight path in a vertical plane. The maneuver is used when the enemy cuts off in the vertical plane during the defender's zoom maneuver. When it is observed that the enemy is cutting off, the USAF aircraft would turn down into him to increase the angle of overshoot. Once the overshoot has been achieved, the nose of the USAF aircraft will be low and the enemy's nose high, so to press the attack, the enemy must pull his nose down also. At this point, when the enemy has been committed nose-low, the USAF attacker would roll 180° toward the defender's flight path and pull into him. If the timing is right the enemy will not be able to match his attacker's attitude, and he will overshoot in front of the attacker's flight path. The rolling maneuver is then continued around to the enemy's 6 o'clock position.

High- and Low-Speed Yo-Yo

The high-speed yo-yo is a maneuver in the vertical and horizontal planes designed to reduce angle-off or maintain nose-tail separation and thus prevent an overshoot of the defender's defensive turn. To employ this maneuver effectively, correct timing is essential. As soon as the attacker realizes that he will be unable to stay inside the defender's turn radius, he should plan to employ the high-speed yo-yo. This is accomplished by maintaining back stick pressure and slightly decreasing bank, relative to the defender, and allowing the nose to arc up through the vertical (assuming the enemy's turn is in the horizontal plane). The effect of gravity on turn and

velocity, combined with a turn in a new plane, will enable the attacker to reduce angle-off and maintain nose-tail separation (assuming equal aircraft). The attacker now must pull his nose down toward the enemy's 6 o'clock position. If too little nose-tail separation is evident at the apex of his yo-yo, the attacker should perform a roll-away from the turn to an in-trail or lag-pursuit position.

While the high-speed yo-yo is designed to convert airspeed to altitude, the low-speed yo-yo converts altitude into airspeed in order to increase the rate of closure and at the same time allow an attacker to slide inside the opponent's turn radius.

Barrel Roll Attack

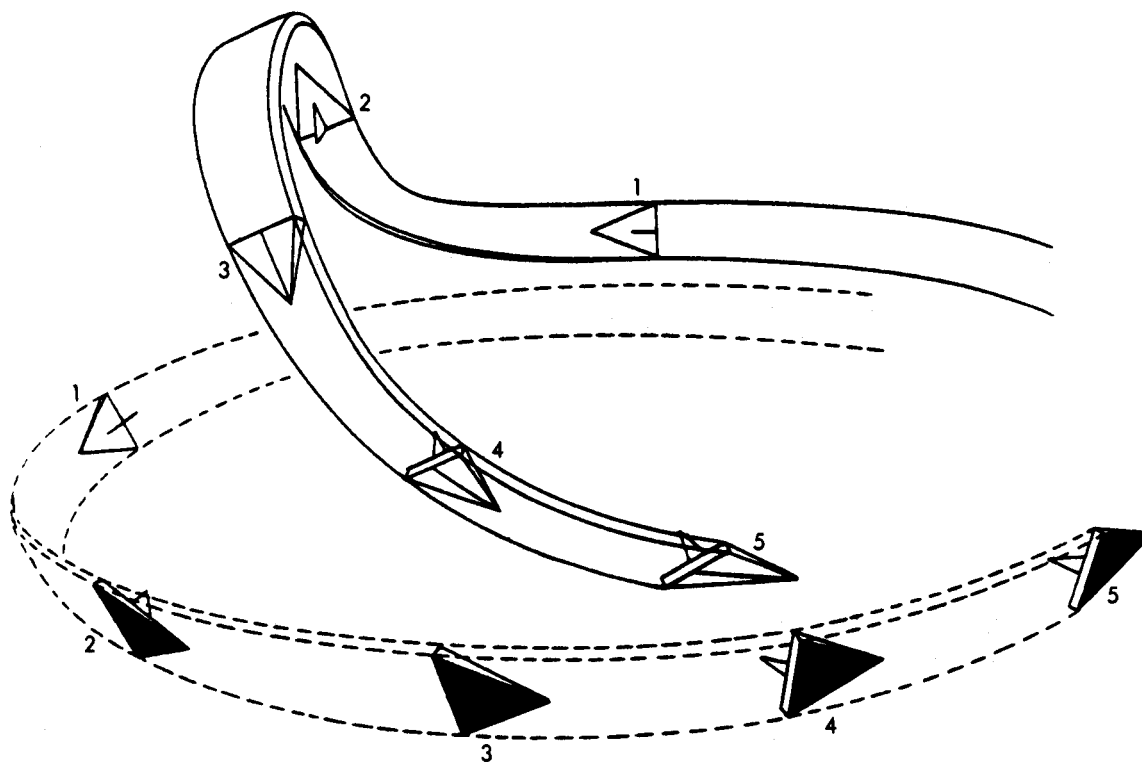
The offensive barrel roll is a three-dimensional maneuver used to reduce a high angle-off while maintaining nose-tail separation. Its purpose is much the same as the high speed yo-yo. It is used instead of the high speed yo-yo at a large angle-off in order to lower the apex of the attack. The range at which the maneuver is begun varies greatly and depends primarily on overtake and angle-off. Generally, it is initiated at a range of 1 to 3 miles, but the attacker must be flying at a relatively high calibrated airspeed.

The maneuver is initiated by rolling to match the defender's angle of bank, then loading the aircraft. As soon as the aircraft is loaded, the pilot rolls it in the opposite direction (over the top).

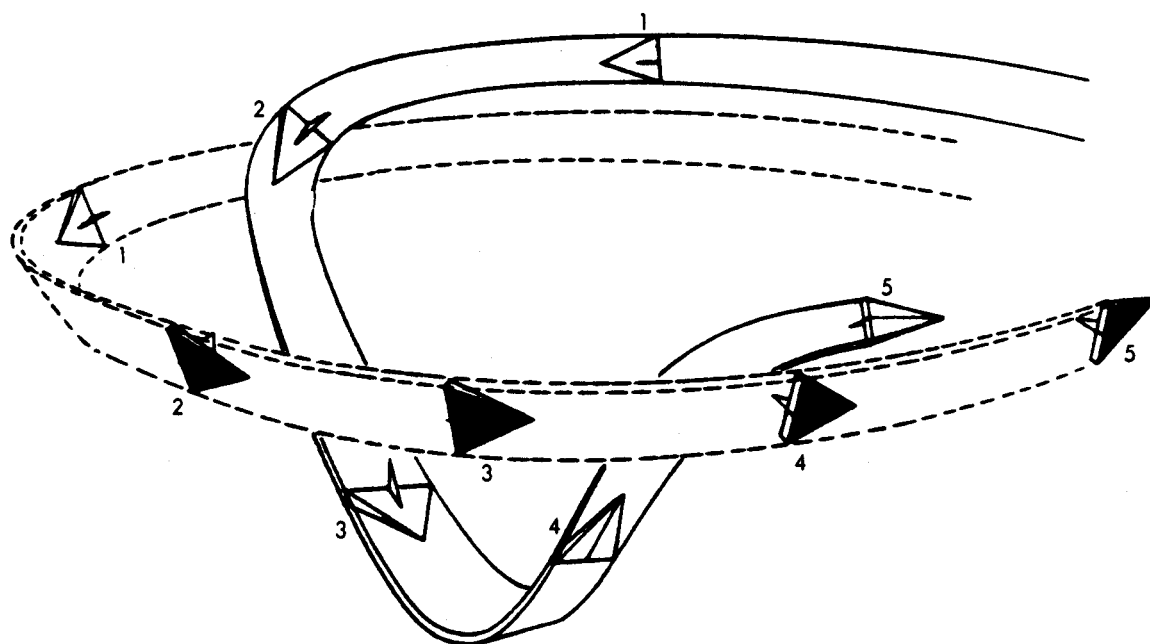
Pop-up Maneuvers

Pop-up tactics are used in attacking a high priority target in a SAM environment. The attacking aircraft approaches the target area in low-level penetration to enhance survivability, achieve deception, and surprise the defenses. In preplanning for such an attack, a significant initial point and a pop-up point are selected. After passing the initial point the aircraft is maneuvered until the target falls within a desirable angle extending from the nose of the aircraft to the target. Airspeed is increased, and at pop-up point the aircraft initiates a wing-level pullup, climbs to an apex altitude above the target suitable for strafing or dive-bombing. Withdrawal following weapons release depends on target environment and subsequent intentions.

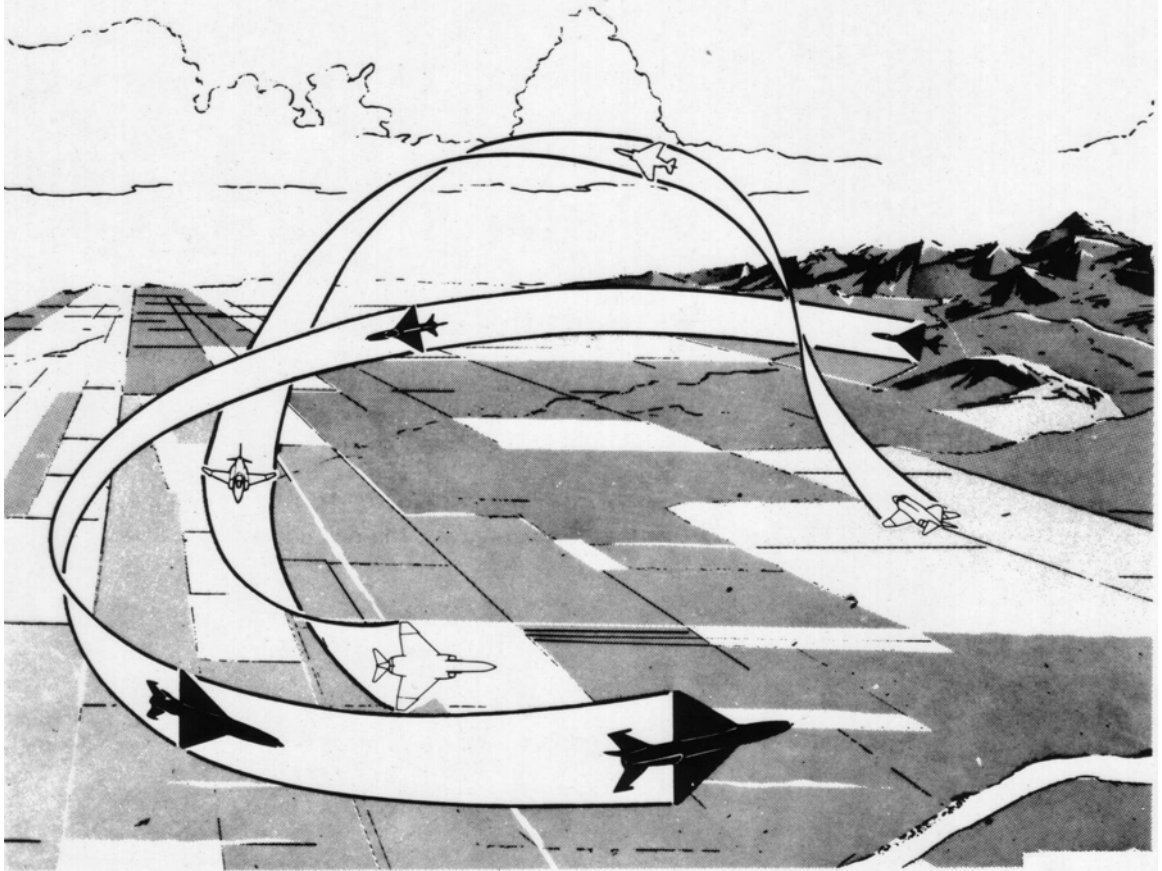
HIGH-SPEED YO-YO



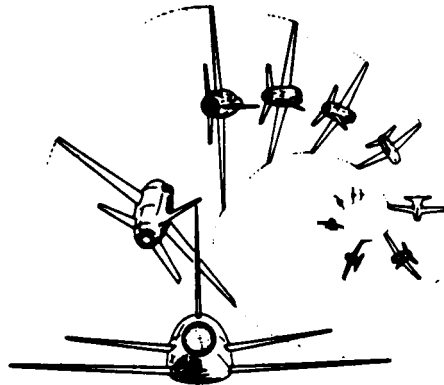
LOW-SPEED YO-YO



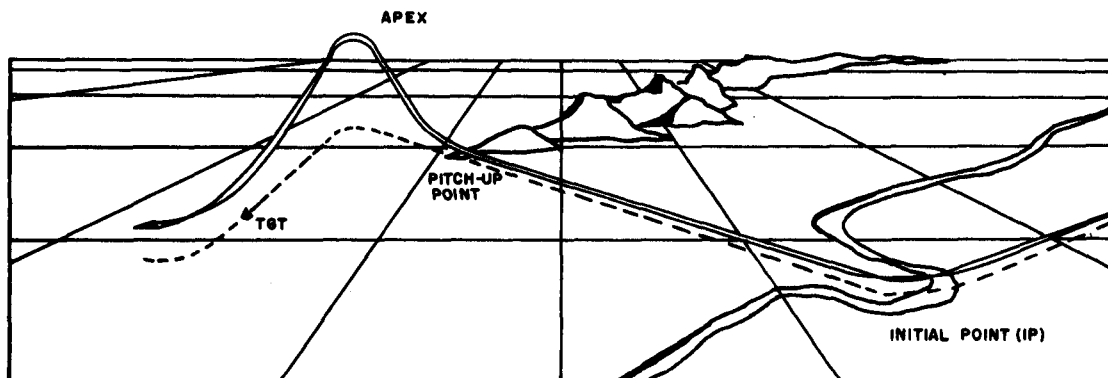
BARREL ROLL ATTACK



AS PORTRAYED IN PERSPECTIVE SKETCH



POP-UP TACTIC



A successful attack using pop-up tactics depends on the pilot's ability to maneuver his aircraft to a precise position in space relative to the target. This position in space is determined by the type ordnance carried, the precomputed delivery conditions for the ordnance, and the maneuvering characteristics of the aircraft.

Wagon Wheel

The Wagon Wheel was a very significant tactic devised by the North Vietnamese Air Force in mid-1967 for MIG-17 defense. This tactic was in fact a modification of the Lufberry Circle. The Wagon Wheel was composed of a group of MIG-17's operating from a static orbit. Whenever they came under attack, they would enter an orbiting wheel formation to provide 6 o'clock coverage for each other, thereby enhancing their mutual defense. Through the use of the Wagon Wheel, the MIG-17's could effectively utilize their superior turning capability to force an overshoot by USAF aircraft while still providing 6 o'clock coverage for the preceding MIG in the orbit.

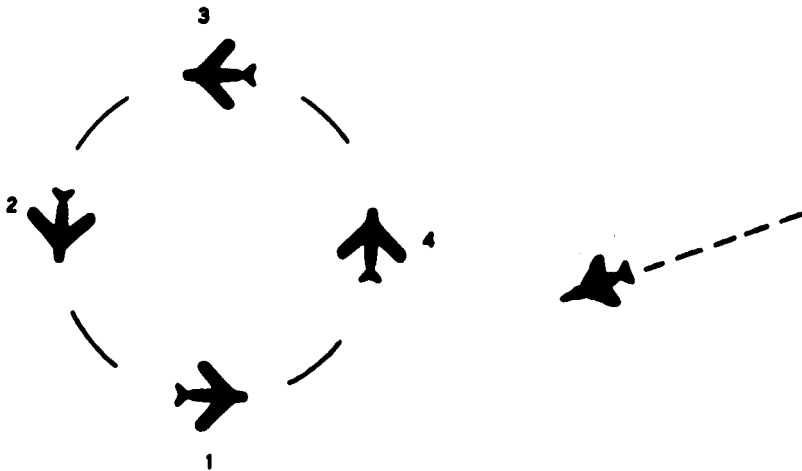
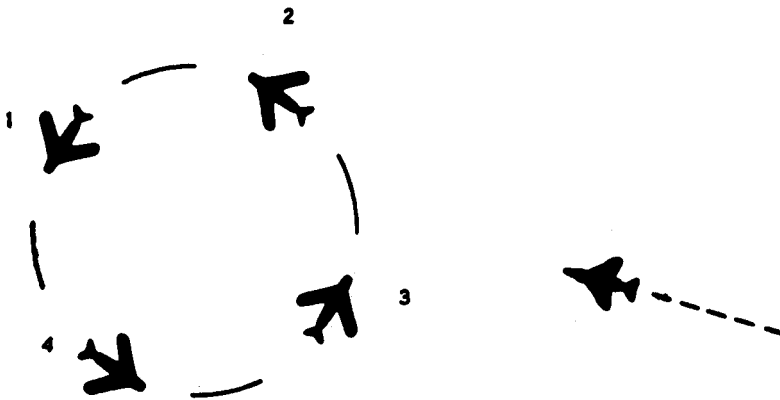
The wheel formation was used in one of two

ways: (1) the circle could tighten to prevent the faster moving, heavier U.S. aircraft from getting into the turn, or (2) each time a USAF aircraft engaged an orbiting MIG, another MIG would cross the circle at full power to gain a firing position on the attacker.

Among the methods introduced for attacking MIG-17's in a Wagon Wheel formation was one in which U.S. aircrews initiated a tangential attack from outside the periphery of the Wagon Wheel to gain position for an AIM-7 shot. When lock-on and positive identification were secured outside of minimum missile range, this attack was effective and presented little threat to the attacking aircraft. However, the low altitudes of the Wheel created excessive noise problems on the attacking aircraft's scope, and radar lock-ons were the exception rather than the rule. It was extremely difficult to burn through ground clutter or to attain a full system lock-on. When this tangential attack was initiated for an AIM-9 or gun attack, the high angle-off of the attacking aircraft made it relatively easy for the MIG to force an overshoot before a tracking solution was achieved.



WAGON WHEEL FORMATION



GLOSSARY OF TERMS AND ABBREVIATIONS

- AA—Air-to-air (weapon)
 AAA—Antiaircraft artillery
 AAM—Air-to-air missile
 AB—Afterburner (with respect to jet aircraft, see definition below); Air Base (with respect to an installation)
 AC—Aircraft commander; the pilot designated in command of a given aircraft
 Acceleration maneuver—Another term for a low-speed Yo-Yo. (See Yo-Yo, Low-Speed)
 Ace—Unofficial term for a person with five or more aerial victories over enemy aircraft
 Acft—Aircraft
 ACM—Air combat maneuvering
 ACT—Air combat tactics
 Activate—1922–1959: To place a constituted unit on the active list and bring it into physical existence by assignment of personnel. 1960–: To place a constituted unit on the active list and thus make it available for organization by assignment of personnel
 AD—Air Division
 ADF—Automatic direction finder
 Afterburner—An auxiliary burner attached to the tail pipe of a jet engine for injecting fuel into the hot exhaust gases and burning it to provide extra thrust
 AGL—Above ground level
 AGM—Air-to-ground missile
 AGM-45—Shrike air-to-ground missile, anti-radiation type
 AGM-78—Standard Arm air-to-ground missile, anti-radiation type
 AI—Airborne intercept
 AIM—Air-intercept missile
 Aim-dot—(See Dot)
 AIM-4D—Falcon air-to-air missile, passive IR type
 AIM-9—Sidewinder air-to-air missile, passive IR type (B, D, E, G, and J models) and radar-guided (C model)
 AIM-7—Sparrow air-to-air missile, semiactive radar type (D and E models)
 Aiming error—Deviation of the actual aim point from the desired aim point.
 Air abort—Cancellation of an aircraft mission for any reason other than enemy action, at any time from take-off to mission completion
 AI radar—Airborne intercept radar
 Aircrew—The full complement of air officers and airmen who man, or are designated to man, an aircraft in the air; also applied in certain contexts to the pilot of a single-place aircraft; often shortened to "crew"
 ALQ-51—Broadband deception ECM system
 ALQ-71—Noise jamming ECM pod (production model of the QRC-160-1)
 Angle-off—Angular position off the tail of the reference aircraft (See Aspect angle)
 APQ 100/109—Airborne intercept radar in F-4C/D aircraft
 APR-25/26—Radar scanner aboard B-52 and certain fighter aircraft
 APR-26—Crystal video airborne warning receiver to detect SA-2 guidance signals
 APR-27—Airborne radar warning receiver
 ARIP—Air refueling initial point (See Initial Point)
 ASE Circle—Allowable steering error circle on radar display, provided by fire control computer
 Aspect angle—The angular measurement between the line of the flight of an aerial target and the attacker's line of sight, in degrees (See Angle-off)
 Atoll—Soviet-built air-to-air missile, infrared seeker type, similar to U.S. AIM-9 IR-homing missile
 Attach—To place units or personnel in an organization where such placement is relatively temporary
 Auto-acquisition—Automatic radar lock-on capability in the front cockpit of an F-4 aircraft
 Auto-track—Automatic tracking in which a servo-mechanism keeps the radar beam trained on the target
 AW—Automatic weapons
 Back—The individual occupying the back, or rear, seat of an F-4 aircraft (See GIB)
 Ballistic—Unguided, i.e. follows a ballistic trajectory when thrust is terminated
 Bandit—Term for an enemy aircraft
 BARCAP—Barrier combat air patrol; fighter cover between the strike force and an area of expected threat; a MIG Screen for one or more missions (See CAP)
 Barrel roll—A 360° rolling maneuver in which the flight path of the aircraft describes a helix about the intended direction of the flight (See p. 167)
 Big Eye—Term for USAF airborne EC-121 early warning radar aircraft; term used from Apr 1965 to Mar 1967, then changed to College Eye (See College Eye; Disco)
 Bingo (fuel)—Minimum fuel quantity reserve established for a given geographical point to permit aircraft to return safely to its home base, an alternate base, or an aerial refueling point
 Blip (radar)—A spot of light on a radar scope, representing the relative position of a reflecting object such as an aircraft; sometimes called "pip"
 Bogey—Unidentified aircraft

- Bogies**—Two or more unidentified aircraft
- Boresight mode**—Radar operation mode in which the antenna is aligned and locked 2° below the fuselage reference line of the F-4 aircraft
- Break**—An emergency turn in which maximum performance is desired instantly to destroy an attacker's tracking solution
- Break X**—Minimum range indication for missile launch; X appears on the radar scope at minimum range
- Brown Cradle**—Nickname for EB-66C aircraft equipped with ECM equipment used in jamming enemy fire control radars
- Bullseye**—A reference point in North Vietnam
- "Burner"**—Afterburner
- CAP**—Combat air patrol; an aircraft patrol provided over an objective area, over the force protected, over the critical area of a combat zone, or over an air defense area, for the purpose of intercepting and destroying hostile aircraft before they reach their target (See BARCAP, CAP/Strike, Fast CAP, FORCAP, MIGCAP, RESCAP, SARCAP, Slow CAP and Strike/CAP)
- CAP/Strike**—Aircraft fraggged (q.v.) with a primary CAP role and a secondary strike role; such aircraft are permitted to jettison strike ordnance and actively pursue any enemy aircraft sighted. They are not restricted to defensive encounters.
- Cartwheel**—(See Wheel)
- CAS**—Calibrated air speed (in knots); also, close air support
- Cell(s)**—Cellular unit(s); unit(s) of airborne military aircraft, usually bombers and/or tankers, made up of a number of individually organized cells or teams which may operate independently of one another to provide flexibility
- Centerline tank**—A fuel tank carried externally on the centerline of the aircraft
- Chaff**—A type of confusion reflector, which consists of thin, narrow metallic strips of various lengths to provide different responses, used to create false signals on radar scopes
- Chandelle**—A maximum performance climbing turn in which speed is converted to altitude while reversing direction
- Chatter (radio)**—Multiple communications on the same radio frequency, usually applied to communications which are of little interest to the individual using the term
- Christmas truce**—Period from 25 Dec 1965 to 30 Jan 1966, when bombing of North Vietnam was halted
- Close**—To decrease separation between aircraft
- Closure**—Relative closing velocity
- Cloud Nine**—Slang term referring to a feeling of elation or haziness
- Col**—Colonel
- College Eye**—Term for USAF EC-121 airborne early warning, intercept control, MIG warning, and vectoring aircraft from Mar 1967 to Dec 1968 (See Big Eye; Disco)
- Combat-spread**—A loose formation which affords each flight member the opportunity for maximum visual look-out
- Constitute**—To designate a unit (by name, or number and name) and place it on the inactive list, thus making it available for activation
- Cool (ed)(ing)**—Employment of a gas for cooling the heat-seeker head of the AIM-4D air-to-air missile in preparation for firing
- Cover**—The protection given to a surface area or force, or to a force of aircraft in the air, by maintaining fighter aircraft in the air to repel or divert attack, especially air attack; also, the aircraft providing, or designated to provide, the protection
- Cpt**—Captain
- CR**—Credit, or aerial victory credit
- Cross-turn**—A rapid, simultaneous 180° change of heading by the members of an element or flight, in which half of the unit turns toward the other half
- Cut-off (tactic)**—Employing the shortest route to intercept an enemy airborne target
- Deck**—A flight altitude just above the surface, as used in such phrases as "to hit the deck," "to fly on the deck," and "to dive toward the deck"
- Defensive spiral**—A descending, accelerating dive using high-G and continuous roll to negate an attack and to gain lateral separation
- Defensive split**—A controlled separation of a target element into different planes, used in an attempt to force the interceptors to commit themselves to one of the members of the target element
- Defensive turn**—A basic defensive maneuver designed to prevent a attacker from achieving a launch or firing position; the intensity of the turn is determined by the angle-off, range and closure of the attacking aircraft
- Demobilize**—To withdraw all personnel from an organized unit and withdraw the unit's designation, thereby terminating the unit's existence
- Deploy**—To relocate forces to desired areas of operation
- DF**—Direction finding
- Disband**—To withdraw the designation of an inactive unit, or withdraw all personnel and the designation of an active or organized unit, thereby terminating the unit's existence
- Disco**—Radio call sign for College Eye, the EC-121 aircraft which provided airborne navigational assistance, border warnings, and MIG warnings
- Discontinue**—To withdraw all personnel of an organized unit
- Disengage**—To break off combat with the enemy
- DME**—Distance measuring equipment
- DMZ**—Demilitarized zone
- Dogfight**—An aerial battle, especially between opposing fighters, involving considerable maneuvering and violent aerobatics on both sides
- Dot**—Electronic dot appearing on the radar scope when radar is locked on, providing computed steering vectoring information (See Aim-dot; Steering-dot.)
- EB-66**—A light reconnaissance bomber which has several configurations for gathering electronic intelligence data or for radiating jamming to provide protection for strike forces
- Echelon**—A formation in which flight members are positioned sequentially on one side of the lead aircraft
- ECM**—Electronic countermeasures: the prevention or reduction of effectiveness in enemy equipment and tactics used by electromagnetic radiations; some activities exploit the enemy's emissions of these radiations
- ECM pod**—Pylon or fuselage-mounted container which houses multiple transmitters and associated electronic devices; a

- self-protection device for aircraft penetrating an electronically-controlled ground-to-air defense system
- Element**—USAF term for the basic fighting unit (two aircraft)
- Encounter**—A series of time-continuous actions between specific US and enemy (or bogey) aircraft
- Engagement**—An encounter which involves hostile, or aggressive action by one or more of the participants
- Envelope**—A volume of airspace within which a particular weapon or weapon system must operate, be expended, or be employed in order to achieve maximum effectiveness; also field of maneuver (See p. 160)
- EWO**—Electronic warfare officer
- FAC**—Forward air controller
- Faceplate**—North Atlantic Treaty Organization designator for early models of the MIG-21
- Falcon**—Nickname for the AIM-4 air-to-air missile, passive IR type
- Farmer**—North Atlantic Treaty Organization designator for the MIG-19
- Fast CAP**—Combat air patrol for strike aircraft, particularly fighters, as opposed to slow CAP
- Fast-FAC**—A forward air controller in an F-4 or other fighter aircraft
- FCS**—Fire control system
- Fighting Wing**—A formation by which the wingman can provide optimum coverage and maintain maneuverability during maximum performance maneuvers
- Finger-four**—(See **Fingertip**)
- Fingertip**—A four-aircraft formation in which the aircraft occupy positions suggested by the four fingertips of either hand, the fingers being held together in a horizontal plane
- 1st Lt (or 1Lt)**—First Lieutenant
- Fishbed**—North Atlantic Treaty Organization designator for later models of the MIG-21
- Flak**—Antiaircraft shrapnel
- Flak envelope**—A varying vertical unit of airspace in which a particular type of AAA is effective (See **Envelope**)
- Flame(d) out**—The extinguishment of the flame in a reaction engine, especially a jet engine
- Flight**—USAF term for a tactical fighter unit, usually consisting of two elements, each element of two aircraft
- Flight integrity**—Aircraft maneuvering in relation to, and in support of, one another
- Fluid element**—The second or supporting element in a fluid-four formation, flying in a high or low element position
- Fluid-four**—A tactical formation having the second element spread in both the vertical and horizontal planes to enhance maneuverability, mutual support and look-out ability (See p. 165)
- FORCAP**—Force combat air patrol: patrol of fighters maintained over the task force to destroy enemy aircraft which might threaten the force (See **CAP**)
- Frag**—(See **Frag Order**)
- Fragged**—Mission directed by fragmentary operational order from higher headquarters
- Frag Order**—A fragmentary operations order; the daily supplement to standard operations orders governing the conduct of the air war in Southeast Asia; directs a specific military mission
- Freedom Train**—Nickname for JCS-directed USAF strikes against targets in North Vietnam as far as 20° N latitude during the period 6 Apr–7 May 1972; replaced by **Linebacker I**
- Fresco**—North Atlantic Treaty Organization designator for the MIG-17
- Friendl (ies)(y)**—Aircraft belong to, or held by, one's own forces or the forces of an allied nation
- Front**—The individual in the front seat of the F-4; the aircraft commander
- Ftr**—Abbreviation for fighter
- G**—Unit of acceleration (32.2 ft/sec²): unit of force applied to a body at rest equal to the force exerted on it by gravity
- G**—Gunner; or specifically in this work, a B-52 gunner
- Gaggle**—Slang term for a number of aircraft operating in close proximity but not necessarily in any semblance of formation
- Gate**—To fly at maximum possible speed or power (full afterburner power); also refers to Range Gate, an indication on F-4 radar of the distance between the target and the interceptor
- GCA**—Ground-controlled approach
- GCI**—Ground-controlled intercept
- Gen**—Abbreviation for General, often in combination with other abbreviations for different levels, e.g., Brig (Brigadier) Gen, Maj Gen, or Lt Gen
- GIB**—"Guy in Back;" the backseat crew member in fighter aircraft (See **Back**)
- G-load**—The force exerted upon a pilot (and his aircraft) by gravity or a reaction to acceleration or deceleration as in a change of direction (maneuvering)
- Growl**—(See **Missile tone**)
- Guard**—Emergency UHF radio channel usually monitored by all aircraft and ground stations as a secondary frequency, in addition to primary tactical frequencies
- Guide**—With respect to an air-to-air missile: to follow the course intended when fired
- Hard turn**—A planned turn in which the intensity of the turn is governed by the angle-off and range of the attacking aircraft
- Heat**—Armament switch setting for using infrared missiles
- HEI**—High explosive incendiary
- High-G**—Status of having the G-load increased during aircraft maneuvering
- Home(d)**—Of a missile: to direct itself toward the target by guiding on heat waves, radar, echoes, radio waves, or other radiation emanating from the target
- Home plate**—Nickname for base of origin
- Hos(ed) (ing)**—To direct an intense stream of gunfire toward the target, sometimes by pulling lead and allowing the enemy aircraft to fly into it
- H-time**—Hotel time; i.e., Zulu time plus 8 hours (See **Z-time**)
- Hunter-Killer**—An Iron Hand mission against targets of opportunity, flown by a flight of two specially equipped F-105's and two F-4's; (Earlier in the air war, flown by one F-105 and three F-4's, and called SAM Strike teams)
- IAS**—Indicated air speed

ID—Identification

IFF—Identification, friend or foe; aircraft transponding beacon receiving radar information distinguishing friend from foe

Immelmann—Maneuver in which the aircraft completes the first half of a loop and then rolls over to an upright position, thus changing direction 180° with a simultaneous gain in altitude (See p. 165)

Inactivate—1922–1959: To withdraw all personnel from an active unit and place the unit on the inactive list. 1960–: To transfer a discontinued unit from the active to the inactive list

Interlocks switch—A 2-position (“in” and “out”) switch on the F-4 front cockpit missile control panel; “in” position prevents AIM-7’s from firing until the FCS computer parameters are met

IP—Initial point; a well-defined point, usually distinguishable visually and/or by radar, used as a starting point for a bomb run to a target or for other tactical purposes, such as air refueling

IR—Infrared

IR missile—An infrared (heat-seeking) missile

Iron Hand—Nickname for a flight with special ordnance and avionics equipment, with a mission of seeking and destroying enemy SAM sites and radar-controlled AAA sites

JCS—Joint Chiefs of Staff

JCS target—A target appearing on the JCS target list

Jink (ed) (ing)—Constant maneuvering in both the horizontal and vertical planes to present a difficult target to enemy defenses by spoiling the tracking solution; a simultaneous change in bank, pitch, and velocity—at random

Joker—A term for fuel planning information: a particular fuel level usually selected to warn that bingo is approaching and further engagements should be avoided

Judy—Term used to indicate that the interceptor has contact with the target and is assuming control of the engagement

KCAS—Knots calibrated air speed

KIAS—Knots indicated air speed

Kill—An enemy airplane shot down or otherwise destroyed by military action while in flight

Kt—Knot (one nautical mile per hour)

KTAS—Knots true air speed

Lead—The lead aircraft in a flight or element, or the lead element of a flight; also a reference to a specific lead aircraft or its pilot

Lead angle—The angle between the line of sight to a moving target and the line of sight to the predicted position of the target at the time the projectile intercepts the target

Lead-pursuit curve—The path followed by an attacking aircraft when its guns are continually aimed so that the bullets will strike the target aircraft (i.e., leading the target)

Lethal envelope—The envelope within which parameters can be met for successful employment of a munition by a particular weapon system (See Envelope)

LGB—Laser-guided bomb

Linebacker—A series of JCS-directed USAF strikes against targets in North Vietnam; Linebacker I began 9 May 1972

and ended 22 Oct 1972; Linebacker II ran from 18 to 29 Dec 1972

Lock-on (lock-up)—To follow a target automatically in one or more dimensions (e.g., range, bearing, elevation) by means of a radar beam

Loose deuce—A term to describe fighter tactics in which two to four aircraft maneuver to provide mutual support and increased firepower

LtC—Lieutenant Colonel

LtCdr—Lieutenant Commander

Lufberry Circle—A circular tail chase, ascending or descending

M—Mach

Mach—The ratio of the aircraft’s velocity to the velocity of sound in the surrounding medium

Maj—Major

Maximum power—Afterburner power

Maximum turn-rate—Turn rate at which the maximum number of degrees per second is achieved

mi—Mile

MIG—The name for the Mikoyan/Gurevich series of Soviet jet fighter aircraft

MIGCAP (or MIG cap)—Combat air patrol directed specifically against MIG aircraft (See CAP)

MIGSCREEN (or MIG Screen)—Mission wherein protection of a strike force is provided by placing fighters between the threat (MIG’s) and the protected force in a specific area

mil—Milliradian; one mil=0.0573 degrees; one degree=17.45 mils; about one foot at 1,000 feet

Military power—Maximum unaugmented (no afterburner) thrust of the aircraft engine

Missile free—Authority to fire missiles unless a target is identified as friendly

Missile tone—Audio signal indicating an AIM-9 is locked on to an infrared source

mm—Millimeter, as in 20-mm

MR—Military Region; the Republic of Vietnam was divided into four military regions

M-61—Vulcan 20-mm cannon used on the F-105 and F-4 aircraft, either by itself or incorporated into SUU-16 or SUU-23 gun pods

M/Sgt—Master Sergeant

MSL—Mean sea level; used as a reference for altitude

Narrow Gate—Mode which can be selected on a radar missile which will allow it to home only on targets with a selected range of “rate of closure”

NAVAIDS—Navigational aids

Negative G—A G-force exerted upon the human body as a result of footward acceleration

Night Owl—Night strike mission(s)

NM (or nm)—Nautical mile: 6,076.1 feet

Noise—Unwanted sound or disturbances found in or introduced into a communication system, or appearing on a radar scope

NVN—North Vietnam

NVNAF—North Vietnamese Air Force

Orbit—A circular or elliptical pattern flown by aircraft to remain in a specified area

Organize—1913–1922: To designate a unit and bring it into

- physical existence by assignment of personnel; 1960-: To bring an active unit into physical existence by assignment of personnel
- Overshoot—To pass through the defender's flight path in the plane of symmetry
- Overtake velocity—Sudden gain in speed to come up on another aircraft
- P—Pilot
- PACAF—Pacific Air Forces
- Padlocked—Term meaning that a crew member has sighted bogies or bandits and has his vision fixed on them; looking away would risk losing visual contact
- Pave Knife—Nickname for F-4's equipped for laser-guided bombing
- Phantom—Nickname for F-4 type aircraft
- Pip—(See Blip)
- Pipper—A 2-mil diameter dot in the center of the optical sight reticle (gunsight)—a dot of light within a lighted ring—used for aiming
- PIRAZ—Positive Identification Radar Advisory Zone
- Pk—Probability of kill
- Pod—Any one of several aerodynamically configured subsystems carried externally on fighter aircraft
- Pod formation—A formation of two or more aircraft flown in such a way that ECM pods installed on each aircraft offer mutual and maximum protection
- POL—Petroleum, oil, and lubricants
- Pop-up—A climbing maneuver from a low-altitude position or other position of concealment, used to gain an advantageous position for weapons delivery; also a maneuver used by enemy aircraft which involved a steep climb from a low-altitude area of concealment to an inbound aircraft or flight of aircraft (See p. 167)
- "Powdered"—Destroyed; caused it to disintegrate (with respect to aircraft)
- PRF—Pulse recurrence frequency
- Pulling lead—Act of aiming the nose of the aircraft ahead of an enemy aircraft; used primarily in a weapons firing maneuver
- Pull-up—An act or instance of pulling up; a pullout, or recovery from a dive; to bring the nose of an aircraft up sharply, especially from a level attitude
- Pylon—A projection under an aircraft's wing, designed for suspending ordnance, fuel tanks or pods
- QRC-160—Quick reaction capability noise jamming ECM pod, developed to counter new radar threats
- Radar (position)—One of three switch positions on the F-4 front cockpit missile control panel; used to select radar-guided missile (AIM-7's) as ordnance to be fired
- Radar signature—Characteristics peculiar to different aircraft which are distinguishable when displayed on a radar scope
- Range-analog bar—A part of the F-4 optical sight reticle which indicates the radar range to the target; does not appear on the reticle until a full-system lock-on has been achieved
- Rd(s)—Round(s) (of ammunition)
- Ready light—Light indicating a particular avionics/munitions system is operating and ready for use
- Recco—Reconnaissance
- Recon—Reconnaissance
- Reconstitute—To return a demobilized or disbanded unit to the inactive list, thereby making it available for activation
- Red—Term referring to the enemy, i.e., "Red" (Communist) North Vietnam
- Red Crown—Voice call sign for the radar-equipped USS *Long Beach* (CLN-9), the USN's PIRAZ ship, stationed in the northern part of the Gulf of Tonkin, which performed GCI functions
- Redesignate—To change the designation (name or name and number) of a unit
- RESCAP—Rescue combat air patrol (See CAP)
- Reticle—Optical sight reticle; a system of lines around a dot (pipper) in the focus of an optical gunsight that provides a reference for aiming and estimating range and distance to the target
- RHAW—Radar homing and warning; on-board aircraft equipment to warn pilot of active enemy defenses
- Ripple fire—Rapid sequential firing of two or more missiles
- Rivet Top—Nickname for experimental EC-121M aircraft tested in SEA beginning in Aug 1967; equipped with advanced airborne radar
- R-max—Maximum range
- Roger—Term meaning "Message received and understood"
- Rolling Thunder—Nickname for JCS-directed USAF air strikes against targets in North Vietnam; began as gradual reprisals rather than hard-hitting military campaigns, but gradually escalated into major air strikes as the war continued; phases of Rolling Thunder: Phase I, 2 Mar-11 May 1965; Phase II, 18 May-24 Dec 1965; Phase III, 31 Jan-31 Mar 1966; Phase IV, 1 Apr-24 Dec 1966; Phase V, 14 Feb-24 Dec 1967; and Phase VI, 3 Jan-1 Nov 1968
- Rollout—Termination of a maneuver, or series of maneuvers, designed to place an aircraft in a position which would most optimally assure completion of the intended activity, e.g., airborne intercept, instrument approach
- Route Package—One of seven geographical divisions of North Vietnam assigned for air strike targeting (RP 1 through 5, 6A, and 6B); Roman numerals sometimes used rather than arabic, such as RP-6A (See map, p. 9)
- RP—(See Route Package)
- RTAFB—Royal Thai Air Force Base
- RTB—Return (ed) to base
- Rudder reversal—A roll reversal using rudder only; normally used in maximum performance, high angle of attack maneuvering
- RVN—Republic of Vietnam (South Vietnam)
- RVNAF—Republic of Vietnam Air Force
- SAM—Surface-to-air missile
- Sandwich—Situation wherein an aircraft is positioned between two opposing aircraft
- SAR—Search and rescue
- SARCAP—Search and rescue combat air patrol, used to cover rescue operations; later changed to RESCAP (See CAP)
- SA-2—Soviet-built surface-to-air missile system
- Scissors—A defensive maneuver in which a series of turn rever-

sals are executed in an attempt to achieve the offensive after an overshoot by the attacker (See p. 165)

SEA—Southeast Asia

2 AD—2nd Air Division

Separation—The distance between the interceptor and the target aircraft; can be lateral, longitudinal, or vertical

Separation maneuver—An energy-gaining maneuver performed with a low angle of attack and maximum thrust, to increase separation (extend) or decrease separation (close)

Shrike—Nickname for the AGM-45 air-to-ground radar-seeking missile

Sidewinder—(See AIM-9)

Sidewinder tone—(See Missile tone)

SIF—Selective identification feature; an electronic device with variable codes for identification

“S”-ing—Performing a series of “S” turns

Six—Six (6) o’clock position or area; refers to the rear or aft area of an aircraft

Slice(d)—A maximum performance, hard, descending, nose-low turn with more than 90° of bank

Slow CAP—Combat air patrol for slower aircraft such as the B-66, B-52 or EC-121, as opposed to fast CAP

“S” maneuver—A weave in a horizontal plane

Snap-roll(ed)—An aerial maneuver in which an aircraft is made to effect a quick, complete roll about its longitudinal axis; the act of putting an aircraft into a snap-roll

Snap-up—A rapid pull-up to establish a climb and gain altitude in order to launch a weapon against an enemy aircraft at a higher altitude.

Sparrow—(See AIM-7)

“S” Pattern—(See “S” maneuver)

Speedbrakes—Flaps designed for slowing down an aircraft in flight

Splash—Term meaning that destruction of the target has been verified by visual or radar means

Split-plane maneuvering—Aircraft or elements maneuvering in relation to one another, but in different planes and/or altitudes; for example, the defensive split

Split-S—180° rotation about the aircraft’s longitudinal axis followed by a 180° change of heading in a vertical plane (a half loop starting from the top) (See p. 165)

Squawk—Term meaning to turn the IFF master control switch to “normal” position so that the IFF can respond to interrogation

SSgt—Staff Sergeant

Standard Arm—Nickname for the AGM-78 air-to-ground missile, anti-radiation type

Standdown—Term meaning that an aircraft stays out of the air, or refrains from air operations, for any number of valid reasons

Steering dot—(See Dot)

Stratofortress—Nickname for the B-52

Streamer(ed)—A parachute that does not open fully when deployed, but streams or trails backward

Strike—An attack upon a surface target, intended to inflict damage on or to destroy an enemy objective

Strike/CAP—Aircraft fragged for a primary strike role with a secondary air defense role; these aircraft are permitted to

jettison strike ordnance and engage enemy aircraft only if they come under direct attack.

“S” turn—A turn to one side of a reference heading followed by a turn to the other side; provides a difficult tracking problem for ground radars

SUU-16—Gun pod containing the M-61 Vulcan 20-mm cannon used on F-4C aircraft

SUU-23—Gun pod containing the M-61 Vulcan 20-mm cannon used on F-4D aircraft

SW—Strategic Wing

Sweep—An offensive mission by several fighter aircraft, sometimes accompanied by fighter-bombers, over a particular area of enemy territory for the purpose of seeking out and attacking enemy aircraft or targets of opportunity; the action of flying over an area in making a search; the path flown in making a search; to clear the skies or other places of opposition

TAC—Tactical Air Command

Tac—Tactical

Tacair—Tactical air

TACAN—Tactical air navigation; an active electronic navigational system which locates the aircraft with respect to another installation

Tally-ho—Term meaning that the target has been visually sighted

TAS—True air speed (in knots)

TCA—Track-crossing angle; the angle between flight paths measured from the tail of the reference aircraft

TDY—Temporary duty; the status of being on TDY

Tet—Vietnamese lunar New Year

TFS—Tactical fighter squadron

TFW—Tactical fighter wing

Thud—Nickname for the F-105

Thud Ridge—Nickname for a mountain range beginning about 20 NM north-northwest of Hanoi and extending about 25 NM northwest, used for navigational and terrain masking; located in RP-6A (See map, p. 48)

Thunderchief—Nickname for the F-105

Tone—(See Missile tone)

Top Cover—(See Cover)

TOT—Time over target

Tracking—Term referring to the maintaining of the center of the field of view of search radars or airborne sensors on a target

Trail formation—Aircraft directly behind one another

Troll(ed)(ing)—Flying a random pattern by ECM aircraft to detect enemy electronic signals; flying a pattern in a specific area to detect signals of a suspected SAM or AAA site

TRW—Tactical reconnaissance wing

T/Sgt—Technical Sergeant

Tuck-under—A tendency of certain aircraft to drop its nose when flying at or near its critical mach number

Turn radius—A radial distance required to effect a 180° turn which varies according to the aircraft’s speed and altitude

UHF-DF—Ultra high frequency direction finder

Unk—Unknown

Unload(ed)(ing)—To reduce the angle of attack (thus, the G-load) on an aircraft, primarily for the purpose of gaining speed

- US—United States (of America)
 USAF—United States Air Force
 USMC—United States Marine Corps
 USN—United States Navy
 USSR—Union of Soviet Socialist Republics
 Vc—Relative closing velocity; closure
 Vector—A command which directs an aircraft to follow a specific heading
 Vertical rolling scissors—A defensive, rolling maneuver in the vertical plane executed in an attempt to achieve an offensive position on the attacker (See p. 167)
 VFR—Visual flight rules
 VID—Visual identification
 Wagon Wheel—(See Wheel)
 Walleye—Nickname for the AGM-62 air-to-ground missile, anti-materiel type
 Weapons system—Refers to the combination of aircraft, crew, ordnance, avionics, etc.
 Weave—A formation in which the two elements of a flight or the two members of an element continuously cross each other's flight path, normally in the horizontal plane, to increase their visual coverage of each other's rear area; also provides a difficult tracking problem for ground radars
 Wheel—Wagon Wheel or Cartwheel; an enemy defensive formation in which two or more aircraft circle in the horizontal plane while covering each other's rear area against attack (See p. 170)
 Whifferdill—A maneuver used to change direction 180°. The nose is raised 30 to 60 degrees, then 90 degrees of bank is used to reverse direction of flight and to pull the nose down below the horizon
 Wild Weasel—F-100F/F-105F aircraft equipped with RHAW and anti-radiation missiles, enabling them to home on SA-2 radar guidance signals and to mark the location of missile sites
 Winchester—Term indicating that all ordnance has been expended
 Wingman—Pilot (or aircraft) who flies at the side and to the rear of an element leader. In an aircraft flight, 02 is wingman to lead (01), and 04 is wingman to 03. Usually, more experienced pilots fly the lead and 03 positions in a flight, and these pilots initiate combat actions while their wingmen fly cover
 WSO—Weapon systems officer; backseater in the F-4
 Yaw—Rotation of an aircraft about its vertical axis so as to cause the longitudinal axis of the aircraft to deviate from the line of flight
 Yo-Yo, High-Speed—An offensive tactic in which the attacker maneuvers through both vertical and horizontal planes to prevent an overshoot in the plane of the defender's turn (See p. 167)
 Yo-Yo, Low-Speed—A dive for air speed and a pull-up for position closure or extension; also called an acceleration maneuver (See p. 167)
 Zoom—An unloaded climb used to gain maximum altitude while dissipating minimum energy
 Z-time—Zulu time; a term for Greenwich mean time.
 Zulu—(See Z-time)



Index*

Aces

- crediting system: v-vi, 22
- first: vi, 20, 102-111
- ranking: 93
- U.S. Navy: vi

Advisors, assignment: 1

Aerial photography. *See* Reconnaissance operations

Aerospace Division, 818th: 143

Air Commands

- Strategic: 4, 16, 112
- Tactical: 143, 146-154, 155

Air crews, proficiency: 19-20

Air Defense Command: 4

Air defenses. *See* Antiaircraft defenses and weapons; Missiles; Radar systems

Air Divisions:

- 2d: 22, 25-26, 118, 127-128, 132, 136, 142-143, 146, 152
- 41st: 146
- 831st: 142
- 832d: 144
- 835th: 142, 148

Air Forces

- Pacific: v, 3, 94, 141-146
- Seventh: v-vi, 12, 14-16, 35, 64, 66, 68, 73, 78, 96, 102, 109, 115, 142-144, 152
- Eighth: 142
- Thirteenth: 142, 144, 146, 148, 154

Air operations, vi, 1, 3-4

- advantages, USAF: 85
- advantages, enemy: 48, 85
- air-to-ground missions: 155
- bombing operations. *See* Bombing operations
- characteristics of combat: 160-161
- close-support missions: 155
- commencement: 19
- counter-air missions: 15
- enemy, general: 7, 22, 35-42, 83
- fighter operations. *See* Fighter operations
- first double kill: 44
- first kills: vi, 22-28, 90, 94
- first mission: 19

first night action: 85

first quadruple kill: 60

formations. *See* Formations and maneuvers, combat

gunners, kills by: 111-115, 117

hunter-killer missions: 103, 108

inertial-guidance system: 155

instrument flight control: 155

interdiction missions: 155

kills distribution: 117-140, 155-157

kills ratios: vi, 101, 160-161

last kills: 115, 117

limitations on: 7, 35, 48, 80, 117

maintenance, supply and support forces: vi, 19-20, 37

maneuvers, combat. *See* Formations and maneuvers, combat

reconnaissance missions: vi, 4-5, 13-14, 43, 62, 68, 83, 101

search-and-rescue missions, vi, 14, 30, 47, 51, 105

sorties, number flown: 10, 17

superiority, definition and attainment: 1

support missions. *See* Escort and patrol missions

suspensions and resumptions: 20-27, 44-45, 64-66, 80-85, 88-89, 97, 101, 111, 115

tactics. *See* Tactics

teamwork, importance in: 103, 110

Air speed, advances in: 19

Air superiority, definition and attainment: 1

Air-to-ground missions: 155

Air units, organizations, assignment and operations: 141-154

Aircraft carriers: 90

Aircraft types

armament. *See* Armament, aircraft

capabilities and deficiencies: 55, 155

characteristics: 155-156

characteristics, enemy: 157-160

losses: 5, 7, 12, 14, 16-17, 19, 26, 32, 34, 48, 51, 64-66, 68-72, 74-76, 80, 84, 87-92, 94-97, 100-101, 105, 111

losses, enemy: 5, 7-8, 11-12, 14, 16-17, 19, 26-27, 29-35, 38-73, 85-115, 117, 141-154, 160

models employed: 155

ranges: 155-156

ranges, enemy: 160

*Photo captions are annotated pc.

- speeds: 19, 155-156
 A-1: 47
 A-7: 16
 B-17: 156
 B-29: 111
 B-52: 4, 14, 16-17, 85, 90, 111-115, 117, 125, 135, 138, 155-157
 EB-66: 4, 7-8, 16, 30, 35, 37-42, 58, 72, 85, 91
 EC-121: 4, 7, 12, 14, 16, 91
 F-4: vi, 4-5, 7-12, 14-16, 29-44, 48-80, 84-111, 117-141, 155-158
 F-5: 12
 F-8: 19
 F-100: 4, 7
 F-104: 37-42
 F-105: 4-5, 7-8, 11-12, 14, 16, 19, 22, 26-27, 29-44, 46-80, 94, 103, 108, 117-141, 155-158
 F-111: 16
 KC-135: 37
 MIG: v-vi, 3-4, 7-16, 20-27, 35-42
 MIG-15: 13, 19, 26, 52-53, 68, 83, 157
 MIG-17: 7-10, 13, 19, 24, 26-27, 30-35, 44-48, 50-80, 83, 94, 117-140, 155-157, 159, 170
 MIG-19: 13, 83, 90, 94-96, 103-111, 118, 123-124, 127, 129-134, 138, 155-157, 160
 MIG-21: 7-14, 26, 28-29, 35, 38-49, 52-53, 57-58, 61-62, 65-80, 83, 85, 88-89, 91-115, 117-140, 155-157, 160
 RB-66: 28
 RC-121: 37
 RF-4: 43
 RF-101: 83
 Aircraft warning systems. *See* Ground control intercept systems;
 Radar systems
 Airfields, enemy (*see also by name*)
 construction and repair: 83
 strikes against: 11-12, 16, 106, 111
 Anderson, Harold: 22-25, 26 pc
 Anderson, Robert D.: 48-49 pc, 119, 127
 Anderson, Ronald C.: 22, 25, 26 pc, 118, 127
 Anderson, Wilbure E.: 22, 25, 26 pc
 Antiaircraft defenses and weapons, enemy: vi, 4, 10, 13-14, 16-17, 19, 26, 43-44, 48-49, 61-62, 66, 68-71, 75, 80, 83, 88, 96, 105, 189. *See also* Missiles
 Armament, aircraft
 bomb loads: 155-156
 bomb loads, enemy: 157
 caliber .50 guns: 155, 157
 computers in: 155-156
 enemy weapons: 157-160
 fire-control systems: 155
 high-explosive incendiary: 68, 105
 kills distribution: 157
 laser-guided bombs: 14, 16, 101
 missiles. *See* Missiles
 radars. *See* Radar systems
 rocket clusters: 7, 155
 rockets, enemy: 157, 160
 SUU-16 gun pod: 55, 60-61, 72, 77-79, 110, 150
 SUU-23 gun pod: 156, 158
 20-mm. guns: 10, 53, 55-57, 60, 62-63, 66, 71, 74-75, 79, 94-96, 104-105, 108, 118-140, 155, 157-158
 Vulcan gun: 53, 125
 Aronoff, Joel S.: 77
 Armor assaults, enemy: 14
 Atlanta call sign: 129
 Auto-acquisition of target: 102-103, 105
 Autrey, Daniel L.: 105, 124, 127
 Awards. *See* Decorations and awards
 Bac Giang: 27, 29, 50, 62, 75
 Bac Le: 58
 Bac Mai: 13
 Baily, Carl G.: 99-100, 100 pc, 123-124, 127
 Baker, Doyle D., USMC: 72, 121, 127
 Bakke, Samuel O.: 57, 120, 127
 Ballot call sign: 129, 133
 Balter call sign: 127, 132, 137
 Barrel roll attack: 167
 Barry, Phineas T.: 158 pc
 Barton, Charles D.: 108, 125, 127
 Basco call sign: 128, 130, 134-135
 Basel, Gene I.: 69-71, 71 pc, 121, 127
 Battista, Robert B.: 77, 122, 127
 Beatty, James M.: 94-95, 123, 127
 Beckers, Lyle L.: 94-95, 105, 123-124, 127
 Bell, James R.: 94, 123, 127
 Bettine, Frank J.: 102, 124, 127
 Bever, Michael R.: 54, 120, 127
 Bien Hoa Air Base: 149
 Big Eye radar: 4, 22
 Binh Long province: 14
 Binkley, Eldon D.: 112, 125, 127
 Bison call sign: 127
 Black River: 73, 98
 Blake, Robert E.: 27, 28 pc, 118, 127
 Bland, David F.: 109
 Blank, Kenneth T.: 32, 118, 128
 Bleakley, Robert A.: 29, 30 pc, 118, 128
 Bodenhamer, Howard L.: 47-48
 Bogoslofski, Bernard J.: 75, 122, 128
 Bokshar, William B.: 158 pc
 Boles, Robert H.: 77, 122, 128
 Bolo operations: 11, 35-42
 Bomb loads: 155-156
 Bomb loads, enemy: 157
 Bombing operations: 3-14, 16-17, 27, 29, 31-35, 44-45, 48-80, 85, 88, 89-115, 117, 155-156. *See also* Close air support
 Bombing operations, enemy: 13
 Bongartz, Theodore R.: 68, 121, 128
 Borchik, Albert S., Jr.: 75
 Brenda call sign: 131, 133, 137
 Brestel, Max C.: vi, 44-45, 119, 128
 Bridges, strikes against: 5, 19, 27, 29, 32-34, 62, 69, 72-73, 75, 96, 102, 105
 Broadcast stations, strikes against: 16, 111
 Brown, Frederick W.: 110-111, 125, 128

Brown call sign: 138
 Brunson, Cecil H.: 108, 125, 128
 Brunson, James E.: 113, 125, 128
 Bucket call sign: 127, 137
 Buick call sign: 20-22, 127-129, 131, 133, 135-136
 Buffer zones: 5, 7, 11
 Burgess, Ray M.: 78-79
 Burr, Daniel S.: 58
 Buttell, Duane A., Jr.: 31-32, 32 pc, 118, 128
 Buttrey, Ronald W.: 104 pc

Cactus call sign: 135, 137
 Cadillac call sign: 127, 130
 Cahill, Robert V.: 78
 Cairns, Douglas B.: 64
 Call signs

Atlanta: 129
 Ballot: 129, 133
 Balter: 127, 132, 137
 Basco: 128, 130, 134-135
 Bison: 127
 Brenda: 131, 133, 137
 Brown: 138
 Bucket: 127, 137
 Buick: 20-22, 127-129, 131, 133, 135-136
 Cactus: 135, 137
 Cadillac: 127, 130
 Chevrolet: 129-130
 Chevy: 128, 131, 134, 138
 Chicago: 49, 127, 133, 135, 139
 Crab: 131, 135, 137, 139
 Crafty: 132-133
 Crossbow: 53, 137-138
 Date: 134, 137
 Dodge: 130, 136
 Drill: 52, 131, 136
 Eagle: 127-129, 134, 138
 Elgin: 58, 127, 129, 132-133, 136, 138-139
 Falcon: 132-134
 Finch: 127, 131, 136
 Flamingo: 133, 135
 Ford: 38, 40, 129, 131, 133-134, 136, 139
 Galore: 129, 132
 Gambit: 127, 131-132, 136
 Gopher: 127, 130, 133, 135
 Hambone: 133, 139
 Harlow: 129-130
 Harpoon: 127, 131, 133, 138
 Honda: 128
 Icebag: 135-136
 Iceman: 128, 131
 Kangaroo: 128
 Killer: 130, 139
 Kimona: 137
 Kingfish: 132, 138
 Lark: 132, 136
 Leech: 136
 List: 130, 134

Nash: 132, 134-135, 138
 Nitro: 132, 138
 Oakland: 135
 Olds: 128-131, 134-139
 Opal: 133, 136, 138
 Otter: 129-131, 137, 139
 Oyster: 129-130, 133-134, 136
 Panda: 47-48, 130
 Papa: 135, 138
 Parrot: 129, 132
 Paula: 129, 136
 Pistol: 127, 132, 137, 139
 Rambler: 128-131, 137
 Random: 135-136
 Rattler: 50, 133
 Robin: 129, 134, 137, 139
 Ruby: 135
 Sapphire: 134, 137
 Snug: 127, 130
 Speedo: 129, 131, 138
 Spitfire: 131
 Stinger: 129, 138
 Tampa: 128-129, 132, 135, 138
 Unknown: 127-134, 136-138
 Vega: 20-22, 134-135, 139
 Wander: 138-139
 Wildcat: 136
 Cam Pha: 108
 Cam Ranh Bay Air Base: 158
 Cambodia: 1, 14
 Cameron, Max F.: 27, 28 pc, 118, 128
 Canal des Rapides: 69
 Cannon Air Force Base, N.M.: 153
 Cao Nung: 77
 Carroll, R.: 87
 Cary, Lawrence E.: 41-42, 42 pc, 119, 128
 Cat Bi airfield: 37
 Catton, Ronald E.: 54
 Cease-fire declared: 115
 Chap Le: 13
 Cherry, Edward D.: 89, 123, 128
 Chevrolet call sign: 129-130
 Chevy call sign: 128, 131, 134, 138
 Chicago call sign: 49, 127, 133, 135, 139
 Chief of Staff, U.S. Air Force. *See* McConnell, John P.; Ryan, John D.
 China, Communist. *See* People's Republic of China
 Christiansen, Von R.: 97-98, 123, 128
 Christmas truces: 7, 11-12
 Chute, Clarence W.: 114
 Clark, Arthur C.: 22, 25, 26 pc, 118, 128
 Clark Air Force Base, Philippines: 151, 153
 Clements, Donald F.: 158 pc
 Cleveland, Edward Y.: 103
 Clifton, Charles C.: 38, 119, 128
 Close-support missions: *See also* Bombing operations; Fighter operations
 Clouser, Gordon L.: 108, 125, 129

- Coady, Thomas J.: 103
Cobb, Lawrence (Larry) D.: 53, 68–69, 121, 129
Coe, Richard E.: 106, 124, 129
Combat Crew Training Wing, 4453d: 150–151
Combies, Philip P.: 40–41, 60, 60 pc, 119, 121, 129
Computers, combat use: 155–156
Cooney, James P.: 94, 123, 129
Couch, Charles W.: 53, 120, 129
Counter-air missions: 155
Crab call sign: 131, 135, 137, 139
Crafty call sign: 132–133
Craig, James T., Jr.: 56 pc, 56–57, 120, 129
Crane, Dale A.: 89
Crews, Barton P.: 90, 123, 129
Crocker, Stephen B.: 59, 60 pc, 121, 129
Crossbow call sign: 53, 137–138
Crosson, Gerald J., Jr.: 78
Cunningham, Randy: vi

Da Nang: 28, 35
Da Nang Air Base: 143–144, 146–147, 151, 153, 158
Dai Loi: 67, 73
Dalecky, William J.: 105
Dalton, William M.: 73–74, 122, 129
Dap Cau: 32–34, 76
Date call sign: 134, 137
Davis-Monthan Air Force Base, Ariz.: 149–151
Dawson, Leland: 32 pc
DeBellevue, Charles B.: vi, 20–22, 93, 98–100, 100 pc, 103–105, 104 pc, 105 pc, 123–124, 129
Deception. *See* Ruses, application of
Decorations and awards: 26
Demilitarized Zone: 13–14, 87
Democratic People's Republic of Korea. *See* North Korea
Democratic Republic of Vietnam. *See* North Vietnam; North Vietnam Air Forces; North Vietnam Army; North Vietnam Navy
DeMuth, Stephen H.: 55–56, 56 pc, 120, 129
Dennis, Arthur F.: 50, 120, 129
Dickey, Roy S.: 35, 119, 129
Diehl, William C.: 109–110, 125, 129
Dien, Ngo Dinh: 1
Dien Bien Phu: 1
Dilger, Robert G.: 51–52, 52 pc, 120, 129
Disco radar: 14, 20–22, 85–87, 98–99, 106, 108
Distinguished Flying Cross awards: 26
Documents, capture and exploitation: 14
Dodge call sign: 130, 136
Dong Dau: 75
Doom Club: 35
Dowell, William B. D.: 29, 29 pc, 118, 129
Drew, Philip M.: 73–74, 122, 130
Drill call sign: 52, 131, 136
Driscoll, William: vi
Dubler, John E.: 114–115, 125, 130
Dudley, Wilbur R.: 30, 118, 130
Dunnegan, Clifton P., Jr.: 41–42, 42 pc, 119, 130
Dutton, Lee R.: 40–41, 119, 130

Eagle call sign: 127–129, 134, 138
Easter offensive, 1972: vi
Eaves, Stephen D.: 93, 123, 130
Eden, Douglas W.: 97
Eglin Air Force Base, Fla.: 146, 148–149
Eisenhower, Dwight D.: 1
Ejections: 46, 65
Electronic countermeasures systems: 4, 11, 14, 16–17, 30, 37, 43, 75, 85, 97, 155–156
Electronic countermeasures systems, enemy: 26
Electronic warfare crews: vi
Elgin call sign: 58, 127, 129, 132–133, 136, 138–139
Enemy aircraft claims evaluation boards: v, 66, 73, 102, 109, 115
Escort and patrol missions: 4, 8, 12, 14–16, 22, 27–32, 35, 37, 43, 47, 51–55, 57–58, 60, 62–80, 85–88, 90–115, 161–165
Escort and patrol missions, enemy: 44
Eskew, William E.: 47, 119, 130
Ettel, Michael J., USN: 101, 124, 130
Evans, Bob C.: 37, 37 pc
Evans, Robert E.: 27, 28 pc, 118, 130

Faison, James E.: 158 pc
Falcon (AIM-4) air-to-air missile: 63–64, 69, 72, 75–77, 79, 122, 127, 129, 131–133, 135–137, 156–157
Falcon call sign: 132–134
Feezel, Tommy L.: 93
Feighny, James P., Jr.: 79, 122, 130
Feinstein, Jeffrey S.: vi, 89, 95–96, 99–100, 100 pc, 102, 109, 109 pc, 123, 124, 125, 130
Ferguson, Alonzo L.: 53
Fighter operations: 4, 8–17, 19–73, 85–111. *See also* Close air support; Napalm strikes; Tactics
Fighter-Interceptor Wing, 51st: 154
Finch call sign: 127, 131, 136
Fire-control systems: 155
Flamingo call sign: 133, 135
Fluid-four formation: 22, 91–92, 97, 165
Ford call sign: 38, 40, 129, 131, 133–134, 136, 139
Formations and maneuvers, combat: 164
 barrel roll attack: 167
 escort and patrol missions: 4, 8, 12, 14–16, 22, 27–32, 35, 37, 43, 47, 51–55, 57–58, 60, 62–80, 85–88, 90–97, 115, 161–165
 escort and patrol missions, enemy: 44
 fluid-four: 22, 91–92, 97, 165
 high- and low-speed yo-yo: 167
 Immelmann turn: 165
 loose-deuce: 24
 Lufbery circle: 45, 47, 170
 pop-up maneuvers: 167–170
 scissors maneuver: 165–167
 split-S: 165
 strike formations: 91–92
 tactics of. *See* Tactics, combat
 vertical rolling scissors: 167
 wagon wheel: 57, 63, 78, 95, 170
France: 1
Freedom Train operation: 14–16

- Frye, Wayne T.: 92, 94, 123, 130
 Funk, Carl: 110
- Galore call sign: 129, 132
 Gambit call sign: 127, 131–132, 136
 George Air Force Base, Calif.: 143, 150–152
 Gast, Philip C.: 44–45, 53, 120, 130
 Geneva conferences: 1
 George, S. W.: 27, 28 pc, 118, 130
 Gia Lam International Airport: 12, 37, 71–72
 Giap, Vo Nguyen: 1, 14
 Gilmore, Paul J.: 27–29, 29 pc, 118, 130
 Givens, Billy R.: 66
 Glynn, Lawrence J.: 41–42, 42 pc, 119, 131
 Golberg, Lawrence H.: 30, 31 pc, 118, 131
 Gopher call sign: 127, 130, 133, 135
 Gordon, William S., III: 68–69, 121, 131
 Gossard, Halbert E.: 29, 29 pc, 118, 131
 Graham, James L.: 73–74, 122, 131
 Green, Stanley C.: 97
 Griffin, Thomas M.: 105, 124, 131
 Ground control intercept systems: 4, 7, 12, 14, 16, 22, 38, 41, 44, 52, 55, 66, 78, 101
 Ground control intercept systems, enemy: 4–5, 7, 12–13, 39, 83, 94
 Ground crews. *See* Maintenance, supply and support forces
 Guam: 4
 Guerrilla operations, enemy: 1–3
 Gulf of Tonkin: 3–4, 14, 58–59, 85, 90
 Gullick, Francis M.: 63, 121, 131
 Gunners, kills by: 111–115, 117
- Ha Dong: 55, 60
 Ha Gia: 76
 Ha Tinh: 10
 Haefner, Fred A.: 54, 120, 131
 Haiphong: 6, 10, 12, 16, 83, 88, 111
 Hall, John A.: 69
 Hall, Richard: 22–24, 26 pc
 Hambone call sign: 133, 139
 Hamilton, Albert T.: 69
 Han Phong causeway: 50
 Handley, Philip W.: 96–97, 123, 131
 Hanoi: 5, 10, 12, 16, 48–49, 60, 69–71, 75, 88, 90, 94, 96–99, 104, 109, 111, 113
 Hanoi Circle: 11
 Harden, Kaye M.: 97–98, 123, 131
 Hardgrave, Gerald D.: 30, 31 pc, 118, 131
 Hardy, Richard F.: 98, 123, 131
 Hargrove, James A., Jr.: 55–57, 56 pc, 120, 131
 Hargrove, William S.: 104, 106, 124, 131
 Harlow call sign: 129–130
 Harpoon call sign: 127, 131, 133, 138
 Harris, David L.: 87
 Harris, Hunter, Jr.: 3, 3 pc
 Hartfield, Lonnie J.: 158 pc
 Heat-seeking home device: 25
 Height finders, enemy: 4
- Hendrickson, James L.: 110, 125, 131
 Higgins, Harry E.: 50, 120, 131
 High- and low-speed yo-yo: 167
 Hill, Robert G.: 76–77, 122, 131
 Hilliard, Michael A.: 106
 Hirsch, Thomas M.: 43, 119, 131
 Ho Chi Minh: 1, 3
 Ho Chi Minh Trail: 1–3
 Hoa Binh: 90
 Hoa Lac airfield: 12, 35, 45, 48, 52, 61
 Hodgdon, Leigh A.: 85, 122, 132
 Holcombe, Kenneth E.: 22–25, 26 pc, 118, 132
 Holland, Michael T.: 90
 Holloman Air Force Base, N.M.: 144, 151, 153
 Holtz, Robert L.: 109–110, 125, 132
 Homestead Air Force Base, Fla.: 149, 151
 Honda call sign: 128
 Host, John F.: 158 pc
 Howerton, Rex D.: 79, 122, 132
 Howman, Paul D.: 115, 125, 132
 Hudson, Sidney B.: 94
 Huneke, Bruce V.: 76, 122, 132
 Hunt, Jack W.: 47, 119, 132
 Hunter, Harris: 3. *See also* Pacific Air Forces
 Hunter-killer missions: 103, 108
 Huntley, Robert R.: 73–74
 Huskey, Richard L.: 75, 122, 132
 Huwe, John F.: 94, 123, 132
- Icebag call sign: 135–136
 Iceman call sign: 128, 131
 Identification, friend or foe: 12
 Identification, friend or foe, enemy: 97
 Imae, Stanley M.: 100–101, 124, 132
 Immelmann turn: 165
 Incendiary ammunition: 68, 105
 Indochina. *See* North Vietnam; Republic of Vietnam
 Inertial-guidance system: 155
 Instrument flight control: 155
 Intelligence operations and reports: vi, 113. *See also* Reconnaissance operations
 Interdiction missions: 155
- James, Daniel: 37, 37 pc, 38, 39–40
 Jameson, Jerry W.: 32–33, 32 pc, 118, 132
 Janca, Robert D.: 58, 120, 132
 Jaspersen, Robert H.: 108, 125, 132
 Jenkins, Gordon: 50
 Jettisons: 7, 10–12, 24, 26, 28, 30–31, 33, 35, 49, 51, 58, 60, 65, 73–74, 76, 88–89, 108, 113
 Johnson, Harold E.: 46–47, 119, 132
 Johnson, Lyndon B.: vi, 3, 4, 7, 12–13, 13 pc, 80, 88, 93, 117
 Joint Chiefs of Staff: 3, 10–11, 13–14, 17, 48. *See also* Moorer, Thomas H.
 Jones, Keith W., Jr.: 90, 123, 132
- Kadena Air Base, Okinawa: 147, 150, 153
 Kangaroo call sign: 128

- Keith, Larry R.: 20, 29, 30 pc, 118, 132
 Kelly, Alexander D.: 78
 Kennedy, John F.: 1
 Kep airfield: 11–12, 35–37, 48, 60, 71, 77, 94–95, 99, 105–106, 109, 113
 Khe Sanh: 12
 Kien An airfield: 12, 159
 Killer call sign: 130, 139
 Kills
 distribution by aircraft and weapon: 117–140, 155–157
 first: vi, 22–28, 90, 94
 first double: 44
 first quadruple: 60
 by gunners: 111–115, 117
 last: 115, 117
 ratios: vi, 101, 160–161
 Kimball, Wesley D.: 78–79
 Kimona call sign: 137
 Kingfish call sign: 46, 132, 138
 Kinh No: 57
 Kirchner, Peter A.: 100
 Kirk, William L.: 54, 59, 67–68, 67 pc, 120–121, 133
 Kisinger, Vernon E.: 158 pc
 Kissinger, Henry A.: 16–17
 Kittinger, Joseph W., Jr.: 85–87, 87 pc, 122, 133
 Kjer, Fred D.: 48, 49 pc, 119, 133
 Klause, Klaus J.: 34 pc, 35, 119, 133
 Knapp, Herman L.: 41
 Kontum province: 14
 Korat Royal Thai Air Force Base: 30, 33, 35, 62, 65, 78, 97, 146–147, 150–151, 153, 158
 Korean War comparison: 111
 Krieps, Richard N.: 31, 32 pc, 118, 133
 Kringelis, Emants: 30, 118, 133
 Kullman, Lawrence W.: 115, 125, 133
 Kunsan Air Base, Korea: 147, 151
 Kurz, Harold E.: 103
 Kuster, Ralph L.: 62–63, 63 pc, 121, 133
 Kutyna, Don: 126

 Lachman, Jerald L.: 89
 Lafever, William D.: 52, 120, 133
 Lafferty, Daniel L.: 60, 60 pc, 121, 133
 Lam airfield: 35
 Lambert, Robert W.: 57, 120, 133
 Lang, Alfred E., Jr.: 77–78, 122, 133
 Lang Lau: 72
 Laos: 1–3, 13–14, 85–89, 105
 Lark call sign: 132, 136
 Larson, George: 22, 24
 Laser-guided bombs: 14, 16, 101
 Latham, Wilbur J., Jr.: 34 pc, 35, 119, 133
 Lavoy, Alan A.: 68, 121, 133
 Leach, Thomas: 101
 LeBlanc, Lewis E.: 112
 Leech call sign: 136
 Leonard, Bruce G., Jr.: 95, 123, 133
 Lesan, Thomas C.: 50–51, 120, 133

 Levy, Stuart W.: 78
 Lewinski, Paul T.: 98, 123, 133
 Lincoln Air Force Base, Neb.: 143
 Linebacker operations: 14–17, 89–92, 94–103, 106–115
 Lines of communication, strikes against: 45, 101
 List call sign: 130, 134
 Locher, Roger C.: 85, 90, 92–93, 122, 123, 133
 Lodge, Robert A.: 85, 90–93, 122–123, 134
 Logeman, John D., Jr.: 68–69, 121, 134
 Logistical support: 37
 Logistics system, strikes against: 101
 Loose-deuce formation: 24
 Lucas, Jon I.: 103, 124, 134
 Lufbery circle: 45, 47, 170
 Luke Air Force Base, Ariz.: 149, 154

 Maas, Stuart W.: 88–89, 122, 134
 MacDill Air Force Base, Fla.: 148, 151, 153
 Madden, John A., Jr.: 103–106, 108–109, 124, 125, 134
 Maddox, USS: 3
 Madison, Thomas M.: 46
 Magill, William S.: 90
 Mahaffey, Michael J.: 106, 124, 134
 Maintenance, supply and support forces: vi, 19–20, 37
 Malaney, James: 110
 Malloy, Douglas G.: 103, 112, 124, 134
 Maltbie, Robert M.: 97
 Maneuvers, combat. *See* Formations and maneuvers, combat; Tactics
 Markey, Ronald L.: 75
 Markle, John D.: 93, 123, 134
 Martin, Ronald G.: 31, 32 pc, 118, 134
 Massen, Mark A.: 101–102, 124, 134
 Maurer, Maurer: 141
 McConnell, John P.: 3. *See also* Chief of Staff, U.S. Air Force
 McConnell Air Force Base, Kan.: 143–144, 149–151, 153
 McCoy, Frederick E., II: 68, 121, 134
 McCoy, Ivy J., Jr.: 110–111, 125, 134
 McGrath, Joseph E.: 67 pc
 McKee, Harry L.: 114–115, 125, 134
 McKinney, George H., Jr.: 71–74, 121–122, 134
 McNamara, Robert S.: 3, 10
 Mesenbourg, John L.: 102
 Meteorologists: vi
 Meyer, John C.: 112 pc. *See also* Strategic Air Forces
 Middleton, James H., Jr.: 51
 MIGCAP. *See* Escort and Patrol missions
 Mincer, Gary P.: 158 pc
 Mining operations: 14, 89
 Missile systems, air-to-air: 37
 Falcon AIM-4: 63–64, 69, 72, 75–77, 79, 122, 127, 129, 131–133, 135–137, 156–157
 kills distribution: 156
 Shrike AGM-45: 7, 31, 46, 58, 71
 Sidewinder AIM-9: 5, 8–10, 19, 22, 25, 27–33, 35, 38–41, 43, 47–48, 50, 52–55, 57–62, 64, 78, 89, 95, 98–99, 104–106, 110–111, 118–140, 156–158, 170
 Sparrow AIM-7: 5, 10, 19, 22–24, 27, 32–33, 35, 40–41, 43,

- 49, 51–52, 54–59, 63–65, 68–69, 73, 77–79, 85, 88–96, 98–111, 113, 115, 118–140, 155–158
- Missile systems, air-to-air, enemy: 12, 26, 35, 61, 65, 92, 95, 98, 103, 105, 156–157, 160
- Missile systems, air-to-ground
- Walleye AGM–62: 76, 160
- Missile systems, surface-to-air
- Talos: 13, 80
- Missile systems, surface-to-air, enemy: vi, 5, 7, 10, 13–14, 16–17, 19, 26, 44, 48–49, 52, 55, 58, 61–62, 64–66, 68–71, 75, 80, 83–85, 88, 96–97, 100, 103, 111–112, 155, 159
- Momyer, William W.: 10–11, 10 pc, 64. *See also* Seventh Air Force
- Monitoring systems, enemy: 87
- Monsees, James H.: 68, 121, 134
- Monsoons. *See* Weather, effect on operations
- Moore, Albert E.: 114, 125, 135
- Moore, Joseph.: 25–26
- Moore, Joseph D.: 73–74, 122, 135
- Moore, Rolland W.: 49, 119, 135
- Moorer, Thomas H.: 17. *See also* Joint Chiefs of Staff
- Moss, Randy P.: 77–78, 122, 135
- Motor vehicles, strikes against: 96
- Mountain Home Air Force Base, Idaho: 144, 151
- Muldoon, Michael D.: 75, 122, 135
- Murphy, Terrance M.: 105
- Murray, James E., III: 38, 119, 135
- Naha Air Base, Okinawa: 153–154
- Nakhon Phanom Air Base: 142
- Nash call sign: 132, 134–135, 138
- Naval operations: 3
- Navigation systems: 16
- Nichols, Stephen E.: 94, 123, 135
- Night actions, first: 85
- Nitro call sign: 132, 138
- Nixon, Richard M.: 13–14, 16, 17, 83, 89, 111, 115
- North Korea armed forces: 10–11
- North Vietnam, aggression by: vi, 1–3, 14, 87, 111
- North Vietnam Air Force: 3, 10–11, 13, 26–27, 37, 41, 71, 83, 117, 170
- North Vietnam Navy: 3
- Northeast Railway: 99
- Northwest Railway: 102
- Norton, William A.: 58
- Norwood, George: 109
- Null, James C.: 89, 123, 135
- Oakland call sign: 135
- O'Brien, Michael B.: 103
- Ogilvie, James W.: 115
- Olds, Robin: vi, 35–42, 42 pc, 52–53, 59–60, 60 pc, 62–64, 66, 119, 120, 121, 135
- Olds call sign: 20–22, 128–131, 134–139
- Olmsted, Frederick S., Jr.: 87–89, 122, 135
- Opal call sign: 133, 136, 138
- Organization, air units: 141–154
- Osan Air Base, Korea: 147
- Osborne, Carl D.: 53–54, 120, 135
- Otter call sign: 129–131, 137, 139
- Oyster call sign: 129–130, 133–134, 136
- Panda call sign: 47–48, 130
- Pankhurst, John E.: 64, 121, 135
- Papa call sign: 135, 138
- Pardo, John R.: 59–60, 60 pc, 120, 135
- Paris conference: 13
- Parrot call sign: 129, 132
- Pascoe, Richard M.: 43, 64–65, 65 pc, 119, 121, 135
- Patrol missions. *See* Escort and patrol missions
- Paula call sign: 129, 136
- Peace negotiations: 5, 7, 13, 16–17, 83
- Penney, Forrest: 102
- People's Republic of China: 1–5, 24, 30, 64, 71, 74, 85
- Petroleum-oil-lubricants, strikes against: 7
- Pettit, Lawrence H.: 93, 96, 108–109, 123, 125, 135
- Phan Rang Air Base: 143–144, 151
- Photography, aerial. *See* Reconnaissance missions
- Phu Tho: 93, 99, 102, 113
- Phu Cat Air Base: 151, 153, 158
- Phuc Yen airfield: 3–4, 11–12, 22, 35–38, 40–41, 43, 49, 52, 67–68, 72, 76, 78–79, 99, 103–106, 108, 111
- Pickett, Ralph S.: 113, 125, 135
- Pilots, training and efficiency: 14, 16, 160–161
- Pilots, enemy, training and efficiency: 4–5, 8–12, 14, 26–27, 44–45, 64, 71, 97
- Pistol call sign: 127, 132, 137, 139
- Pop-up maneuvers: 167–170
- Port facilities, strikes against: 16, 89
- Positive Identification Radar Advisory Zone Ship. *See* Red Crown radar ship
- Power plants, strikes against: 11, 16, 49, 75, 102, 111
- Priester, Durwood K.: 64, 121, 135
- Prisoners of war: 14, 17
- Proffitt, Glenn A.: 111
- Proximity fuze: 89
- Quang Binh province: 83
- Quang Lang airfield: 106
- Quang Tri province: 14, 87
- Rabeni, John J., Jr.: 34 pc, 35, 119, 136
- Radar jamming operations. *See* Electronic countermeasures systems
- Radar operators, proficiency: 20
- Radar systems: 4, 7, 12, 14, 16, 20–22, 24–25, 156
- Radar systems, enemy: 4, 7, 13, 19, 22, 85, 157
- Radeker, Walter S.: 38–39, 119, 136
- Radio call signs. *See* Call signs
- Radio transmission, typical: 20–22
- Railways, strikes against: vi, 4–5, 7, 11, 16, 38, 50, 53–54, 58–59, 65, 67, 71, 73, 75–77, 99, 102, 111, 114
- Rambler call sign: 128–131, 137
- Random call sign: 135–136
- Raspberry, Everett T., Jr.: 39–40, 42, 42 pc, 63, 119, 121, 136

- Rattler call sign: 50, 133
 Rauscher, Forrest L.: 10 pc
 Reconnaissance missions: vi, 4-5, 13-14, 43, 62, 68, 83, 101
 Red Crown radar ship: 14-16, 20-22, 85, 87-88, 90, 93, 96, 98-101, 108-115
 Red River and Valley: 28, 30, 37, 44-45, 65, 71-72, 90, 101, 106
 Refueling operations and units: vi, 22, 91
 Republic of Vietnam
 military assistance to: 1-3
 training and equipment: 13
 RESCAP. *See* Search-and-rescue missions
 Retterbush, Gary L.: 105, 108, 124-125, 136
 Rhine, Kimzey W.: 114
 Richard, Lawrence G., USMC: 101, 124, 136
 Richter, Karl W.: 33 pc, 33-34, 118, 136
 Rilling, Robert G.: 53-54, 120, 136
 Ritchie, Richard S.: vi, 20-22, 93, 96, 98-100, 100 pc, 102-104, 104 pc, 123-124, 136
 Roberts, Thomas S.: 22-25, 118, 136
 Roberts, William E., Jr.: 58, 120, 136
 Robin call sign: 129, 134, 137, 139
 Rocket clusters: 7, 155
 Rockets, enemy: 157, 160
 Rogers, Danny R.: 100
 Rolling Thunder operation: 3-14, 37, 101
 Rose, Douglas B.: 32-33, 32 pc, 118, 136
 Rotation system: vi
 Route Packages
 1 and 2: 80
 3: 80, 115
 5: 14
 6: 97, 101, 113
 6A: 14, 72
 Ruby call sign: 135
 Rubus, Gary M.: 110, 125, 136
 Ruses, application of: 11, 37, 43-44
 Russell, Donald M.: 67, 67 pc, 121, 136
 Russia. *See* Soviet Union
 Rutherford, Robert L.: 76
 Ryan, John D.: vi. *See also* Chief of Staff, U.S. Air Force
 Ryan, John D., Jr.: 72, 121, 136

 Sandy call sign: 47-48
 Sapphire call sign: 134, 137
 Saudi Arabia: 142
 Scissors maneuver: 165-167
 Scott, Robert R.: 44-45, 119, 136
 Screen missions: 27, 31
 Search-and-rescue missions: vi, 14n 30, 47, 51, 105
 Sears, James F.: 49, 119, 137
 Seaver, Maurice E., Jr.: 54-55, 55 pc, 120, 137
 Seventh Fleet: 3
 Seymour, Paul A.: 47, 54
 Seymour Johnson Air Force Base, N.C.: 149
 Sharp, Jerry K.: 38, 119, 137
 Shaw Air Force Base, S.C.: 145
 Sheffter, Fred W.: 101-102, 124, 137
 Shields, George I.: 106, 124, 137

 Shipping, strikes against: 96
 Sholders, Gary L.: 112-113, 125, 137
 Shrike (AGM-45) air-to-air missile: 7, 31, 46, 58, 71
 Sidewinder (AIM-9) air-to-air missile: 5, 8-10, 19, 22, 25, 27-33, 35, 38-41, 43, 47-48, 50, 52-55, 57-62, 64, 78, 89, 95, 98-99, 104-106, 110-111, 118-140, 158-168, 170
 Silver Star awards: 26
 Simmonds, Darrell D.: 71-72, 121, 137
 Simonet, Kenneth A.: 76, 122, 137
 Slaughter Alley: 10
 Slay, Alton D.: 11, 91
 Smallwood, John J.: 96-97, 123, 137
 Smith, Wayne O.: 76, 122, 137
 Smith, William T.: 27, 118, 137
 Sniowski, Greg E.: 158 pc
 Snug call sign: 127, 130
 Sorties flown, number: 10, 17
 Southeast Asia Treaty Organization: 1
 Soviet Union: 1, 4, 11, 85, 97, 156-157
 Sparrow (AIM-7) air-to-air missile: 5, 10, 19, 22-24, 27, 32-33, 35, 40-41, 43, 49, 51-52, 54-59, 63-65, 68-69, 73, 77-79, 85, 88-96, 98-111, 113, 115, 118-140, 155-158
 Speedo call sign: 129, 131, 138
 Spencer, Robert V.: 77-78
 Spitfire call sign: 131
 Split-S maneuver: 165
 Squadrons. *See* Tactical Fighter Squadrons
 Squier, Clayton K.: 75, 122, 137
 Stearman, Ralph W.: 73
 Steel plants, strikes against: 44
 Sterling, Thomas J.: 46
 Stinger call sign: 129, 138
 Stone, John B.: 40-41, 119, 137
 Storage facilities, strikes against: 16, 96, 111
 Strasswimmer, Roger J.: 43, 119, 137
 Strategic Air Command: 4, 16, 112. *See also* Meyer, John C.
 Strategic Wing, 307th: 111, 125, 135, 138, 141, 142
 Strike formations: 91-92
 Sumner, James M.: 94-95, 123, 137
 Supply depots, strikes against: 55, 57, 88, 96, 111
 Supply forces. *See* Maintenance, supply and support forces
 Support forces. *See* Maintenance, supply and support forces
 Support missions. *See* Escort and patrol missions
 Surprise, application of: 4
 Suzanne, Jacques A.: 53, 120, 137
 Sweeny, Allan R.: 78
 Swendner, William J.: 31-32, 32 pc, 118, 137

 Tactical Air Command: 143, 148-153, 155
 Tactical Fighter Squadrons
 4th: 98, 100, 123-125, 127, 131-133, 137, 139, 144, 145
 13th: 99, 121-125, 127-136, 138-139, 144
 34th: 32, 118, 121, 124-125, 127-129, 132, 134, 138-139, 144
 35th: 123-125, 127, 131-132, 134, 136-137, 143, 146, 147
 44th: 120, 137, 146, 147
 45th: 19, 22, 118, 127-128, 132, 136, 146, 147

- 58th: 96, 101, 123-124, 130-131, 136-137, 146, 147
 307th: 125, 131, 136, 148, 149
 333d: 118-122, 129, 131, 133, 135-137, 139, 148
 336th: 101, 124, 134, 137, 148, 149
 354th: 119-121, 127-130, 132, 138, 148, 149
 357th: 119-120, 122, 129-132, 138-139, 148, 149
 389th: 119-121, 127, 132-133, 135-137, 139, 150, 151
 390th: 54, 118, 120, 129-130, 133, 138, 150, 151
 421st: 118, 136, 150, 151
 433d: 54, 119-122, 127-133, 135, 137-138, 150, 151
 435th: 75, 121-122, 130, 133-135, 137, 139, 150, 151
 469th: 97, 119, 121, 123-124, 128-129, 131, 134, 137, 139, 152, 153
 480th: 31, 35, 118-121, 127-131, 133-138, 152, 153
 523d: 123, 125, 128, 134-135, 138, 152, 153
 555th: 27, 29, 32, 61-63, 85, 92-96, 98, 106, 118-125, 127-139, 154
Tactical Fighter Training Wing, 58th: 154
Tactical Fighter Wings
 3d: 146, 148
 4th: 148
 8th: 11, 35, 43, 51-54, 57-58, 62, 67, 71, 75, 77, 85, 101, 118-122, 124, 127-139, 142, 143, 148, 150, 154
 12th: 146, 150, 152
 15th: 146, 150
 18th: 144, 146
 23d: 148, 150
 27th: 152
 31st: 148
 33d: 144, 146
 35th: 118, 128, 130, 133-134, 137, 142, 143, 150, 152
 37th: 150, 152
 347th: 144, 150
 355th: 34, 37, 44-45, 50, 52, 67, 118-122, 127-133, 135-139, 142, 143, 147, 149-151, 153
 366th: 34, 37, 48-49, 54-55, 57, 100, 119-121, 123-124, 127, 129, 131-133, 135-139, 144, 145, 146, 151, 153
 388th: 30, 33, 35-37, 44, 53-54, 62, 65-67, 94, 98, 103, 105-106, 108-109, 118-121, 123-125, 127-129, 131-134, 136-139, 141, 144, 145, 146, 150, 152, 158
 401st: 148
 405th: 152
 457th: 150
 4531st: 150
 6234th: 150, 152
 6251st: 148
 6252d: 150
 6441st: 146
Tactical Reconnaissance Wing: 432d: 72, 85, 90-92, 94-96, 99, 101, 109-110, 115, 121-125, 127-139, 144, 145, 146, 148, 150, 152, 154
Tactics: 5-8, 11, 16, 19, 22-73, 85-111, 160-170. See also Formations and maneuvers, combat
Tactics, enemy: vi, 1-3, 5, 10-14, 16, 22, 24-26, 29, 31, 34-42, 44-45, 48-80, 97-111, 170
Taft, Gene E.: 100-101, 124, 137
Takhli Air Base: 34, 69, 143-144, 146-147, 149-152
Talley, James T.: 56-57, 56 pc, 120, 138
Talos surface-to-air missile: 13, 80
Tampa call sign: 128-129, 132, 135, 138
Tan Son Nhut Air Base: v, 142
Target acquisition systems: 16, 102-103, 105. See also Ground control intercept systems; Radar systems
Tax, Cal W.: 71
Taylor, Reggie: 103, 104 pc
Teamwork, importance of: 103, 110
Tet offensive: 12
Thai Nguyen: 44, 76, 96, 108, 110, 114
Thailand: 1, 4, 7, 80
Thanh Hoa: 4, 19
Thibodeaux, James L.: 64
Thies, Mack: 51-52, 52 pc, 120, 138
Tho, Le Duc: 17
Thorsness, Leo K.: 46-47, 119, 138
Thud Ridge: 38, 49, 58, 63-66, 69-72, 78-79
Tibbett, Calvin B.: 104, 106, 124, 138
Tien Cuong: 73
Titus, Robert F.: 58, 60, 120-121, 138
Tolman, Frederick G.: 47, 119, 138
Torching: 71
Torrejon Air Base, Spain: 149
Tracy, Fred L.: 30-31, 118, 138
Troops, withdrawal: 83
Truman, Harry S: 1
Trung Quang: 75
Tuan Quan: 105
Tuck, James E.: 34 pc, 35, 119, 138
Turner, Samuel O.: 111-112, 112 pc, 125, 138
Turner Joy, USS: 3
Ubun Royal Thai Air Force Base: 22, 32, 51, 58, 62, 65, 77, 109, 142, 148-149, 152, 154
Udon Royal Thai Air Force Base: 25, 30, 87-89, 91, 105, 145-146, 149, 152-154
United States Air Force: v, 7, 16, 80, 141
United States Air Forces in Europe: 142
United States Marine Corps: 12, 72, 101
United States Navy: 4-5, 7, 13-14, 16, 19, 40, 48, 51, 67, 69, 80, 85, 90, 101, 155-156
Unknown call sign: 127-134, 136-138
U-Tapao Royal Thai Air Force Base: 111, 143
Vahue, Michael D.: 89, 123, 138
Vandenberg, Hoyt S., Jr.: 52 pc
Vega call sign: 20-22, 134-135, 139
Vertical rolling scissors maneuver: 167
Viet Tri: 73, 102, 109-110
Vietnamization program: 13, 83
Vinh: 13, 96, 106
Vinh Yen: 53
Voigt, Ted L., II: 79, 122, 138
Vojvodich, Mele: 97
Volloy, Gerald R: 87-88, 122, 138
Wagon-wheel formation: 57, 63, 78, 95, 170
Waldrop, David B., III: 65-66, 121, 138

Walleye (AGM) air-to-ground missile: 76, 166
 Wander call sign: 138-139
 Watson, George D.: 108, 125, 138
 Wayne, Robert E.: 111
 Wayne, Stephen A.: 54, 59-60, 60 pc, 120, 138
 Weapon systems, aircraft. *See* Armament, aircraft; Missile systems
 Weapon systems, enemy aircraft: 156-157
 Weather, effect on operations: vi, 7, 11-12, 16, 27, 37-38, 41, 43-45, 77, 80, 165
 Weather men. *See* Meteorologists
 Webb, Omri K., III: 106, 124, 139
 Wells, Norman E.: 43, 64-65, 65 pc, 119, 121, 139
 Weskamp, Robert L.: 45
 Western, Robert W.: 40, 42 pc, 119, 139
 Westphal, Curtis D.: 109, 125, 139
 Wetterhahn, Ralph K.: 38, 119, 139
 Wheeler, William H.: 73-74, 122, 139
 White, Sammy C.: 102, 124, 139
 Wiggins, Larry D.: 62-63, 63 pc, 121, 139
 Wildcat call sign: 136
 Williams, David O., Jr.: 79, 122, 139
 Williams, Lee: 101
 Wilson, Fred A., Jr.: 33 pc, 34, 118, 139
 Wings. *See* Fighter-Interceptor Wing; Strategic Wing; Tactical Fighter Training Wing; Tactical Fighter Wings; Tactical Reconnaissance Wing
 World War II comparison: 58-64
 Xuan Mai: 45, 47
 Yen Bai airfield: 10, 22-24, 65, 90, 92-94, 98, 106, 110, 113
 Yen Vien: 53-54, 65
 Yokota Air Base, Japan: 147, 153
 Yunnan province: 30
 Zimer, Milan: 58, 60, 120-121, 139

For sale by the Superintendent of Documents, U.S. Government Printing Office
 Washington, D.C. 20402
 Stock Number 008-070-00365-1