



UNITED STATES AIR FORCE IN SOUTHEAST ASIA

ACES and AERIAL VICTORIES



The United States Air Force in Southeast Asia 1965-1973

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Foreword

During the war in Southeast Asia, U.S. Air Force fighter pilots and crewmen were repeatedly challenged by enemy MIG's in the skies over North Vietnam. The air battles which ensued were unique in American history because U.S. fighter and strike forces operated under stringent rules of engagement. With periodic exceptions, for example, MIG bases could not be struck. The rules generally forbade bombing or strafing of military and industrial targets in and around the enemy's heartland, encompassing the capital of Hanoi and the port city of Haiphong. These restrictions gave the North Vietnamese substantial military advantage. Free from American attack and helped by its Soviet and Chinese allies, the enemy was able to construct one of the most formidable anti-aircraft defenses the world has even seen. It included MIG forces, surface-to-air missile (SAM) batteries, heavy concentrations of anti-aircraft artillery (AAA) units, and an array of early warning

radar systems. These elements sought to interdict and defeat the U.S. bombing campaign against North Vietnam's lines of communication and its military and industrial base. The primary mission of U.S. fighter pilots was to prevent the North Vietnamese MIG's from interfering with U.S. strike operations. This book tells how American airmen—assisted by an armada of other USAF aircraft whose crews refueled their planes, warned of approaching enemy MIG's and SAM's, and flew rescue missions when they were shot down—managed to emerge from their aerial battles with both victories and honor.

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Preface

Aces and Aerial Victories is a collection of first-hand accounts by Air Force fighter crews who flew combat missions over North Vietnam between 1965 and 1973. They recall their air battles with enemy MIG fighters, the difficult and dangerous tactical maneuvers they had to perform to survive, and their victories and defeats. The narratives are taken directly from aircrew after-action reports. A number of direct quotations have been altered, but only to clarify for the reader the very specialized language of their profession (e.g., code words).

The unofficial title of "ace" originated during World War I in recognition of a combat pilot who had shot down five enemy aircraft (including observation balloons). The honorific title was used again during World War II, the Korean War, and the war in Southeast Asia to recognize similar exploits. Credits for the destruction of enemy aircraft in the area are confirmed by the Air Force. The manner of awarding them, however, has varied from war to war and even from theater to theater (as in World War II). The different guidelines reflected the different circumstances in each theater and each war, and the weapons technology employed by both sides.

When the Air Force found itself engaged in aerial combat over North Vietnam beginning in 1965, it had no plan for handling claims or awarding victory credits. A year elapsed before Headquarters Seventh Air Force, located at Tan Son Nhut Air Base (AB) in South Vietnam, developed a method for awarding credits. By this time at least 16 MIG's had been downed by USAF crews. On 12 November Seventh Air Force published a regulation to govern victory credits; however, it was not until 1967 that Headquarters USAF authorized the Pacific Air Forces to publish confirming orders.

In accordance with the Seventh Air Force regulation, each combat wing or separate squadron was required to establish an Enemy Aircraft Claims

Evaluation Board of four to six members. Each was composed of at least two rated officers, the senior operations officer, and the unit's intelligence officer. A crew seeking confirmation of a "kill" was required to submit a written claim to the board within 24 hours after the shutdown. The board had 10 days to process the claim and to forward it through the unit commander to Seventh Air Force headquarters, where another board was convened to review the evidence. This headquarters board consisted of six officers—three from operations, two from intelligence, and one from personnel. They reviewed the evidence and were required to confirm or deny the claim within 24 hours. Credit for destroying an enemy aircraft became official upon publication of a Seventh Air Force general order.

The criteria established for aerial victory credits were not much different from those used during the Korean War. Credit was given to pilots of any aircraft and to gunners in multiplace aircraft if they fired the weapon that destroyed the enemy aircraft or caused it to crash. While credits were awarded only for the destruction of enemy aircraft, claims were accepted for probable destruction or damage.

An enemy aircraft was considered destroyed if it crashed, exploded, disintegrated, lost a major component vital for flight, caught fire, entered into an attitude or position from which recovery was impossible, or if its pilot bailed out. The claim had to be substantiated by written testimony from one or more aerial or ground observers, gun camera film, a report that the wreckage of the enemy aircraft had been recovered, or some other positive intelligence that confirmed its total destruction. No more than two 2-man crews could be credited with downing a single enemy aircraft, thus limiting the smallest share in a victory credit to one-fourth. Every detail had to be described as clearly as possible to insure that claims were evaluated judiciously and speedily.

The war in Southeast Asia was peculiar and did not provide U.S. pilots the opportunity to amass the high victory scores that were common in World War II and Korea. One reason for this was that enemy pilots did not engage American aircraft whenever the North Vietnamese were at a disadvantage. This strategy probably was devised by their commanders in an effort to conserve aircraft obtained from foreign sources and to introduce their newly trained pilots into combat gradually. Another reason for the limited number of victories was that the enemy relied heavily upon Soviet surface-to-air missiles and antiaircraft artillery units. When the MIG pilots did scramble to challenge U.S. strike aircraft, it was to prevent the destruction of vital transportation and other war-supporting industrial facilities by American bombing planes.

Another important factor which limited U.S. aerial victories was the 3½ year standdown in American air operations over North Vietnam, which began in November 1968 and lasted (with certain exceptions) until the spring of 1972, when Hanoi launched a massive invasion of South Vietnam. Finally, the kill ratio was low because of restraints imposed on U.S. airmen throughout the war and the many intermittent halts of air operations between 1965 and 1968, whose aim was to get peace negotiations under way. As a consequence, many airmen completed their 1-year combat tours without having the opportunity to engage the enemy in the air except on limited occasions.

When President Lyndon B. Johnson announced the complete bombing halt of 1 November 1968, he placed North Vietnam off limits to fighter aircraft. At that time, the highest kill scores consisted of only two victories each, awarded to two pilots: Col. Robin Olds and Capt. Max C. Brestel. Olds shared the credits with his F-4 weapon systems officers and was responsible for the destruction of four enemy aircraft. Brestel, flying alone in an F-105, destroyed two aircraft. The Air Force thus had no aces at the time, and no crewmember approached the magic score of five victories.

After USAF operations over the North were resumed in the spring of 1972, Gen. John D. Ryan, Chief of Staff, changed the policy of dividing aerial victories between aircrew members of dual-place fighters. He announced that each member of a 2-man

crew would be assigned full credit for each hostile aircraft downed in combat. The policy became retroactive to April 1965, the date when the first F-4's arrived in Southeast Asia. As a result, Olds was awarded four kills and he thus headed the victory list.

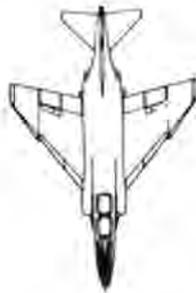
Following the Communist Easter offensive of March-April 1972, air units were ordered back into action over North Vietnam and MIG's once again came under the fire of USAF guns and missiles, enabling U.S. fliers to score sufficient victories to become aces. The Navy produced the first aces of the conflict on 10 May 1972, when Lieutenants Randy Cunningham and William Driscoll destroyed three MIG's to bring their total score to five. But the Air Force was not far behind. On the same day, Capt. Richard S. (Steve) Ritchie and Capt. Charles B. DeBellevue shot down their first MIG. Ritchie downed his fifth on 28 August, and DeBellevue followed on 9 September. Another weapon systems officer, Capt. Jeffrey S. Feinstein, became the third USAF ace on 13 October, when he scored his fifth victory.

The achievements of the fighter crews, however, could not have been accomplished without the assistance of other USAF airmen flying supporting missions. The latter included members of aerial refueling squadrons, who made it possible for the fighters to engage the enemy in the skies over North Vietnam and return safely to base. Fighter pilots also were indebted to the USAF electronic warfare crews, who jammed enemy radars and interfered with North Vietnamese fighter control. SAM-hunting Wild Weasel aircraft, flying deep into enemy territory, sought out and destroyed the SAM sites and their radar systems. Search and rescue crewmen assisted in locating and recovering downed fighter crews; unarmed reconnaissance aircraft brought back photo intelligence needed by top commanders to direct air operations; Air Force weather men provided vital information on the weather situation in the theater, which enabled Seventh Air Force commanders to decide when to launch the strike force; and, of course, USAF maintenance, supply, and other support units kept the fighter planes flying.

Individual contributors to this volume included: Dr. R. Frank Futrell, Mr. Charles A. Ravenstein,

Mr. Gerard E. Hasselwander, and MSgts. Robert F. Jakob and Carl Grubb. For other significant contributions, the writers are indebted to Mr. William H. Greenhalgh, who compiled the information on awarding victory credits. The manuscript underwent extensive editorial revision by Mr. Lawrence J. Paszek, Office of Air Force History, Headquarters, USAF, and Col. Walter Hanak, mobilization assignee to the Office. Mr. James N. Eastman, Jr.,

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F-4C Fighter



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I

The Situation

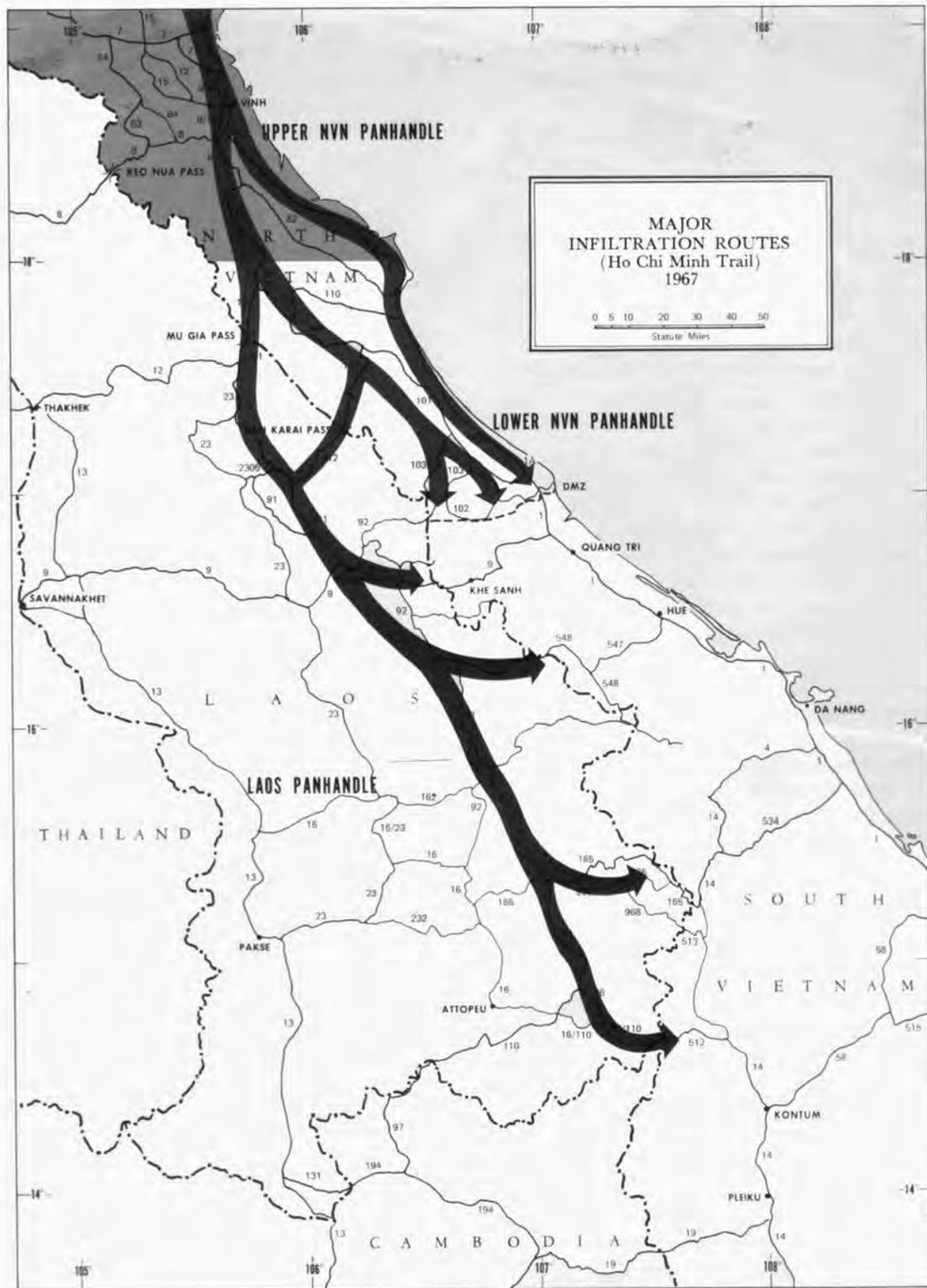
Attainment of air superiority was the primary mission of U.S. tactical air power during World War II and the Korean conflict. Air superiority has been officially defined as "that degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force." Establishing air superiority is essential for successful land, sea, and air operations. In Southeast Asia the Communists unwisely conceded air superiority to the allies operating within South Vietnam. The air war over North Vietnam, however, was another story. There the enemy waged an all-out air defensive battle, the likes of which never before had been seen in history.

When the North Vietnamese, under the leadership of Ho Chi Minh and his military commander, Gen. Vo Nguyen Giap, launched campaigns in Southeast Asia, they started with guerrilla tactics. Ho's insurgents began their operations against the French in 1946 and 4 years later received active support from Red China and the Soviet Union. At first the United States remained aloof of the problems of Indochina but in 1950, when the Communists were so clearly in command in East Asia, President Harry S Truman then ordered materiel assistance sent to help France suppress the insurgency. However, it was too far along to be stopped. The military climax of this phase of the conflict came in May 1954, when General Giap's forces overwhelmed the French garrison at Dien Bien Phu. At the subsequent international peace conference held in Geneva, Switzerland, Vietnam was temporarily divided at the 17th parallel

into a northern Communist-controlled Democratic Republic of Vietnam and a non-Communist Republic of Vietnam in the south, the latter led by Ngo Dinh Diem.

President Dwight D. Eisenhower, soon after his inauguration into office in January 1953, had committed the United States to assist South Vietnam and the other free countries of Southeast Asia to defend themselves against Communist aggression. As part of this commitment, the U.S. government sponsored establishment of the Southeast Asia Treaty Organization and provided military assistance to South Vietnam, Laos, Cambodia, and Thailand. By 1959, noting that the Republic of Vietnam was pursuing an independent course, Ho Chi Minh sent his guerrilla forces into a renewed war aimed at uniting Vietnam. Against this background, President John F. Kennedy in early 1961 increased American aid to Saigon and dispatched U.S. advisors to Vietnam. Air commando and ground force advisors sought to assist Vietnamese military forces to counter the infiltration of Communist cadres southward and the growing insurgency within the country.

During the early 1960's Washington recognized that the North Vietnamese were actively participating in military operations, both in South Vietnam and Laos. Hanoi's interference in the affairs of Laos was essential to the Communist cause, since the Ho Chi Minh trail wended its way through the Laotian panhandle into South Vietnam. Despite this knowledge, Washington officials decided that the insurgency would have to be defeated within South Vietnam and operations should not be expanded into North Vietnam. A major U.S. objective in 1961-



1964 was therefore to strengthen the Republic of Vietnam and to enable it to withstand the Communist guerrilla effort to topple it.

North Vietnamese strategy called for building an insurgent force in the south, then starting widespread guerrilla operations, and finally launching an all-out offensive to destroy Saigon's military forces. After December 1963 North Vietnam's rulers greatly increased infiltration into the south and, by the autumn of 1964, apparently were ready to start the final, decisive campaign. Meanwhile, on the night of 2 August 1964 North Vietnamese torpedo boats boldly attacked the U.S. Navy destroyer *Maddox* in the Gulf of Tonkin. On the night of 4 August the *Maddox* and *Turner Joy* again reported torpedo attacks. In Washington, President Johnson announced that the United States, while seeking no wider war, was determined to honor its commitments in Southeast Asia. Accordingly, on 5 August U.S. Seventh Fleet carrier aircraft attacked North Vietnamese patrol boat bases. The immediate reaction from the Communist side was to deploy some 30 MIG-15/17 jet fighters from China to Hanoi's Phuc Yen airfield on 7 August. Also, during the next several weeks, a division of North Vietnamese regulars began to deploy down the Ho Chi Minh trail in Laos heading for South Vietnam.

Against this background of a more unfavorable military situation, the U.S. Joint Chiefs of Staff drew up contingency plans for American air operations against North Vietnam. In late 1964 the Joint Chiefs recommended a "fast/full squeeze" hard-hitting, 16-day air campaign against 94 targets in North Vietnam to establish U.S. air superiority and destroy Hanoi's ability to continue to support operations against South Vietnam. However, President Johnson and Secretary of Defense Robert S. McNamara rejected the plan. They decided that bombing North Vietnam would be a supplement to and not a substitute for an effective pacification campaign within South Vietnam. According to Secretary McNamara, the basic objectives of air attacks against North Vietnam were to:

- reduce the flow and/or increase the cost of infiltration of men and supplies from North Vietnam to South Vietnam.

- Make it clear to the North Vietnamese leader-

- ship that so long as they continue their aggression against the South, they will have to pay a price in the North.

- Raise the morale of the South Vietnamese people.

President Johnson agreed with these objectives. Thus, when in early 1965 he authorized the first strikes against North Vietnam, he saw them as a demonstration of America's determination to retaliate against military targets so that Hanoi would understand that it was not immune from attack. Accordingly, the Joint Chiefs—with Gen. John P. McConnell, the USAF Chief of Staff, dissenting—directed that air operations against North Vietnam (known by the nickname "Rolling Thunder") would be limited in scope and not be a hard-hitting military campaign.

Rolling Thunder

Under these circumstances, Gen. Hunter Harris, Jr., Commander in Chief, Pacific Air Forces, proposed to strike the Communist MIG base at Phuc



Gen. Hunter Harris, Commander, Pacific Air Forces, boards his T-39 after a visit to Pleiku Air Base, South Vietnam, Nov. 1966.

Yen, situated north of Hanoi, and destroy an immediate threat to U.S. air operations. Although this proposal was not immediately approved, the Strategic Air Command armed 30 B-52's on Guam for a night strike against Phuc Yen. This air raid was to be followed at first light by tactical fighters to complete the job of destruction. However, this planned strike—initially included in the first Rolling Thunder operations order—was cancelled by higher authority. Between 2 March 1965, when the first tactical air strikes were launched, and 11 May when the first phase of operations ended, Rolling Thunder attacks were directed against military and transportation targets in the panhandle of southern North Vietnam below 20 degrees North latitude. The initial attacks were against fixed targets, but on 19 March the first armed reconnaissance against targets of opportunity was authorized.

In August 1964, on the occasion of the Tonkin reprisal air strikes, North Vietnam's air defenses consisted of approximately 1,426 antiaircraft artillery weapons, 22 early warning radars, and 4 fire control radars. This rudimentary defense allowed U.S. strike pilots to begin their attacks without great concern about enemy AAA defenses. Their initial flight tactics, however, were for those involving a nuclear weapons strike. These tactics involved a high-speed, low-altitude penetration to a target followed by a pop-up maneuver to unload the nuclear device onto the target and then to depart as fast as possible before detonation. Low clouds, often encountered en route and in the vicinity of the assigned North Vietnamese targets, justified this tactic for conventional ordnance. It became common for enthusiastic aircrews to make multiple passes on targets at low altitude. However, enemy automatic weapons and small caliber AAA soon began to take a toll of Air Force planes. It became evident that low-altitude, high-speed tactics did not provide sufficient protection for aircrews. Accordingly, USAF pilots changed their methods and ascended to 15–20,000 feet and dive-bombed their targets, thus cutting losses by operating above the effective altitude of most enemy guns. At higher operating altitudes, however, U.S. pilots sacrificed the element of surprise.

Meanwhile, with the aid of the Soviet Union and Communist China, North Vietnamese air defenses

rapidly improved. By the end of March 1965 they possessed 31 early warning radars, 2 height finders, and 9 AAA control radars and demonstrated an ability to construct, occupy, and operate 85-mm radar-controlled gun positions in as few as 8 days. In the early weeks of the air war, North Vietnamese MIG pilots trained with ground control intercept (GCI) controllers, but appeared reluctant to engage in combat. But by 3 April several MIG-17 pilots were ready for action and air-to-air fighting ensued when three MIG's attacked a U.S. Navy strike force that was bombing a road and rail bridges near Thanh Hoa, 76 miles south of Hanoi. The following day, when USAF F-105's attacked the same bridge, a flight of MIG-17's was apparently vectored by GCI around USAF F-100's flying MIG combat air patrol (MIGCAP). The enemy pilots pounced upon the heavily loaded F-105's orbiting over the target waiting their turn to attack, downed two with cannon fire and escaped at high speed.

On 6 April President Johnson directed that the "slowly ascending" tempo of the Rolling Thunder operations would continue against targets outside the effective GCI range of the MIG's. But the first MIG engagement and growing enemy AAA demanded corresponding reactions. It was obvious that enemy jet pilots working with their GCI units had substantial advantages over the bomb-laden F-105's which lacked a warning system of impending attacks. To provide advance warning, in April 1965 a detachment of Air Defense Command EC-121 "Big Eye" aircraft was deployed to the theater and began flying radar surveillance orbits over the Gulf of Tonkin while USAF strikes were in progress. The EC-121's were equipped to provide "yellow" caution and "red" immediate danger warnings to U.S. pilots of impending MIG activity.

Arrival of USAF F-4C fighters at bases in Thailand promised to increase the effectiveness of MIG combat air patrols. Another USAF deployment—aimed at jamming enemy fire control radars—brought the first EB-66C "Brown Cradle" aircraft to Southeast Asia where their electronics countermeasures (ECM) equipment could be used against hostile AAA radars. Initially, these EB-66's were able to operate without difficulty over North Vietnam, but growing enemy opposition forced them away to safe areas over Laos and the Gulf of Tonkin

where they would orbit during Rolling Thunder strikes.

During the week of 12–17 May 1965, while U.S. officials sought to get the North Vietnamese to begin peace talks, U.S. armed reconnaissance and strike missions were suspended. During this standdown, the Air Force evaluated the results of its air campaign. When Washington's peace efforts proved unfruitful, Rolling Thunder (Phase II) was initiated and expanded somewhat. The first target north of 20 degrees latitude was cleared for attack on 18 May. In July some additional strikes were authorized against fixed bridge targets on the northwestern rail line between Hanoi and the Chinese border. In September new targets were approved for strikes, including four bridges on the Hanoi-China rail line. The air operations into the northeast quadrant continued into October-December but were rigidly controlled by Washington. Pilots were not permitted to enter a 30-mile buffer zone along the Chinese border, or within 30 miles of Hanoi and 10 miles of Haiphong.

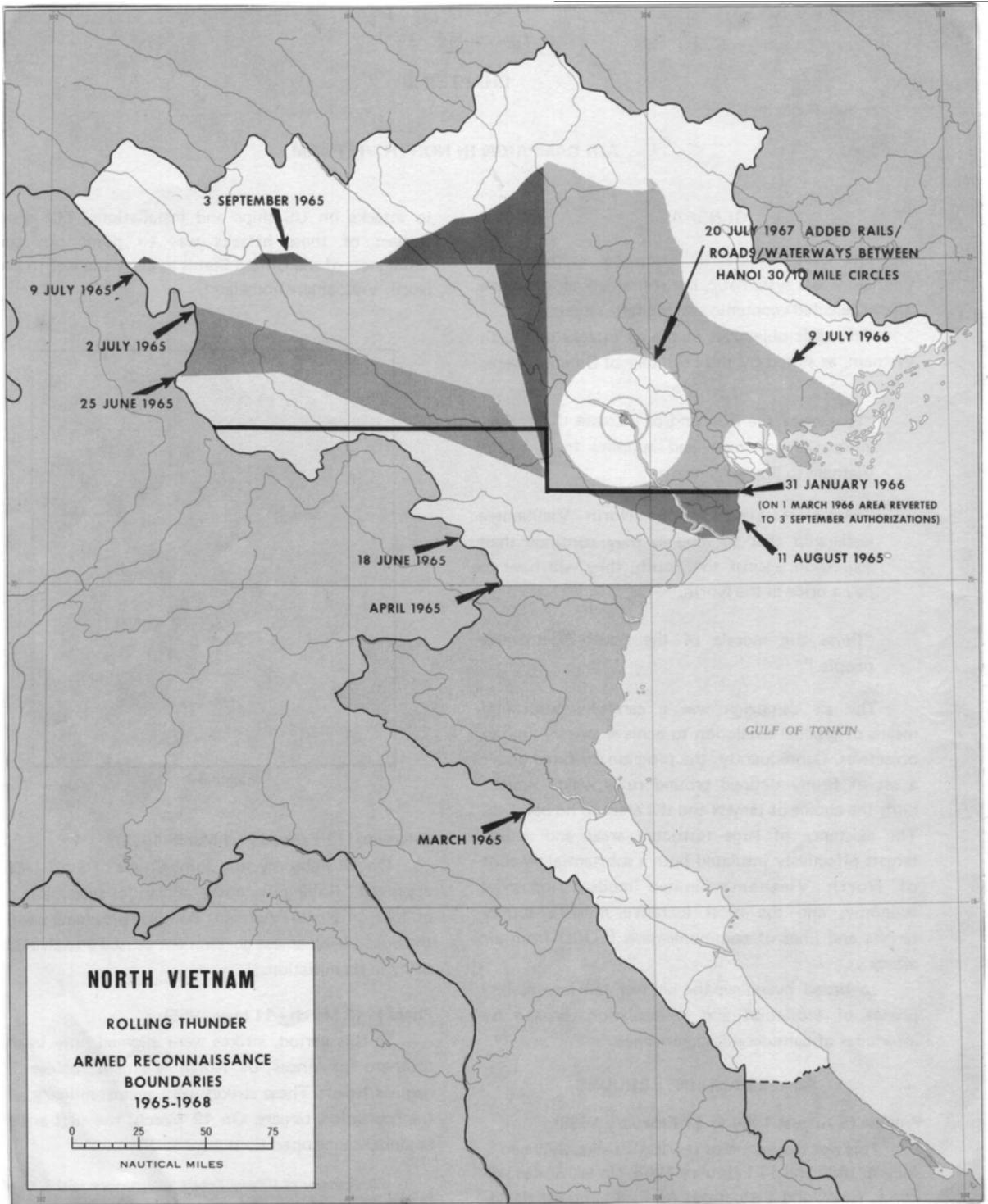
During the summer of 1965, MIG pilots remained in training status; there were only sporadic challenges to combat-loaded F-105 fighters. The few

MIG pilots who did appear tried to use the superior turning ability of their aircraft to get into 6 o'clock positions behind the F-105's. But this maneuver worked poorly whenever used against Navy F-4B's or USAF F-4C's. On 17 June two Navy F-4B's downed two MIG-17's with Sparrow missiles and on 10 July two Air Force F-4C's—positioned at the end of a strike force—downed two other MIG-17's with Sidewinder missiles. After 10 July and through March 1966 the MIG force apparently again stood down and renewed extensive training. Enemy GCI controllers not infrequently positioned MIG's for stern attacks against U.S. aircraft, but the pilots would break off before engaging.

On 24 July 1965 Soviet-built SA-2 surface-to-air missiles, dispersed about Hanoi and Haiphong, were used for the first time by the North Vietnamese. On that day, two SA-2's were fired at a flight of four F-4C strike aircraft, resulting in the loss of one plane and damage to the other three. The following month 11 missile firings destroyed two more U.S. aircraft. The immediate reaction of American pilots was to return to low-profile missions in SAM-defended areas, approaching and departing their



EC-121D aircraft sent to Southeast Asia in April 1965 to provide radar coverage and control in areas over the Gulf of Tonkin and over Hanoi and Haiphong harbor.



targets at an altitude of 500 to 1,500 feet. But while this return to low-altitude attack was effective against the SAM, the cure was worse than the disease since aircraft losses to other types of enemy ground fire rose sharply. It was soon clear that while the SA-2 was dangerous, it could be avoided through appropriate maneuvers if advance warning was received by strike pilots. Moreover, the SA-2 proved less dangerous than flying at low level into the most lethal part of the AAA and automatic weapons flak envelope.

U.S. flights gradually returned to 3-4,000-foot altitude and within a few months to 6-9,000 feet. Successful evasive maneuvers were developed to avoid the SAM's provided the launchings were detected in time. Although losses to SAM's were not great compared to losses due to other causes, the effect of the SA-2 on strike forces was nevertheless considerable. Attacks were run in streams of four-ship flights spaced 1 to 3 minutes apart, and each flight gave little mutual support to the other. Evasive maneuvers often demanded jettisoning of ordnance. At the very least, flight and mission integrity was disrupted or destroyed when the SAM's were fired.

During the 37 days of the "Christmas Truce" (25 December 1965 to 30 January 1966), all bombing of North Vietnam ceased while the President and his aides sought once again to bring Hanoi to the conference table. When they received no response, Rolling Thunder (Phase III) was launched on 31 January and continued to 31 March 1966. In authorizing these renewed strikes, President Johnson still maintained tight control over the operations. Rolling Thunder limited strikes to lower North Vietnam and the Air Force and Navy were authorized a total of no more than 300 sorties per day.

The arrival in Thailand of F-100F aircraft (nickname Wild Weasel) equipped with radar homing and warning (RHAW) sets proved of great assistance to the strike force. This equipment enabled the F-100 crews to home in on SA-2 Fansong radar guidance signals and to mark their location with rockets for strikes by accompanying F-105's (nickname Iron Hand). The F-100F's also gave early warning of an impending SAM firing. The F-100F's and F-105's orbited the day's target and positioned themselves in order to suppress SA-2 firings that might threaten the strike force. The

F-100F gave the Air Force its first real capability to detect an impending SAM launch. On 18 April 1966, with a further perfection of tactics, an F-100F launched its own AGM-45 Shrike missile against a SAM site. In May and July 1966 the F-100's were replaced by the higher performance F-105F's (known as Wild Weasel III).*

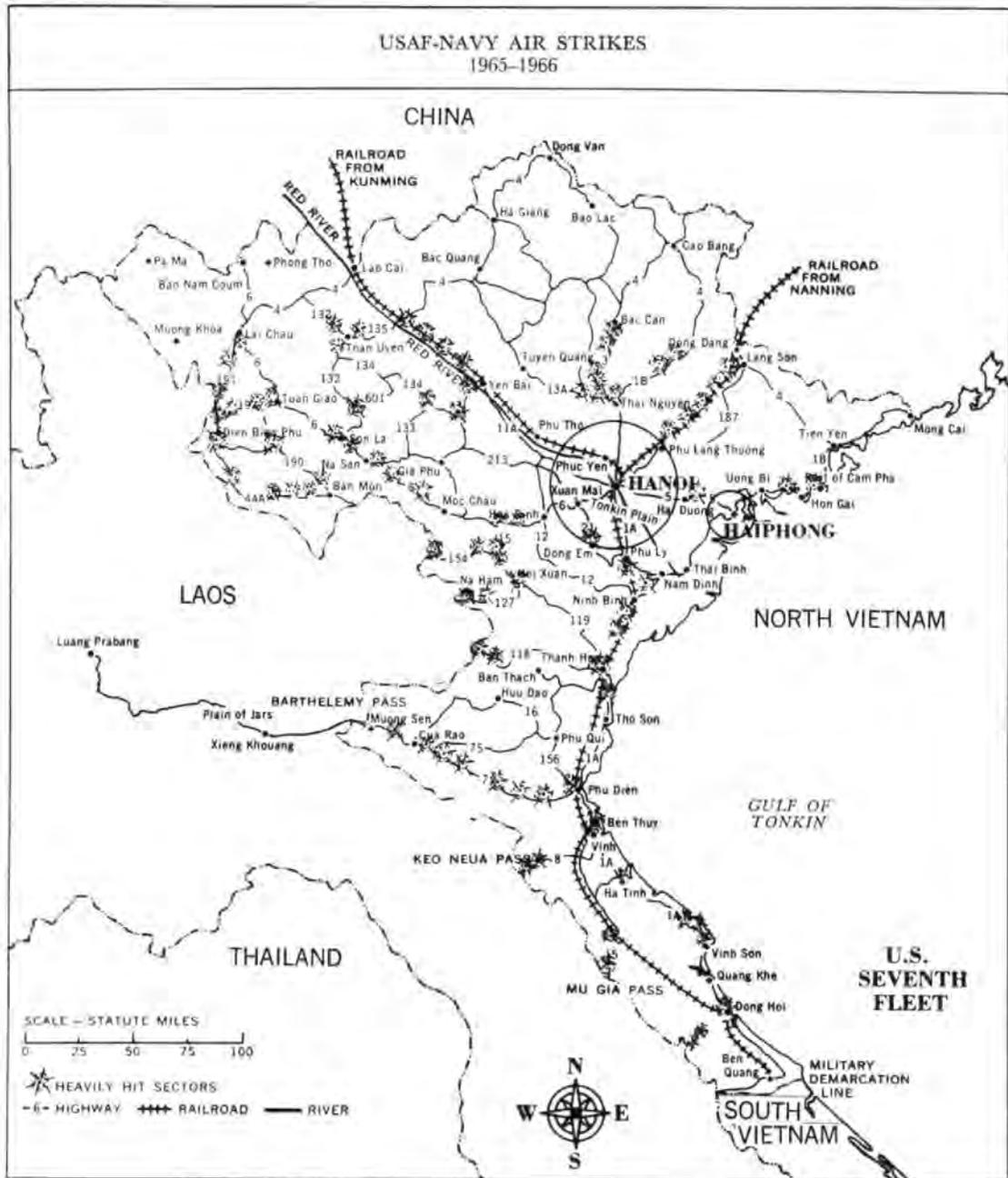
As an additional precaution to prevent enemy interference with the air campaign, during the first quarter of 1966 F-4's were employed to assist the F-105 strike force by flying MIG Screen orbits ahead of strike forces and by assisting strike aircraft in the event MIG's slipped past the screen.

Toward the end of the monsoon season in early April 1966, the fourth phase of Rolling Thunder began. All of North Vietnam, aside from specific sanctuary areas, was vulnerable to attack. The highlight of this massive new series of strikes was an attack by Air Force planes against seven major bulk petroleum-oil-lubricant (POL) storage areas in the Hanoi and Haiphong areas from 29 June to 1 July.

During these major penetration strikes, F-105's and supporting F-4C's arrived first over assigned targets and were then followed over the same route by other strike F-105's with a 3- to 5-minute separation between flights. While the Iron Hand aircraft and the accompanying F-4C's prepared to react to enemy SAM launches, the strike F-105's descended from altitude and dashed into the SAM defense ring at an altitude just above the effective height of small arms and automatic weapons fire. At the same time, an EC-121 orbited the area to provide MIG warnings while USAF EB-66's (also with F-4C cover) employed their jammers.

Perhaps because of improving weather, but more probably because of the importance of the military targets under attack, Hanoi ordered its MIG's into action. On 23 April there took place a major air clash involving two flights of eight MIG-17's, each under GCI control, which attempted to intercept the F-105's as they came off target. Instead, the MIG's found themselves engaged by F-4C's, and two of the enemy planes were downed. On 25 and 26 April, MIG-21's entered the air battle for the first time and launched a high-altitude attack against the EB-66's.

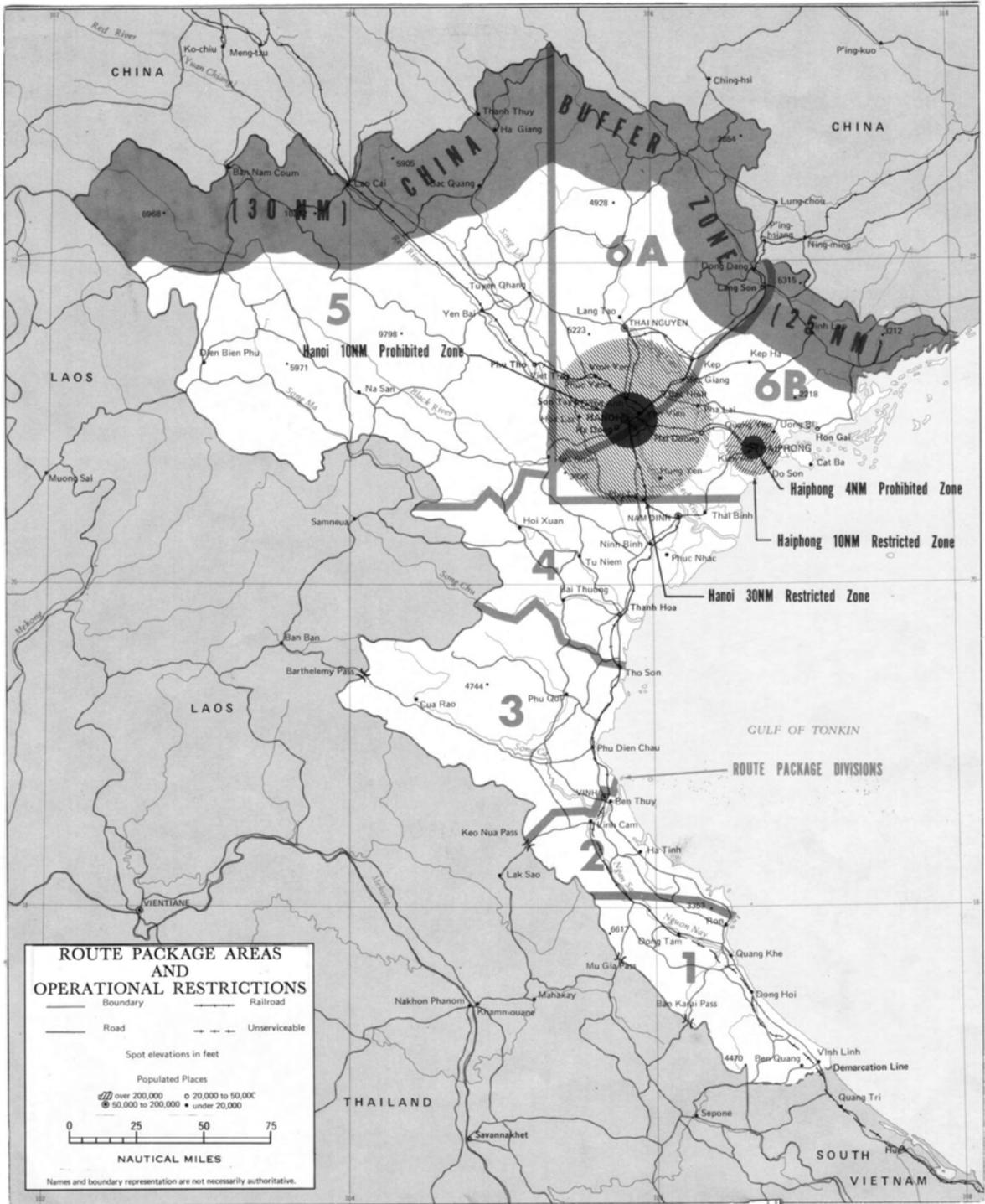
*Wild Weasel II was an experimental model tested at Eglin AFB, Fla.



The first MIG-21 was shot down on the 26th by an F-4C flying combat air patrol when the latter scored two Sidewinder hits on the North Vietnamese aircraft. Following these losses, MIG pilots seemed reluctant to engage the large numbers of F-4C's

committed in May and June. In May only one MIG-17 was shot down, while it attempted to attack an EB-66 protected by F-4's. The next month an F-105 downed another.

Although MIG pilots appeared to be unskilled in





Lt. Gen. Momyer, 7th Air Force commander, flew a strike mission with Col. Forrest L. Rauscher (right), Vice-Commander of the 3d Tac Fighter Wing, to get a close look at his units in action. January 1967

aerial combat, the slowly escalating air war gave them time to mold their force into a more serious threat, a fact that became evident during the summer and autumn of 1966. The roles of the MIG-17 and MIG-21 were distinctive, the former concentrating on low-level interceptions while the latter operated at high altitude. Although some MIG's still tried to interdict U.S. strike aircraft during their bomb runs, others assumed positions to threaten American planes en route to targets. The enemy's objective was to force strike aircraft to jettison their ordnance. The MIG pilots also discovered that they could successfully out-manuever most U.S. air-to-air missiles with a rapid turning descent, since the Sparrow (AIM-7) and the Sidewinder (AIM-9) had been designed to down bombers, and the missiles could not maneuver fast enough in a fighter engagement.

As a consequence, U.S. pilots asked that guns be installed on their F-4's. External 20-mm gun pods were mounted on the F-4C's and were first used in combat in May 1967. Until the modification was accomplished, however, MIG attacks against U.S. strike forces became quite difficult to handle. Of the 3,938 strike sorties flown (Route Packages 4, 5, 6A, and 6B, *see* Map, p. 9) during September-December 1966, only 107 sorties—or 2.72 percent—jettisoned

ordnance as a result of MIG interceptions. On the other hand, of the 192 strike aircraft actually engaged by MIG's, 107 (or 55.73 percent) jettisoned their ordnance. This rather clearly demonstrated that the MIG's reduced the effect of U.S. strikes on those days when they were committed. As a solution, the Joint Chiefs of Staff had recommended that North Vietnamese airfields be struck to reduce the MIG threat. But Secretary McNamara believed that the enemy threat was not sufficient to interfere with strike operations.

In combination, MIG's, SAM's, and flak posed a difficult problem for the strike forces. Lt. Gen. William W. Momyer, Commander of the Seventh Air Force, commented that his crews were forced to fight for their lives to reach the route packages north of Hanoi. By the end of 1966, approximately 150 SAM sites provided continuous coverage of a zone extending from Yen Bai to Haiphong in the north and to Ha Tinh in the south. Pilots called this area "Slaughter Alley."

In air-to-air engagements, however, American crews held the edge over the North Vietnamese. Experienced North Korean "instructors," according to creditable intelligence sources, appeared in the North Vietnamese Air Force along with NVAF

crews trained in the Soviet Union. Some 70 North Vietnamese MIG's, including about 15 MIG-21's, were based at Phuc Yen and Kep airfields. The North Vietnamese were also developing and using other fields to serve as MIG dispersal areas.

During the Christmas-New Year interlude beginning on 24 December 1966 and continuing to mid-February 1967, attacks on North Vietnamese targets were suspended for 48 hours over New Year's Day and for a 6-day period during the lunar New Year (8-15 February). On occasion throughout this period, adverse northeast monsoon weather restricted operations severely, but on some days American airmen could exploit newly-arrived electronic equipment (ECM jamming pods) to improve dramatically their operations. This device provided the U.S. strike forces with their first self-protection capability and was probably the most significant item of equipment introduced into the air war. The F-105 strike wings received their initial allotment of pods in October 1966. More time was required to equip other aircraft—including the F-4's—with the electronic countermeasure device.

Meanwhile, on 2 January 1967 the 8th Tactical Fighter Wing, using borrowed electronic jamming pods, launched Operation Bolo. In order to insure that the North Vietnamese would engage in an air battle, a force of F-4C's simulated an impending F-105 and F-4C strike. As anticipated, a large MIG-21 force, quite possibly manned by newly-trained Vietnamese pilots fresh from the Soviet Union, challenged what they thought were primarily F-105 crews. The result was the destruction of seven MIG-21's within 12 minutes of combat. There was no damage to USAF aircraft. On 6 January F-4C's simulated a weather reconnaissance mission and this lure resulted in the destruction of two more MIG-21's. Stunned by their losses, the North Vietnamese Air Force stood down for further training which extended to February 1967.

The next phase of Rolling Thunder operations—conducted between 14 February to 24 December 1967—reached a new peak of intensity as U.S. strike forces began the destruction of Hanoi's industrial base. Major power plants were knocked out, key military airfields came under attack, and systematic strikes were launched against rail transportation targets (yards and repair facilities). For the first

time, targets in restricted areas of North Vietnam were approved for controlled attacks. Pilots were permitted to hit military facilities both within the China buffer zone and the "Hanoi Circle."

Although the Joint Chiefs of Staff expressed interest in setting up another MIG trap similar to Operation Bolo to further erode the morale and effectiveness of the North Vietnamese Air Force, the overriding purpose of the aerial campaign remained that of placing ordnance precisely on assigned targets with the least possible loss of American crews. MIG-killing decidedly took second place to bombing. Maj. Gen. Alton D. Slay elaborated upon this point when he stated: "Much has been written about the MIG-killing campaign . . . I will only add that MIG-killing was not our objective. The objective was to protect the strike force. Any MIG kills obtained were considered as a bonus. A shoot-down of a strike aircraft was considered . . . a mission failure regardless of the number of MIG's killed." General Momyer, in agreement with Gen. Slay, emphasized that any excessive losses of USAF aircrews could very well have led Washington officials to reduce or terminate the operations.

As new ECM equipment became available for general use, USAF strike forces were able to return to mass formation tactics reminiscent of World War II and Korea, i.e., to operate at altitudes above the range of enemy flak. When major air strikes were required, F-105 wings usually employed three four-ship flights of strike aircraft, one flight of four flak suppressors, and one flight of Iron Hand aircraft. In addition, the strike force usually was escorted by four F-4C's, which through April 1967 normally preceded the strike force by 5 minutes to "sweep" the target area of MIG's and then stand by to fly cover.

MIG operations were habitually cyclical, perhaps geared to training and definitely related to the importance of targets under attack. By April 1967 it became evident to the North Vietnamese that the MIG's would have to bear the brunt of the defense of their key military facilities. In April, May and June of that year, their airmen tried a great variety of tactics, ranging from single, apparently uncoordinated attacks to highly effective, well-coordinated group attacks involving as many as 16 aircraft. Once again the F-105's were forced to jettison ordnance

and some were lost to MIG guns. In April, Washington finally authorized attacks against Hoa Lac, Kep, and Kien An airfields. The same month, F-4C support for the strike formations was doubled, with two flights of F-4C's now assigned to fly MIGCAP.

During the first 6 months of 1967—but primarily in the months of April, May and June—U.S. aircrews scored 54 confirmed MIG kills at a cost of 11 U.S. aircraft. The North Vietnamese Air Force lost another 9 MIG's on the ground during airfield strikes in April and 15 more in May. As MIG activity diminished in July, the F-4's were used to drop ordnance as well as to fly escort missions. The F-4's, which were equipped with both bombs and air-to-air missiles, were placed at the rear of the strike forces.

In August 1967 the situation once again changed when MIG-21's, seemingly flown by elite pilots, introduced a tactic that was extremely difficult to counter. The MIG-21's took off in pairs from either Phuc Yen or Gia Lam and flew at low level, keeping within radar ground clutter until they were abeam of the inbound USAF force. As a result, the F-4 radars were unable to detect the enemy aircraft. Once behind the American formation, the MIG-21 pilots fired their afterburners to climb to a high perch above the U.S. force. Then, with the aid of GCI vectoring, they would launch down at speeds in excess of Mach 1, fire their Atoll missiles (infrared seekers, similar to Sidewinders), and either zoom back to altitude or pass through the USAF formation. After one firing pass, the MIG's would separate and head for an airfield either in North Vietnam or China.

The initial success of these MIG-21 hit-and-run tactics was due in part to the fact the F-4's were being used either as strike or combat air patrol aircraft. Until the new threat was clearly analyzed, the MIG-21's operated with near impunity. But by the end of September, F-4's were positioned to guard the rear quadrants of strike forces against the MIG's. Also in late October, President Johnson for the first time authorized the Air Force to hit Phuc Yen, the major enemy base. At year's end, all jet airfields in North Vietnam—with the single exception of Gia Lam International Airport at Hanoi—had been attacked, and all but about 20 MIG's had been driven back into China. Even so, the MIG-21 hit-and-run

passes continued to be highly damaging to American aircraft. To August 1967, 24 MIG-21's were shot down compared to 6 U.S. losses to the MIG-21; but from August 1967 through the end of February 1968, the score was 5 MIG-21's downed while 18 U.S. aircraft were lost to the MIG-21.

The Christmas and New Year's halt in operations (between 24 December 1967 and 2 January 1968) was shorter than before. Each cessation lasted 36 hours. The usual Tet ceasefire was cancelled because of a massive enemy offensive against South Vietnam's cities and towns. Meanwhile, the Seventh Air Force on 3 January launched another phase in Rolling Thunder operations, but strikes were limited because of adverse weather in the Hanoi and Haiphong areas. The strike aircraft were then diverted to support Marines at Khe Sanh. By late March, with the end of the North Vietnamese siege and clearing weather in the north, Rolling Thunder operations accelerated and continued until President Johnson halted all attacks north of the 19th parallel on 1 April 1968.

Until the April bombing halt, the Air Force, responding to the threat of high-speed MIG-21 stern attacks, undertook to extend its airborne GCI control into northeastern North Vietnam. It became clear that, while the EC-121's (nicknamed "College Eye" after March 1967) were able to provide general MIG warnings, something better was needed. Fortunately, the Air Force was then testing an experimental EC-121M (nicknamed Rivet Top) in the theater. This aircraft was equipped with advance airborne radar and IFF.* On 6 October, the EC-121 crew was authorized to communicate directly with strike aircraft and was able to warn F-105 and F-4 pilots of MIG's. These advance warnings of MIG's in the area proved accurate and important. They resulted in saving U.S. aircraft and crews and contributed to the confirmed destruction of 10 MIG's and probable destruction of 5 others between October 1967 and the end of March 1968.

The bombing restriction of 1 April 1968 shifted U.S. air attacks far south beyond the normal MIG operating areas. Below 19 degrees latitude, the

*Identification, friend or foe; a method of determining the friendly or unfriendly character of aircraft and ships by other aircraft or ships.



President Johnson, on 31 March 1968, appeared on nation-wide TV to announce termination of all attacks north of the 19th parallel.

North Vietnamese were unable to work effectively, since they had no GCI support. Some MIG's did attempt to raid southward under radio and radar silence. In one such incident on 23 May, a MIG-21 was downed by a U.S. Navy Talos surface-to-air missile. Following this, U.S. forces were instructed to "clear the air" whenever MIG's appeared over the North Vietnamese panhandle and to give the Talos "clear fire" at the target. However, the North Vietnamese seem to have soon recognized that the MIG's could not operate without their ground control. Their air threat thus dwindled well before 1 November 1968, when President Johnson halted all air and naval attacks against North Vietnam.

When he suspended air operations against North Vietnam, Mr. Johnson had received reasonable assurances from Hanoi that they would respect the demilitarized zone (DMZ) between North and South Vietnam, would cease attacks on South Vietnamese cities, and would begin peace talks in good faith. Hanoi also understood that the United States would continue to fly unarmed reconnaissance aircraft over North Vietnam and that if they were fired upon, armed escort fighters would return the fire.

When President Richard M. Nixon entered the

White House in January 1969, he hoped that the peace talks under way in Paris would secure a supervised ceasefire, ensure the withdrawal of all non-South Vietnamese forces from South Vietnam, and guarantee political self-determination for the people of South Vietnam. Even as the talks continued, President Nixon directed the Joint Chiefs of Staff to expedite the military training and equipping of South Vietnamese forces to enable them to take over the conduct of the war while U.S. forces withdrew. This was his policy of "Vietnamization."

At Paris, however, the North Vietnamese refused to proceed with substantive negotiations and used the respite from air attack to develop further their military forces. The North Vietnamese Air Force extended radar control down the panhandle, establishing GCI sites at Vinh, Bac Mai, and Chap Le. By early 1972, the NVAF fighter inventory included 93 MIG-21's (some of them newer models, designated the "Export Fishbed-J"), 33 MIG-19's and 120 MIG-15/17's, for a total of 246 aircraft. Both SAM's and AAA units were deployed southward as well, and increasingly they began to fire at U.S. reconnaissance aircraft and also across the border into Laos. Between 1 November 1971 and 31

January 1972 there were 57 MIG incursions into the panhandle of Laos, where U.S. airmen continued attacks against North Vietnamese infiltration of men and supplies southward.

Under the rules of engagement which prevailed for U.S. forces between 1969 and 1971, American pilots could launch protective reaction strikes if the enemy fired AAA or SAM's against friendly reconnaissance or strike aircraft, or if USAF planes detected enemy radar signals indicating a firing was imminent. The frequency of protective reaction strikes increased in proportion to increasing enemy activity. There were 14 such strikes by F-4 or F-105 aircraft escorting reconnaissance planes in November 1971, 29 in December, 27 in January 1972, 30 in February, and 35 in March.

In Laos increasing MIG interference with USAF operations also demanded attention. As a consequence, USAF strike aircraft were sent aloft to fly combat air patrol and to serve as escorts for B-52 strikes. Additional EC-121's (with a new call sign: "Disco") and F-4D's were deployed to Southeast Asia. Special F-4D crews were designated and authorized to intercept MIG's penetrating toward Laos which had been identified either by "Disco" or the U.S. Navy "Red Crown" radar warning and control vessel operating in the Gulf of Tonkin. These actions served to check MIG activity. In February and March 1972 there were only 10 enemy penetrations, and in 13 air-to-air engagements the United States lost one aircraft while the Communists lost five.

Freedom Train and Linebacker

On the night of 30 March 1972, North Vietnamese forces commenced an all-out field attack through the DMZ into Quang Tri province. This action was quickly followed by other attacks launched from Laos and Cambodia into Kontum and Binh Long provinces of South Vietnam. Captured North Vietnamese documents reveal that General Giap confidently believed that these division-level assaults with heavy armor would overwhelm Saigon's forces, after which Hanoi could demand a ceasefire and install a coalition government in South Vietnam.

On 6 April American airmen were authorized to resume attacks (nicknamed Freedom Train) as far north as 20 degrees latitude. This operation was expanded into Linebacker I on 8 May when President Nixon authorized the aerial mining of North Vietnamese ports and a resumption of air and naval strikes against military targets throughout North Vietnam. At the same time, the President stated that the United States would halt all offensive operations when Hanoi agreed to release American prisoners of war and to accept an internationally supervised ceasefire. The Joint Chiefs of Staff gave the Seventh Air Force responsibility for attacking prevalidated targets in Route Packages 5 and 6A, the areas where the enemy concentrated his strongest defenses to protect his heartland and rail links to China.

Between the period Rolling Thunder terminated and Linebacker I operations began, USAF tactical fighter crews flying F-4's lost some of their proficiency because of a lack of aerial combat. On the other hand, their tactical fighter aircraft were now equipped with new military hardware: laser guided bombs (LGB's) for strikes, ECM chaff, and improved electronic countermeasures for tactical fighter mutual self-protection. College Eye ("Disco") EC-121's orbiting over Laos and the Gulf of Tonkin were assigned the task of controlling chaff, photo, strike, and escort flights. The Navy's Red Crown control ship in the Gulf provided additional warning of MIG activity.

Because of the strength of North Vietnamese defenses and the need to provide maximum protection to the limited number of F-4's equipped for laser-guided bombing, the ratio of support aircraft (those assigned chaff, escort, MIGCAP, SAM/flak suppression, ECM, and search and rescue missions) during Linebacker I was not infrequently as high as 5 to 1 in comparison with strike aircraft. Support forces were able to counter the extensive and well-disciplined SAM and AAA defenses, but the North Vietnamese MIG force—although still essentially limited by too few combat ready pilots—was still a serious threat.

Most MIG-21 interceptions were clearly flown by experienced pilots, who would get airborne, cruise at low altitude, pick up a lot of "smash" (speed and energy), strike from 6 o'clock with good control, excellent position, and "much overtake," and then



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disengage and head for home on the deck. It was not uncommon for some of these MIG actions to last no more than 12 to 14 minutes. This gave USAF pilots very little reaction time or margin for error. In May 1972 the use of EC-121's and the Navy's control ship to alert MIGCAP aircraft of the approach of enemy planes was moderately effective. But in June and July the MIG threat burgeoned when North Vietnamese pilots launched their supersonic rear attacks. Quite often under such circumstances, the first warning of an attack was the sighting of an enemy's infrared missile streaking in. The success of the F-4's against the MIG's now was due primarily to the greater proficiency and aggressiveness of the American fighter pilots. Between February and July 1972 the Air Force lost 18 aircraft while downing 24 MIG's, but in June and July of that year air combat victories and losses were on a one-to-one basis.

Had the Seventh Air Force possessed an airborne warning and control system which could have provided "look-down" radar coverage of the target area, together with positive control over counter-air fighters, it is probable that 75 percent of the USAF losses could have been avoided. Fortunately, the U.S. Air Force, working with the Navy, developed a new command and control capability, and they refined tactics which resulted in a 4-1 ratio in favor of USAF pilots between 1 August and 15 October 1972.

As a result of progressing diplomatic talks, Dr. Henry Kissinger, President Nixon's Assistant for National Security Affairs, was confident in mid-October 1972 that peace arrangements would shortly be accepted in Paris. Accordingly, on 22 October 1972, the Linebacker I air campaign ended.

Linebacker II

Contrary to expectations, the North Vietnamese continued to drag out the peace negotiations, raising many technical objections to propositions already agreed upon. Quite possibly, Hanoi anticipated a resumption of bombing attacks in the Hanoi and Haiphong areas but believed that the impending onset of bad weather during the northeast monsoon seriously would hamper U.S. tactical fighter attacks

and that its forces could ride out the strikes as they had done before. While Hanoi stalled the talks, Saigon became more rigid. "Therefore," in the words of Dr. Kissinger, "it was decided to try to bring home, really to both Vietnamese parties, that the continuation of the war had its price."

In order to convince North Vietnam, the United States on the night of 18 December 1972 launched Linebacker II, an intensive USAF and Navy day-and-night attack against electrical power plants and broadcast stations, railways and railyards, port and storage facilities, and airfields around Hanoi and Haiphong. During this daily around-the-clock operation, which lasted through 29 December with but a single stand down on Christmas Day, the Air Force employed the new A-7 and F-111 tactical fighters as strike aircraft. Also, for the first time, Strategic Air Command B-52's struck targets in the heavily defended Hanoi and Haiphong areas.

The Air Force campaign was divided into two distinct, highly compressed operations with B-52's and F-111's attacking by night and F-4's and A-7's by day. Each B-52 attack was supported heavily by other aircraft. The F-4's established chaff corridors and flew escort and MIGCAP's; EB-66's orbited for ECM jamming; and F-105's flew Iron Hand or F-105 and F-4 hunter-killer missions against the enemy's SAM complex. The F-111's were assigned specific targets, frequently airfields, with their attacks being bracketed in between B-52 waves. These new tactical fighters approached their targets at low level, made single high-speed ordnance delivery passes, and departed at low level and high speeds. Daylight tactical air included F-4 Pathfinders which provided long-range navigation/target acquisition for delivery of unguided bombs by other F-4's or A-7 aircraft. When weather permitted, F-4's equipped with laser bombs struck high priority targets with precision. The support forces for daytime strikes were equivalent to that provided for the B-52's at night. In fact, many of the support aircraft (and sometimes the same tired crews) flew both day and night missions.

The intensity of Linebacker II operations completely disrupted North Vietnamese air defenses and did not allow them to recover during the campaign. MIG fighters got airborne but flew through B-52 formations apparently without knowing what to do;

two were shot down by B-52 tail gunners. SAM direction radars were jammed successfully, but the enemy fired nearly a thousand SA-2's at the big bombers and downed 15 of them, evidently by visually sighted barrage fire. The enemy stock of SAM's began to diminish and only 15 to 20 missiles were fired at the B-52's on the night of 28 December. During the course of Linebacker II, the Air Force flew 729 B-52 sorties, 613 tactical strike sorties, and 2,066 support sorties. Twenty-seven USAF aircraft were lost, the B-52's being hardest hit with 15 losses and severe damage to 3 other bombers, all by SAM's. One SAM also downed a tactical aircraft. Three other tactical aircraft were lost to AAA and two to MIG's.

When President Nixon announced the termination of Linebacker II effective on 29 December 1972, he included the news that Dr. Kissinger would resume

negotiations with the North Vietnamese in Paris on 8 January 1973. The effect of Linebacker II clearly hastened the conclusion of peace negotiations or, as Kissinger said: ". . . there was a deadlock in the middle of December . . . there was a rapid movement when negotiations resumed . . . on 8 January." On 23 January 1973, Kissinger and North Vietnam's Le Duc Tho initialed the agreement that provided what the United States wanted: a supervised ceasefire, return of U.S. prisoners of war, and political self-determination for the people of South Vietnam. "I am convinced," stated Adm. Thomas H. Moorer, Chairman of the Joint Chiefs of Staff, "that Linebacker II served as a catalyst for the negotiations . . . Airpower, given its day in court after almost a decade of frustration, confirmed its effectiveness as an instrument of national power—in just 9½ flying days."





An F-4C Phantom flies low over the South China Sea as it makes a final approach to the runway at Cam Ranh Bay air base, following a mission in Vietnam.

II

Combat Narratives

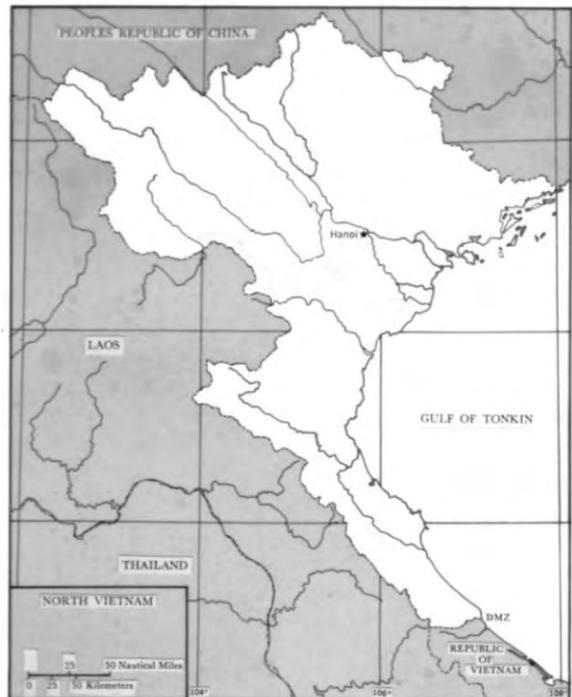
1965 – 1968

The first U.S. aircraft on a mission against targets in North Vietnam in August 1964 encountered only a rudimentary air defense system which did not severely impede the attack. North Vietnam possessed no jet aircraft or surface-to-air missiles and had only a crude radar system. These deficiencies were soon corrected, however, when the North Vietnamese introduced MIG-15 and MIG-17 aircraft and other defenses.

Enemy MIG's soon rose to challenge U.S. aircraft. Air-to-air warfare in Southeast Asia began on 3 April 1965, when a U.S. Navy strike force of four F-8E's bombing the Thanh Hoa Bridge, approximately 33 nautical miles south of Hanoi, was attacked by MIG-17's. One Navy aircraft was damaged during the engagement. Enemy aircraft did better the next day when an Air Force attack force, bombing the same target, was jumped by MIG-15's and MIG-17's about 76 miles south of Hanoi; two F-105 Thunderchief fighter-bombers were shot down by MIG cannon fire. Until 17 June, on which day a U.S. flight of F-4B's downed two MIG-17's with Sparrow missiles, aerial engagements had been infrequent. One month later, a flight of four F-4C's of the 45th Tactical Fighter Squadron faced two MIG-17's. Both fell victims to the deadly Sidewinder heat-seeking missiles. By mid-1965, the air-to-air contest was well underway.

The aerial battles in Vietnam bore little resemblance to the dogfights of World War II or even

Korea. The equipment had become so sophisticated and the speed of aircraft so incredibly increased that it took coordination and teamwork to kill a MIG. Every air-to-air encounter involved the ability and training of many people—support personnel, ground crews, strike and protective flight aircrews, and the



airborne and ground radar operators. Unlike the air-to-air engagements of previous wars in which a single pilot pitted his aircraft against a single opponent, some modern aircraft required 2-man crews, working as an integrated and well-disciplined team.

Captain Richard S. (Steve) Ritchie, the first USAF pilot to down five MIG's in Southeast Asia, achieved this distinction as one member of a team. On his fifth kill, for example, he needed the aid of his backseater, Capt. Charles DeBellevue; he relied on the support of his flight; and he coordinated his techniques with those of the other flights in the area, as they all blended their skills for the mutual assistance necessary to fight as a team. Moreover, it would have been impossible for him to score his victories without Red Crown and Disco, the two supporting radars that pinpointed MIG's and friendlies in the skies of Vietnam. They provided Ritchie and the F-4's with flawless coordination and exact information.

How important this interaction proved to be can be illustrated in the following radio transmissions recorded in Ritchie's fifth kill. Cockpit communications are identified as "Ritchie (intercom)" and "DeBellevue (intercom)." Transmissions between Ritchie and other aircraft and radar are identified as "Buick," "Olds," "Vega," and "Radar." "Bullseye" was a reference point in North Vietnam known to aircrews and ground agencies. Bullseye located the MIG's without the MIG pilot knowing that the U.S. transmissions referred to him.

Radar:	Buick, Bandits 240/30, Bullseye.*
Buick:	Copy 240 at 30.
Ritchie (intercom):	What in the hell are they [the MIG's] doing down there?
DeBellevue (intercom):	What's our fuel?
Ritchie (intercom):	11.2.
DeBellevue (intercom):	OK.
DeBellevue (intercom):	I've got some friendlies and some MIG's. The

*Enemy fighters at 240° and 30 miles from Bullseye

	MIG's are behind the friendlies right now.
Buick:	Buick shows MIG's 10 miles behind friendlies.
Buick:	Stand by for position.
Olds:	Olds 90 right [Olds flight is also turning toward the MIG's].
Radar:	This is Red Crown. Bandits at 253/37, Bullseye.
Buick:	Copy that.
Ritchie (intercom):	Bandits on the nose.
DeBellevue (intercom):	It looks like two of them at least.
Buick:	Buick flight, fuel check.
Olds:	Olds, 90 left.
Radar:	This is Red Crown. Bandits 252/51, Bullseye.
Buick 3 (The element lead responsible for protecting Capt. Ritchie's airplane):	Buick 4, this is 3. Can you read me? We've got bogies [unidentified aircraft] off to the left at 10 o'clock, way out.
Buick 4:	Tally.
Radar:	This is Red Crown. Bandits 251/57, Bullseye.
DeBellevue (intercom):	Roger, I've got 'em.
Ritchie (intercom):	I can't believe we're not getting a SAM [surface-to-air missile] shot at us.
DeBellevue (intercom):	Me either.
DeBellevue (intercom):	Bandits. We're running in.
DeBellevue (intercom):	He's at 1 o'clock right now. [At this point, Buick Flight is converging head on with the MIG's. Olds and Vega flights are chasing the

	MIG's, ground radar is telling everyone where the MIG's are. All the F-4's are using radar, eyeballs, and everything else to try to get to the MIG's, and the MIG's are trying to run away from everyone and get home.]	Buick:	Say their altitude.
Ritchie (intercom):	Keep giving it to me, Chuck.	DeBellevue (intercom):	22 miles dead ahead.
DeBellevue (intercom):	OK.	Buick:	Say altitude please.
Buick:	Disco, do you have an altitude on them?	Buick:	Anybody know their altitude?
DeBellevue (intercom):	Looks like the MIG's are 160 [degrees] from us.	DeBellevue (intercom):	25. We're locked. [The bandits are at] 25,000 [feet], 15 miles dead ahead.
Radar:	This is Red Crown. Bandits 250/67, Bullseye.	Buick:	Buick flight, reheat. [Capt. Ritchie is now starting a climb from 15,000 feet to get up to the MIG's.]
DeBellevue (intercom):	1 o'clock [the MIG's are just to the right of the nose] Two of them at least.	Ritchie (intercom):	We want to get a visual first. [Because of all the friendly airplanes converging, Capt. Ritchie wants to see the MIG's before he fires.]
Radar:	Vega, they are 255/62, Bullseye.	DeBellevue (intercom):	They are dead ahead going right to left. They're about 1130. You're in range.
Vega:	Roger.	DeBellevue (intercom):	Come left a little.
DeBellevue (intercom):	Two sets looks like. May be 4 MIG's.	DeBellevue (intercom):	Come left a little.
Radar:	Vega, Disco. They are 248 for 53 [miles].	DeBellevue:	About 11 o'clock. Three and one-half miles ahead. Turning left. 3 miles, 2½. They are off the scope. Hurry it up!
Buick:	Say altitude of MIG's.	Ritchie (intercom):	I've got'em. I've got'em, I've got'em [visual].
Radar:	Buick, they are 266 for 32. Heading 080. Speed point 7. [Capt. Ritchie now knows their position, heading and speed. Speed is seven-tenths of the speed of sound, or point seven mach. Now all he needs is their altitude.]	Buick:	Buick's got a tally ho. [He sees them.]
		DeBellevue (intercom):	Three miles - 3½ miles, 2 o'clock. [Capt. Ritchie is in a hard climbing turn, attempting to get behind the MIG's. He fires his first missiles, which miss.]

DeBellevue (intercom): You got min overtake. OK, you are out of range. You are out of range. [At this point, Capt. Ritchie has turned and is directly behind the MIG's. He fired and missed during the turn, but is now accelerating and closing on the MIG's from behind.]

Ritchie (intercom): They are 12 o'clock straight ahead.

DeBellevue (intercom): You're in range. You're in range. Fire. [Captain Ritchie fires again.]

Ritchie (intercom): He's conning way high [the MIG is making a contrail].

Buick: Splash! I got him! Splash!

DeBellevue (intercom): Good show, Steve!

First USAF MIG Kills

Air Force pilots flying missions in the northern part of Vietnam during the early summer months of 1965 had discovered a pattern in enemy air activity. This was evident in the Big Eye (airborne early warning radar aircraft) warnings, broadcasting the approach of MIG aircraft. These warnings, as noted earlier, were of two types. As the first U.S. aircraft entered the area, the first warnings from Big Eye flashed yellow, indicating that MIG's were airborne from Phuc Yen airfield. The warnings turned red as the MIG's approached within 10 minutes flight time of the attacking U.S. aircraft. Soon thereafter however, the red warning would change again to yellow. Then, as the last flight departed the area following the attack, the red warning would reappear, and the MIG's would follow the flight out of the area. The North Vietnamese timed their threats (the second red warning) so that the escorts, with a critically low

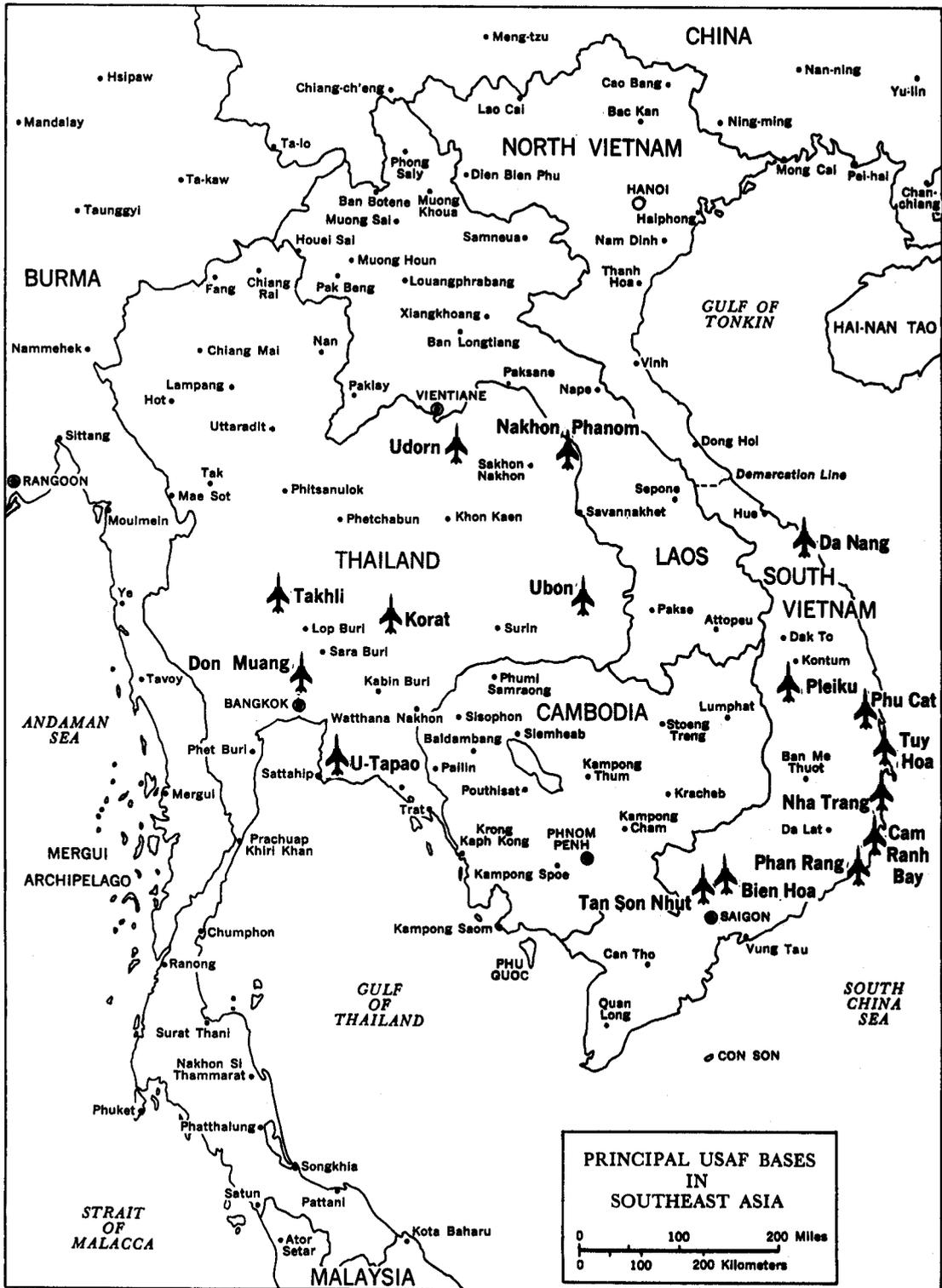
fuel supply, would be forced to fly home and could not engage their MIG's. Apparently, MIG pilots could determine from their own radar equipment when the escorts had returned to base.

Pilots of the 2d Air Division recognized this pattern and decided to take advantage of MIG tactics. Having observed the same characteristics during morning strikes on 10 July, the afternoon flight planned to engage the harassing MIG's. The F-4C escort flight delayed its take-off time for this particular mission by 20 minutes and arrived in the area about 15 minutes later than the North Vietnamese normally anticipated.

Each of the four F-4C aircraft was armed with four Sparrow and four Sidewinder missiles. Major Richard Hall, flight commander, and 1st Lt. George Larson flew lead. Captains Harold Anderson and Wilbure Anderson flew in the number 2 position. The number 3 plane was manned by Captains Kenneth E. Holcombe and Arthur C. Clark, and the 4th was crewed by Captains Thomas S. Roberts and Ronald C. Anderson.* All were members of the 45th Tactical Fighter Squadron (TFS), based at Ubon Royal Thai Air Force Base, Thailand.

The flight and the refueling rendezvous were accomplished in complete radio silence. With full tanks, the four aircraft flew north at Mach .85 and at an altitude of 20,000 feet, a tactic which resembled that of the F-105 strike aircraft. The track pointed toward the target—the Yen Bai ordnance and ammunition depot. The F-4's moved in a "fluid-four" formation. Fluid-four was a tactical formation in which the second element was situated on vertical and horizontal planes to enhance maneuverability, mutual support and visibility. Aircraft numbers 1 and 2 were on the left, and 3 and 4 on the right; the two elements were separated by about 5,000 feet. Fluid-four, designed to provide complete visual coverage to the rear, became the favored formation for MIG-hunting throughout the Southeast Asian conflict. The F-4's moved randomly in both vertical and horizontal planes, maintaining the same basic formation. The second element, aircraft 3 and 4,

*For the sake of convenience, the narrative may, at times, make reference to these aircraft under the aircraft commanders' names. It must be realized, however, that aerial victories are achieved as a result of joint effort. Both crew members receive credit.



provided cover by weaving behind the lead. Radar coverage was assigned to 1 and 3, the element leaders, one searching high and the other low, while 2 and 4 were responsible for visual search.

Shortly after entering orbit over the Yen Bai area the lead F-4 established radar contact, and aircraft number 3 locked on to the MIG a few seconds later. Major Hall instructed the flight to assume the "loose-deuce formation," in which two of the four aircraft would maneuver to provide mutual support and increased firepower. While aircraft of the first element proceeded to make a visual identification of the bogey (unidentified aircraft), the second element, in order to enter the engagement at a reasonably high airspeed, flew an S-pattern (a weave in a horizontal plane) to gain separation from the first element of F-4's. When the MIG's were visually sighted and identified, the F-4 elements were only 2 to 3 miles apart instead of the desired 7 to 8 miles. A Sparrow missile, therefore, could not be launched by the second element without endangering the first.

Hall and Larsen were unaware that the other flight members had located the targets. The lead aircraft

tried to maintain radio silence as much as possible to conceal its presence from the MIG's. Upon an initial radar contact, Hall's aircraft tracked a bogey on the radar scope, which then turned 180° away from the flight. Hall's flight gave chase. Estimating an overtake velocity at about 200 knots, (i.e., the speed differential necessary for the F-4's to overtake the bogies) the flight continued to pursue the MIG until it appeared that he would reach China before he could be intercepted. The F-4's then turned for home. But the overtake velocity suddenly changed to 900 knots and Hall's flight immediately returned to an intercept course. They visually sighted MIG's seconds later. Both bogies were slightly high, to the left of the F-4's. Anderson, aircraft 2 commander, was the first to identify them.

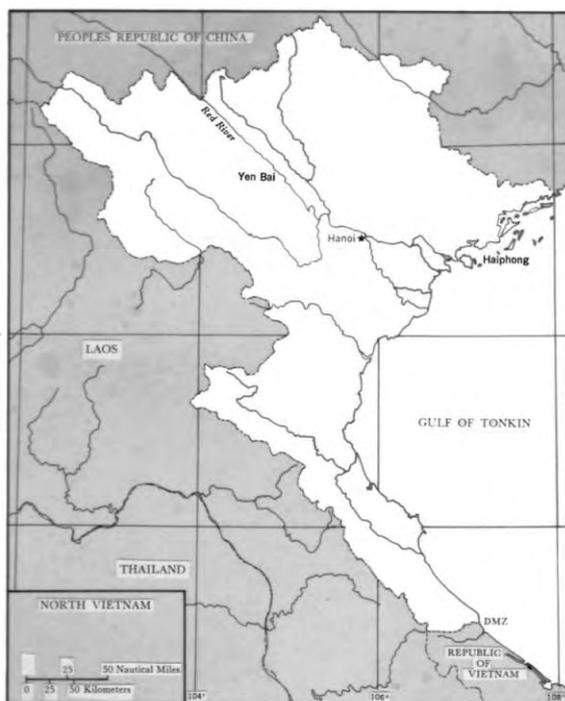
The two MIG's, flying in close formation, started to turn after the lead element but rolled out and turned toward the second element. Hall and his wingman closed left into the MIG's, jettisoned their fuel tanks, and lit afterburners in the turn. As they did so, they saw the MIG's moving up behind Holcombe and Roberts (3 and 4), also jettisoning their tanks.

Holcombe and his wingman heard Anderson's warning of the bogies, and they too lit afterburners. The MIG's swept by them dropping their tanks, but Holcombe and Roberts broke into the MIG's.

Meanwhile, Hall accelerated as Anderson started a climbing turn which split the first element. Hall also climbed to orbit the area. Anderson continued to search for other MIG's, since the flight had been briefed to look out for MIG's in groups of four.

Holcombe and Roberts broke into the MIG's, but the enemy aircraft turned very tightly behind them and fired. Both commanders saw their blasts, but there were no tracers—just "the nose of the MIG lighted up" by muzzle flashes, recalled Holcombe.

Although the MIG-17's had out-turned the F-4's, Holcombe and Roberts accelerated during their turns and gained separation. Roberts broke right in an attempt to either "sandwich or split" the MIG's. The latter occurred and one followed Holcombe, while the other chased Roberts. Once the MIG's had split, Holcombe reversed his turns several times and his MIG slid by, having overestimated his distance (an "overshoot"). Then Holcombe again reversed. His radar went out during these scissors maneuvers,



and when the MIG overshot, he decided to gain separation, executing a right roll and going into a 30° dive.

The MIG tried to give chase and ended up at 7 o'clock, three-fourths of a mile away. This gap increased to a 5-mile separation. Holcombe then executed a hard left turn into the MIG, attacking almost head-on. From the rear of his aircraft, Clark tried to advise his aircraft commander that the radar was out and to "Go heat" (he wanted Holcombe to use a Sidewinder missile equipped with the heat-seeking homing device). Holcombe misinterpreted the message as a problem in detecting the MIG on radar and told Clark to "Go boresight" (to fire the weapons visually). While the crew members tried to clear up their misunderstanding, the MIG passed very close head-on and fired but scored no hits.

Once the MIG had passed, Holcombe turned slightly left to maintain the MIG in sight and then made a very steep dive to 10,000 feet. The afterburner had been turned on in the initial break and was still operating, so the F-4's speed increased to Mach 1.3. Holcombe then initiated a high-G barrel roll with the MIG behind at about 1 mile. When the F-4 reached the 270° position, the MIG opened fire from 7 o'clock at a range of 1/2 mile, but scored no hits. As Holcombe dished back (i.e., emerged from the maneuver) the MIG again overshot and then turned, leveled, and descended toward a cloud.

Holcombe's aircraft was now between 13,000 and 15,000 feet, flying at a speed of Mach .9 to .95, with the MIG ahead. He fired a Sidewinder missile, but nothing happened. A second Sidewinder produced a large fireball at or slightly to the right of the tail cone. The third missile detonated slightly to the right of the MIG. He fired the fourth missile and again nothing happened. Neither Holcombe nor Clark saw the MIG explode, but they did see a fireball as the MIG entered the cloud. The two Andersons in aircraft 2, on the other hand, witnessed the attack and saw the enemy aircraft "blow completely apart."

After firing his fourth and last Sidewinder, Captain Holcombe broke left and intended to head for Udorn, since his fuel level had dropped to 3,000 pounds.

Meanwhile, after Roberts and Anderson in aircraft 4 broke to the right, they started to dive from 20,000 feet in afterburner and unloaded the aircraft.

Roberts accelerated to about Mach 1.4 at 12,000 feet and started a "4-G pull-up" (a climb, four times the pull of gravity), to get into position for an attack.

The MIG lost ground behind him but continued to pursue. During the pull-up, Roberts lost sight of the enemy aircraft but continued his climb to 33,000 feet. By now his radar was completely inoperative. Rolling out at the top of the climb, he saw the MIG at 28,000 or 29,000 feet, falling off on its left wing into a 90° bank and then making a vertical recovery. The MIG pilot smoothly pulled out in a 20° bank and descended slightly to the left, placing himself about 4,000 to 5,000 feet ahead, as Roberts came out of afterburner.

A fall-off to the left and a turn gave Roberts an excellent firing position. As his aircraft closed on the MIG, Roberts fired a Sidewinder. It streaked past the tail and detonated about 4 to 6 feet from the left wing tip. The MIG rocked its wings several times following the detonation but remained in flight, rolling slowly to the left in a bank. Roberts fired a second Sidewinder, but since he fired hastily, it was without tone (i.e., without an audio indicator that the radar track was locked on for the missile). The missile proved ineffective. Roberts then established tone with the third Sidewinder and fired. The missile tracked well and exploded just short of the MIG's tail, but in line with it. The fireball expanded until only the MIG's wing tips were visible. He saw no debris emitting from the aircraft. After the fireball had subsided, the MIG started to discharge white smoke from its tailpipe.

Roberts continued to descend with the MIG, slowly closing distance. When the MIG reached 6,000 feet, it was 60° nose down and inverted. Since his aircraft was about to overshoot, Roberts rolled inverted, nosed toward the MIG, and fired his fourth Sidewinder. He did not watch for results, for just at that moment Anderson, in the rear, sounded a flak warning. Roberts went into afterburner and began maneuvers to evade the flak while leaving the area. Later, Roberts reported: "The MIG obviously lost sight of me. It was simple from then on."

As soon as Roberts completed his encounter, the F-4's left the battle area and rejoined about 30 miles from Udorn. The flight landed with approximately 1,800 pounds of fuel remaining aboard each aircraft.

On 11 July, Lt. General Joseph Moore, Comman-



After receiving awards, members of the first USAF flight to down MIG jets over North Vietnam whoop it up. Flight Commander Maj. Richard Hall gets a ride on the shoulders of the other flight members: (l. to r. in the foreground) Capt. Ronald C. Anderson, Capt. Kenneth D. Holcombe, Capt. Harold Anderson, Maj. Hall, Capt. Arthur C. Clark, and Capt. Wilbure Anderson.

der of the 2d Air Division, awarded Silver Stars to the men scoring these two aerial victories; the other two aircrews were awarded Distinguished Flying Crosses. This established a tradition for the tenure of the Vietnam conflict that, whenever significant aerial victories were achieved, appropriate awards would be made to the aircrews. However, while the U.S. Air Force was duly proud of its fighter pilots who had achieved aerial victories and had nullified the MIG threat to strike forces, MIG kills were not a primary objective at any time during the conflict.

Enemy Stand-Down

Sporadic encounters between MIG's and U.S. fighters occurred during the 9 months following the initial aerial victories. During this period, American crews shot down five MIG's, while four U.S. fighters were lost to the enemy's aircraft. Prior to July 1965, North Vietnam had augmented its MIG-15/MIG-17 force with modified versions of the MIG-21, which were equipped with Atoll infrared homing missiles, but they showed a marked reluctance to commit this jet fighter force to other

than defensive roles. The NVN Air Force seemed more intent upon improving its electronic defenses and at the same time began a considerable expansion of its surface-to-air (SAM) sites and Antiaircraft Artillery/Automatic Weapons network. North Vietnamese MIG's were committed to lengthy training exercises against U.S. aircraft and made dry firing passes (feinting an attack) under GCI radar vectoring, but broke off before U.S. fighters could engage them.* This training period extended from July 1965 through April 1966. The integration of GCI and MIG systems produced excellent training for inexperienced NVN pilots and ground controllers in developing their intercept capability.

When aerial encounters did occur, MIG pilots effectively used the superior turning capability of their aircraft to achieve a 6 o'clock position, which then endangered F-105 strike aircraft if they slowed down to follow or turn. MIG pilots relied on turn radius and cut-off tactics almost exclusively to attain a viable combat attack capability. They usually forced F-105 aircraft to jettison their ordnance in order to take evasive action and prepare for counterattack. Against F-4's armed with radar-controlled and heat-seeking missiles, however, the MIG-17's were at a disadvantage when they employed turn radius and cut-off tactics, since under these conditions the F-4's enjoyed superiority.

U.S. air forces customarily attacked targets from high altitudes to escape small arms fire and flak. When NVN introduced surface-to-air missiles in mid-1965, this threat became significant and strike aircraft shifted to lower approach and withdrawal altitudes, since SAM's were less effective at these levels. Once beyond the concentrations of SAM sites, American aircraft would then pop up to higher altitudes and make their attack. When gunfire again

*Ground control intercept (GCI) radar vectoring is the electronic control of a friendly aircraft from the ground. In air interception—that is, in the contact by a friendly aircraft with an enemy aircraft—there are five phases of maneuvers: (a) climb phase—airborne to cruising altitude; (b) maneuver phase—receipt of initial vector to target until beginning transition to attack speed and altitude; (c) transition phase— increase or decrease of speed and altitude required for the attack; (d) attack phase—turn to attack heading, acquisition of target, completion of attack, and turn to breakaway heading; and, (e) recovery phase—breakaway to landing. The MIG's would break away sometime before the attack phase.

became too effective, the strike aircraft returned to higher levels where, with advance warning and time to see the missiles, the aircrews could outmaneuver them. MIG's were more of a threat at the higher altitudes, but this threat was more potential than real in 1965 and early 1966.

With the growing nuisance caused by MIG tactics against strike forces, by March 1966, the F-4's began to fly "MIG Screen" missions (i.e., protecting fighters were placed between the threat and the strike aircraft). When MIG's bypassed the MIG Screen flight, the F-4's left orbit to assist the strike force. When no MIG's engaged, the orbit was maintained until the last F-105 departed target, then the MIG Screen aircraft escorted the strike flights from the target area.

More MIG Kills

When the northeast monsoon season ended in April 1966, American activity increased against North Vietnam, and there was a corresponding reaction in MIG activity. The NVN Air Force compromised American strike missions and affected the security of strike aircraft. Seven Phantoms and one Thunderchief downed eight MIG's between late April and June, as NVN fighter pilots became increasingly aggressive.

The first encounter came on 23 April with a flight of four F-4C's of the 555th Tactical Fighter Squadron, 8th Tactical Fighter Wing, flying MIG Screen in support of Thunderchief strikes against the Bac Giang highway and railroad bridge, 25 miles northeast of Hanoi. Involved in the two MIG-17 victories were flight aircraft 3 (Capt. Max F. Cameron and 1st Lt. Robert E. Evans) and 4 (Capt. Robert E. Blake and 1st Lt. S.W. George). Four MIG-17's were detected on radar at a distance of about 15 miles, and the two forces met in a near head-on pass.

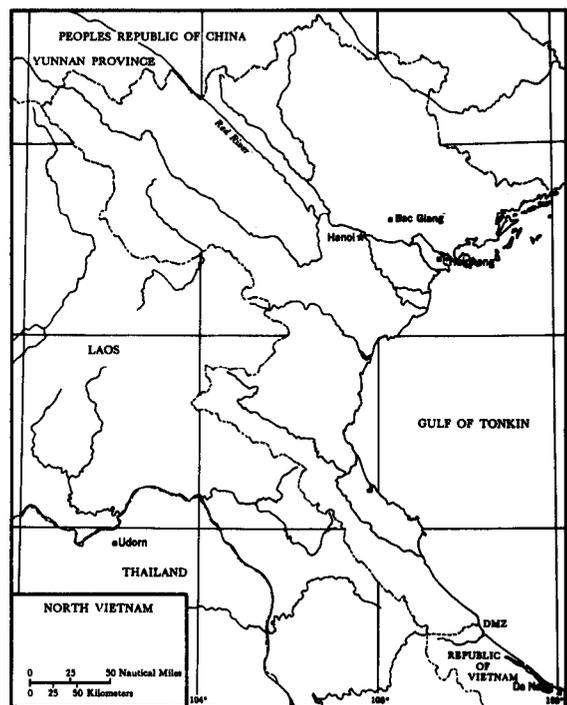
The flight lead and aircraft 2 each fired one Sparrow; Cameron fired a Sidewinder during this head-on contact. None of them made a hit. For the next 10 minutes, the aircraft were in a left-turning engagement between 10,000 and 18,000 feet. Three of the MIG's gained position on aircraft 2, one of them firing without making a hit. Cameron and Blake maneuvered their F-4's to attack the three MIG's.

"We could see little flashes of light when the lead MIG fired at our number two man with his cannon," Cameron later reported. "I quickly fired a Sidewinder missile at him, then went after the second MIG behind our flight leader's wingman."

Cameron's rear seat pilot, Lieutenant Evans, said he thought the Sidewinder went up the MIG's tailpipe. "As the MIG went down," he said, "it was falling apart and trailing thick, whitish-gray smoke."

Another MIG, meanwhile, achieved a firing position on both Cameron and Blake, but was unable to follow their climbing separation maneuver and rolled down to the right. Blake followed the MIG. "I went into a diving roll and came straight down on the MIG," he later commented. "The pilot must have seen us on his tail. He applied full power and dove toward a valley. As I came out of the roll, I fired one Sparrow. I had a bad angle on him and missed but I realigned and fired again." This one connected. "The smoke looked like taffy streaming from the rear," Blake said.

Three days later, on 26 April, Maj. Paul J. Gilmore, in the front seat of the lead F-4C, and 1st Lt. William T. Smith in the back, downed the first



MIG-21 of the war. They were part of a flight of three F-4's flying escort for two RB-66's. Launching from Da Nang, they rendezvoused with the RB-66's and proceeded north to the Red River, where one RB-66 and one F-4 split off for a separate mission. Gilmore, flying the other F-4, and the other RB-66 proceeded northeast of Hanoi. Almost at once they spotted two or three MIG's coming high in the 2 o'clock position and closing rapidly. Gilmore and his wingman jettisoned their external tanks, lit their afterburners, and broke into a hard left-descending turn while the RB-66 departed the area.

Gilmore pulled out of his vertical reversal at 12,000 feet, with his wingman flying a tight wing position. They pulled up after the MIG's, which were in afterburner, heading northwest at 30,000 feet.

The second MIG was descending very slowly, trailing white vapor toward the east. The F-4 aircrews lost sight of this aircraft as they closed rapidly on the first, which was making gentle clearing turns as he climbed away. Gilmore had several boresight lock-ons but was out of range for a good Sparrow



Capt. Cameron (left) and Lt. Evans pose beside Sidewinder missiles upon return from their victory.



Capt. Blake (left) and Lt. George

shot. At a range of 3,000 feet, Gilmore fired one Sidewinder with a good tone; he then maneuvered to the left to gain more separation and as a result did not see his first missile track.

Later, Gilmore reported that he had not realized that he had scored a victory with his first missile: "My wingman, flying cover for me, told me later the MIG pilot had ejected after I fired the first missile. I didn't realize I'd hit him the first time. My wingman wondered why I kept after him as I had hit him the first time and the pilot ejected." Because of radio difficulties, his wingman could not inform Gilmore of his success.

After his maneuver to gain separation, Gilmore pulled up behind the pilotless MIG-21 again and fired another Sidewinder without effect. He again rolled to the left, pulled up, and fired his third Sidewinder at a range of 3,000 feet. "After missing [he thought] twice," Gilmore later told newsmen,



Maj. Gilmore (left) and Lt. Smith pose beneath the red star painted on their aircraft for downing the first MIG-21 of the war.

“I was quite disgusted. I started talking to myself. Then I got my gunsights on him and fired a third time. I observed my missile go directly in his tail-pipe and explode his tail.”

The two F-4 aircrews then descended to watch the debris impact. As Gilmore commenced his pull-up he spotted another MIG-21 tracking his wingman and called for a defensive split. He broke to the left and down while his wingman broke to the right and up.

When Gilmore emerged from the roll, he sighted the MIG ahead, in afterburner and climbing away. He rolled in behind this aircraft and climbed in afterburner until he was directly behind. He fired his fourth Sidewinder, but the range was too short and the missile passed over the MIG’s left wing. Because of low fuel reserves, both F-4’s then left the battle area. The 6-minute aerial battle was Gilmore’s first encounter with an enemy plane “after twelve

years in the tactical fighter business.”

Phantom aircrews of the 555th TFS destroyed two more MIG-17’s on 29 April, when they were flying MIGCAP for a force of F-105’s attacking the Bac Giang bridge about 25 miles northeast of Hanoi. The Phantoms met four of them north of the strike area, and the F-4C crewed by Capt. William B. D. Dowell and 1st Lt. Halbert E. Gossard downed one of them with an AIM-9 Sidewinder.

The flight leader, Capt. Larry R. Keith, flying with 1st Lt. Robert A. Bleakley, accounted for a second MIG by maneuvering him into a crash. Observing the two aircraft of the other element rolling into the MIG’s, Keith broke off in the opposite direction. He saw a MIG preparing to attack Gossard and quickly fired a Sidewinder to distract the pilot. The MIG then executed an evasive maneuver, but Keith followed in hot pursuit. At a distance of 6,000 feet behind the MIG, Keith’s F-4 was just beginning to get Sidewinder tone. During his evasive tactics, the MIG inverted rolling to the left at an altitude of 2,500 feet. He crashed. The flight leader recalled later that the MIG pilot “either lost control of the



Capt. Dowell (left) and Lt. Gossard shot down the first MIG-17 destroyed in aerial combat on 29 April 1966.

aircraft or attempted a Split-S with insufficient altitude."

On the morning of 30 April an element of two F-4C's (aircraft 3 and 4) were alternating with another element (1 and 2) in air refueling. They were providing rescue combat air patrol (RESCAP) for two pilots downed about 100 miles west-northwest of Hanoi. The number 3 and 4 aircraft were withdrawing from the area and 1 and 2 were returning when four MIG-17's attacked. The MIG's, under ground-control, flew out of the sun and waited until the F-4's were low on fuel before closing. They were headed directly for the Phantoms when the aircrew of aircraft 3 sighted them at a range of 5 miles. In the ensuing air battle, Capt. Lawrence H. Golberg and 1st Lt. Gerald D. Hardgrave in aircraft 4 fired a Sidewinder into a MIG's tailpipe. The aircraft exploded. The two Phantoms, then low on fuel, hurriedly left the battle area. Golberg landed at Udorn with only 400 pounds of fuel on board.*

Controversy erupted from the next USAF MIG kill, on 12 May, when Communist China charged that U.S. fighters had intruded into Chinese airspace and shot down a Chinese aircraft. China's report placed the air battle in Yunnan Province, 25 miles north of the border.

Involved in this aerial victory was an F-4C crewed by Maj. Wilbur R. Dudley and 1st Lt. Imants Kringelis, the third aircraft of a flight of three Phantoms escorting an EB-66 on an ECM mission in the Red River Valley. Four MIG-17's jumped the flight about 105 to 115 miles northwest of Hanoi, more than 20 miles south of China's frontier.

"The enemy flier seemed to be a pretty good pilot, but he made one mistake," Dudley later reported. "He apparently had a case of tunnel vision when he bore in on the EB-66 and never knew we were behind him. That was his mistake. And one mistake is all you're allowed in this game."

Dudley missed with his first Sidewinder, fired just as the MIG began descending in what appeared to be a Split-S maneuver designed to regain an offensive position. When the MIG rolled out behind the EB-66, Dudley fired a second missile. It guided up the MIG's tailpipe and the aircraft disintegrated. It spun out of control and crashed. The pilot was

apparently unable to eject, for no parachute was observed. The battle continued a little longer without any further losses on either side, and the two forces then disengaged.

The first half of 1966 ended with another MIG-17 kill by an F-105D pilot: Maj. Fred L. Tracy, 388th TFW, Korat AFB, Thailand. This was the first instance in which a Thunderchief claimed a victory. A flight of four F-105's was flying an Iron Hand (SAM suppression) mission during the afternoon of 29 June when it encountered four MIG-17's about 25 miles north-northwest of Hanoi. The F-105's had just left their target when they detected the MIG's closing at 7 o'clock.

The first MIG fired, but missed the third Thunderchief which along with number 4 was breaking and diving. The first and second MIG's then pursued the lead element. The third and fourth MIG's followed, but did not take an active part in the engagement. The F-105 flight leader and his wingman had begun a left turn when the MIG's were sighted. The American aircraft went to afterburners and jettisoned their ordnance as they commenced a dive to the left.



Capt. Keith (left) and Lt. Bleakley maneuvered a MIG-17 into a crash.

*Flying time was about 4 minutes.

The lead MIG fired at Tracy, in aircraft 2, and made several hits. One 23-mm slug entered the cockpit and knocked Tracy's hand off the throttle, putting him out of afterburner and damaging his instruments, including his gun sight and oxygen equipment. The MIG overshot the Thunderchief and ended up at Tracy's 12 o'clock position.

Tracy fired 200 rounds of 20-mm, observing about 10 hits. The MIG rolled over and did a Split-S into clouds at an altitude of 2,000 feet. Because of the damage to this aircraft, Tracy then left the battle area, with aircraft 3 providing cover.

Cannon fire from the second MIG, meanwhile, hit and damaged the lead F-105. Aircraft 4 engaged the fourth MIG, which had joined in the battle. The lead Thunderchief pilot fired about 200 rounds of 20-mm, but scored no hits. Before departing the area, he fired a burst at the departing MIG's, and again he apparently missed.

During July, August, and September 1966, North Vietnamese MIG activity increased, and six more MIG's were downed by Air Force F-4's and F-105's. During this period, MIG-17's concen-



Capt. Golberg (left) and Lt. Hardgrave fired a Sidewinder into the tailpipe of a MIG-17.

trated almost exclusively upon the F-105 strike forces. As MIG activity picked up, it became apparent that the primary objective of NVN was to prevent as many strike aircraft as possible from reaching their targets with ordnance. The MIG pilots attacked the F-105's during their bomb runs and often caused enough distraction to disrupt the attack. Once they succeeded in forcing strike pilots to jettison their ordnance, they quickly withdrew. During this same period, MIG-21's slowly began to assume most of the high-altitude intercept role.

The earlier MIG Screen flights of American F-4's evolved during this period into pure MIGCAP missions. The Phantoms kept watch for MIG aircraft and actively engaged them to prevent them from attacking strike forces. MIG pilots, however, at times out-maneuvered American air-to-air missiles.

Two MIG-21's were destroyed on 14 July by F-4C aircrews of the 480th TFS. Capt. William J. Swendner and 1st Lt. Duane A. Buttell, Jr. flew the lead Phantom, and 1st Lts. Ronald G. Martin and Richard N. Krieps the number 2 aircraft. They were part of a flight of four F-4's providing MIG cover for an Iron Hand flight of three F-105's.

Following the Thunderchiefs north of Hanoi, the Phantom flight, in a right turn, sighted the first MIG-21 in a 7 o'clock position. The F-4's jettisoned their tanks and spotted a second MIG pursuing the third F-105. Even though the second MIG closed in on the F-105, the pilot continued his Shrike launch. Captain Swendner and his wingman gave chase.

Swendner's first Sidewinder passed close to the MIG's canopy without detonating, and the MIG pilot lit his afterburner, initiating a 30° climb to the right. Swendner's second Sidewinder detonated behind the MIG, but seconds later a third one went up the MIG's tailpipe and blew the enemy aircraft into pieces.

Lieutenant Martin, meanwhile, had maneuvered behind the second MIG, which was attacking the fourth Phantom. Just after the MIG missed that aircraft with a missile and initiated a climb with afterburner on, Martin fired a Sidewinder which impacted near the right side of the MIG's tail. The pilot ejected at once.

No additional aerial victories were chalked up by Air Force aircrews until 18 August, when Thunder-



Lt. Butell (left) and Capt. Swendner. Their third Sidewinder went up the tailpipe of a MIG-21 and blew the enemy aircraft to pieces.



Lts. Jameson (left) and Rose scored against a MIG-17.

Lts. Krieps (left) and Martin (center) receive congratulations from Lt. Col. Leland Dawson, their squadron commander, for shooting down a MIG-21.

chief pilot Maj. Kenneth T. Blank of the 34th TFS destroyed a MIG-17. A flight of four F-105's involved in an Iron Hand SAM suppression mission on that day sighted two MIG-17's.

One MIG came in firing his cannon at the lead Thunderchief. Flying aircraft 2, Blank maneuvered into a 6 o'clock position on the MIG and opened fire with his 20-mm gun. He fired about 200 rounds at a range of 400 to 600 feet before the MIG burst into flames, entered an inverted dive, and hit the ground. The entire engagement took less than 2 minutes. The second MIG broke off and fled.

The first of three September MIG kills came on the 16th when at least four MIG-17's were sighted by a flight of three F-4C's of the 555th TFS at Ubon, which was conducting a strike/CAP mission against the Dap Cau railroad and highway bridge. During the air battle, the lead Phantom fired all of his Sidewinders and two of his Sparrows at several MIG's, but all escaped damage. The number three Phantom fought with two MIG's and did not return from the mission. First Lieutenants Jerry W. Jameson and Douglas B. Rose downed the only MIG lost by the enemy that day.

"It seemed unreal," Jameson later told newsmen. "I think for the first 3 or 4 minutes I didn't realize what I was doing. I was just hanging on, trying to

get away from a MIG that was chasing me. After I got away I started putting into practice what I had learned in training.” When Jameson had tried to get behind one of the MIG’s in order to fire his Sidewinders, the slower but more maneuverable MIG went into a tight turn and ended up on his tail.

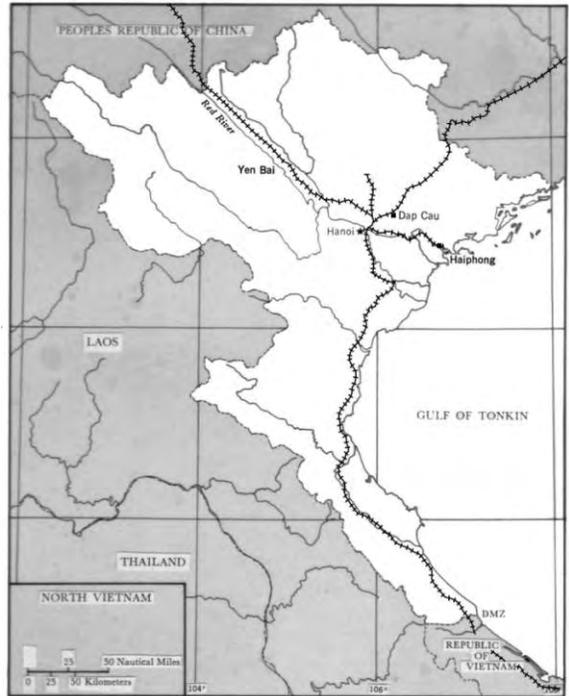
When the MIG pilot began firing his 23-mm gun, Jameson put his F-4 into afterburner, turned hard to the left and then hard to the right to escape. He then jettisoned his tanks and ordnance and returned to the engagement. Another MIG was sighted dead ahead, but Jameson was unable to pick it up with radar so he could launch a Sparrow. He overshot the MIG, ignited afterburner again, made a hard right turn, and observed still another MIG at his 12 o’clock position.

“At about a mile out,” he reported, “I fired two missiles. Then I turned hard to the left and back to the right again to get away from another MIG that had begun firing on me. When I straightened out again I saw debris and a man in the air.”

F-105 pilots made the other two MIG kills on September 21. The two Thunderchiefs were from different wings, performing different missions. The first flight of one F-105F and three F-105D’s from the 388th TFW at Korat was flying an Iron Hand mission against SAM sites in support of a large strike force directed against the Dap Cau highway and railroad bridge. Aircraft 4 sighted the MIG’s visually as they closed in on aircraft in positions 1 and 2. First Lieutenant Karl W. Richter in number 3 and his wingman, flying number 4, then turned into the MIG’s, which went into a left turn after failing to overtake 1 and 2. Richter got within 2,000 feet and opened fire with his 20-mm gun, hitting the first MIG, which rolled out level and then went into a hard right turn. The second MIG broke sharply to the left.

Richter’s wingman shot at this MIG but did not score any hits. Both 3 and 4 stayed with the first MIG, and then Richter fired a second time. “I saw my 20-mm rounds start to sparkle on his right wing the second time I fired,” Richter later reported. “His right wing fell off. As I flew past I saw the MIG’s canopy pop off.” The enemy pilot ejected safely as Richter and his wingman followed the MIG, watching it hit the ground.

The second flight on that day comprised four



Thunderchief pilots Lts. Wilson (left) and Richter scored MIG-17 kills on 21 September 1966. Richter, 23 years old at the time, was the youngest pilot to score a MIG kill in Vietnam.



Lts. Klaus (l. to r.), and Latham, Maj. Tuck, and Lt. Rabeni, in two F-4C's, shot down two MIG-21's in 3 minutes.

F-105D's of the 355th TFW from Takhli AFB, Thailand. They were flying a strike mission against the Dap Cau bridge. Within a few minutes after Richter had downed his MIG-17, this flight also sighted a MIG-17 in a 12 o'clock low position. Aircraft 1 and 2 descended to the 6 o'clock position in afterburner, leaving 3 and 4 as high cover.

The lead F-105 fired a burst of 154 rounds and damaged the MIG. The North Vietnamese pilot then suddenly lit his afterburner and pulled up and rolled left behind the F-105 lead. But, flying in position 2, 1st Lt. Fred A. Wilson, Jr. began shooting at the MIG from the 6 o'clock position.

"He [the MIG pilot] still had some fight left in him and he could have fired at the leader. I just rushed up behind him firing my 20-mm guns all the time. My sights were not even set up. I just kept firing." Wilson fired off 280 rounds, shooting off a portion of the MIG's aft section. The lead F-105 was safe, he noted. Breaking hard left, he then observed an explosion in the area where the MIG could have crashed.

Aircraft 3 and 4 in the meantime spotted another

MIG. Number 3 attacked, firing 135 rounds before his guns jammed and the MIG broke hard left. No hits were observed.

The aggressiveness of MIG pilots continued unabated. Between 4 September 1966 and January 1967, with the exception of 4 days, the MIG's ascended each day. This marked the first continuous use of these aircraft for active air defense purposes. North Vietnam's intention to employ as fully as possible its MIG force to reduce U.S. strike effectiveness resulted in the loss of several American aircraft. The kill ratio was still favorable for the U.S., but the MIG threat clearly demanded special attention.

During December MIG activity further increased, particularly against Thunderchief strike aircraft, although—as earlier—the MIG pilots generally broke off engagements once the American aircraft dumped their ordnance and prepared for offensive action. Three MIG's were destroyed by Air Force crews during the last quarter of 1966, and one of these was credited to an F-105 pilot.

Four F-4C's of the 366th TFW were providing

escort for an EB-66 on 5 November when they were attacked by two or more MIG-21's in the northeastern section of North Vietnam, near Hanoi and Haiphong. The EB-66 was making its final orbit of the area and all of the escorting Phantoms were near the minimum fuel level for a safe return to their home station.

The MIG's were first detected on radar at a range of 18 miles. Shortly after the EB-66 executed a left turn, Maj. James E. Tuck, flying the lead F-4, saw the MIG's visually and called them out to his flight.

The first MIG launched a missile at the EB-66 just as that aircraft broke into a diving spiral. The missile missed. The F-4's and MIG's also spiraled down, and Tuck and his pilot, 1st Lt. John J. Rabeni, Jr., launched three Sparrow missiles. The explosion from the third Sparrow caused the MIG to flame out, and the pilot ejected.

Meanwhile, a second MIG got on the tail of Major Tuck's Phantom, and his wingman, 1st Lts. Wilbur J. Latham, Jr., and Klaus J. Klause, maneuvered to fire on it. During the execution of this maneuver, Latham saw a MIG (possibly a third one not previously observed) pull up in front of him, and he launched a Sidewinder. The missile exploded near the MIG's tailpipe, and the pilot ejected. The entire air battle lasted less than 3 minutes.

That night there was a celebration in the "Doom Club" at Da Nang's officers' open mess. These MIG kills gave the 480th Tactical Fighter Squadron its fifth aerial victory.

Maj. Roy S. Dickey of the 388th TFW at Korat, flying in a flight of four Thunderchiefs on 4 December, scored the final victory of 1966. His flight was one of several in a second wave assigned to strike a railroad yard approximately 2 miles north of Hanoi. As the flight rolled in on the target, the Thunderchiefs sighted four MIG-17's directly over the target, several thousand feet below their flight level.

As Dickey came off his bomb run, he saw one of the MIG's at a 2 o'clock position, attacking aircraft 3. He was then 2,000 feet behind and slightly above the MIG's 4 o'clock position, so he began to fire his 20-mm guns as he closed to within 700 feet. He ceased firing when the MIG burst into flames at the wing roots. The entire fuselage behind the cockpit was a sheet of flame. The MIG rolled over on its

right wing and began spinning. Dickey last saw the MIG in a flat right-hand spin at 3,500 feet.

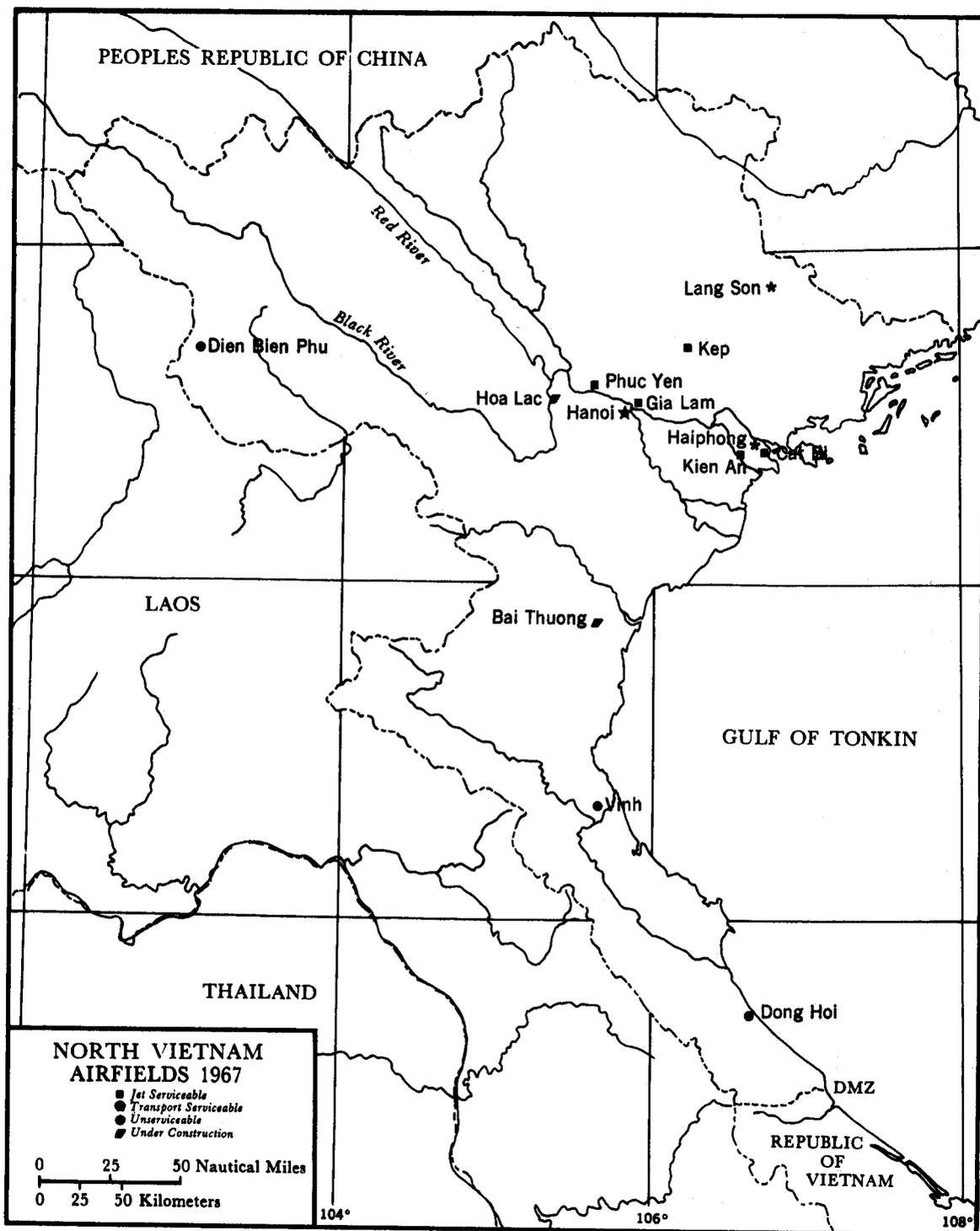
Meanwhile, another MIG had begun to fire at Dickey from the Thunderchief's 6 o'clock position. Dickey took evasive action and after entering a steep dive, leveled out at 50 feet, and lost sight of the second MIG.

Operation Bolo

MIG activity directed at the strike forces late in 1966 was unusually high and demanded measures to counteract the threat. Operating from five principal airfields—Phuc Yen (north of Hanoi), Kep (northeast of Hanoi), Gia Lam (east of Hanoi), Kien An (southwest of Haiphong), and Cat Bi (east of Haiphong)—the MIG's enjoyed a degree of immunity so long as they remained on the ground. The United States imposed political restrictions until 23 April 1967, barring strike forces from bombing enemy airfields. Assured of such immunity, the MIG's could feint air attacks against American bombing aircraft, forcing them to jettison bomb loads prematurely. But instead of confronting U.S. jets in air-to-air combat, the MIG's would withdraw and return to their safe havens. Moreover, to complicate matters, the later model MIG-21's carried radar-guided or heat-seeking missiles, which presented a direct threat to American fighter aircraft. This threat had to be negated.

With outright destruction of MIG's on the ground prohibited for political reasons, the commander of Seventh Air Force hit upon another scheme to eliminate or reduce the threat. He called upon Col. Robin Olds, commander of the 8th TFW, to launch an offensive fighter sweep of North Vietnam. Olds arrived on 22 December 1966 at Headquarters Seventh Air Force, where operation "Bolo" was outlined.

The first step was to get the MIG's airborne and then to destroy them in air-to-air combat. At the same time, it was necessary to cover the airfields and routes which they might use to recover or escape to China. The entire mission hinged on this. The execution of this plan in all its phases required a large force of F-4's to be airborne at staggered intervals.



The fighter forces were drawn from the 355th, 388th, 8th, and 366th Tactical Fighter Wings. The 355th and 388th Wings, equipped with F-105 Thunderchiefs, were to fly regular Iron Hand strikes. The F-4C's of the 8th TFW became the West Force and were charged with bringing the MIG's up and covering suspected orbit areas as well as Phuc Yen and Gia Lam airfields. The F-4C's of the 366th TFW, designated the East Force, were assigned to cover Kep and Cat Bi airfields and to block approach routes to and from the north.

The West Force used an elaborate ruse to make the Phantoms appear to the enemy as an F-105 Rolling Thunder* strike force. The F-4C's used F-105 tanker anchors, refueling altitudes, approach routes, approach altitudes, airspeeds, and radio call signs and communications to simulate a normal Thunderchief strike force. This was intended to deceive the enemy on NVN radars. For this operation, the F-4C's were also equipped for the first time with ECM pods to outwit the enemy's SAM and AAA acquisition and tracking radars.

The Bolo task force consisted of 14 flights of F-4C's, 6 flights of F-105 Iron Hand aircraft, 4 flights of F-104's and supporting flights of EB-66, RC-121 and KC-135 aircraft. Time on target for each flight was separated by 5 minutes to provide at least 55 minutes of F-4C air coverage in the target area. It was believed that MIG's could remain airborne for approximately 50 minutes and could devote 5 minutes to aerial combat.

Because of the size of the task force and the required logistical support, timing was crucial. A 24-hour standdown was required prior to H-hour. Based on this planning and on long-term weather prognostication, D-day was set for 2 January 1967. For 3 days prior to the execution of Bolo, all aircrews received special briefings. The F-4 aircrews were briefed not to attempt to turn with or to try to out-turn the MIG's.

On the 2nd, weather conditions over the target area were poor and considerable cloudiness and overcast was forecast. A 1-hour delay was instituted on the 2nd to await more favorable weather and then the mission proceeded on schedule. All other flying

*A nickname assigned to air strikes against targets in NVN on a continuing schedule from March 1965 to October 1968.



Col. "Chappie" James and his GIB, Lt. Evans, prepare for take-off.

was cancelled for that day and all designated units went into high gear to carry out the operation.

Each flight of the West Force was comprised of four F-4C's. Olds' flight arrived over target at 1500. The next arrived at 1505—led by Col. Daniel "Chappie" James, Jr., the 8th TFW's deputy commander for operations, and his crewman, 1st Lt. Bob C. Evans. The third flight arrived at 1510. Other West Force flights arrived later, but only the first three encountered MIG's.

The first flight over the target was given unrestricted use of air-to-air missiles, since any other aircraft in the vicinity would have to be a MIG. Olds' flight expected to encounter MIG's about the Red River or near Phuc Yen airfield. Given the adverse weather conditions, however, the NVN Air Force apparently did not expect a strike force and their reaction to Operation Bolo was much slower than anticipated. Proceeding on the preplanned route over and to the southeast of Phuc Yen, no MIG's were sighted and Olds' flight turned to a northwest heading. The second flight entered the Phuc Yen battle area minutes later. Because of the slow MIG

scramble reaction, Olds' missiles-free option was cancelled in order that the flights would not endanger one another.

The cloud overcast made it impossible for the West Force to cover the airfields, which would have prevented a MIG recovery. The cloud layer also gave the MIG's an easy means to disengage from aerial combat by diving into the overcast for cover. The weather also hampered the East Force, since its primary mission was to cover the airfields. Unable to enter the battle area, the East Force sighted no MIG's.

While heading northwest from Phuc Yen, Olds' flight acquired a low, very fast radar contact at a distance of 17 miles from their 12 o'clock position. The lead was given to aircraft 3 of Olds' flight, who pursued the radar contact in a diving intercept to the top of the cloud layer. But aircraft 3 lost radar contact as the target passed under the flight. Aircraft 1, Olds and 1st. Lt. Charles C. Clifton, resumed the lead and climbed to 12,000 feet, heading toward Thud Ridge, a chain of mountains northwest of Hanoi. James' flight entered the area and reported a MIG at 6 o'clock to Olds' flight and closing. The entire battle was fought within a 15-mile radius centered on Phuc Yen airfield. For 15 minutes the Americans fought a high-speed duel with aggressive MIG-21 pilots.

Lieutenants Ralph F. Wetterhahn and Jerry K. Sharp, flying in aircraft 2 in Olds' flight reported the start of the air battle:

Olds 03 [aircraft 3 of Olds' flight] observed one MIG-21 at 6 o'clock. Olds 01 saw one at 8 o'clock and Olds 02 saw one at 10 o'clock. Olds 01, 02, and 03 swung left and slid between the second and third MIG's. Olds 01 fired two AIM-7E's which failed to guide, while the number three MIG began sliding to 6 o'clock on the three F-4's. Olds 01 fired two Sidewinders which immediately guided on the undercast. At this time Olds 02 achieved a boresight lock-on, returned the mode switch to radar, centered the dot, and salvoed two AIM-7E's. The first was felt to launch, but was not observed. The second launched and it appeared just left of the radome. It guided up to the MIG-21 (range 1½ to 2 nautical miles) and impacted just forward of the stabilizer.

A red fireball appeared and the MIG-21 flew through it, continued on for an instant and then swapped ends, shedding large portions of the aft section. A small fire was observed in the aft section, emitting black smoke. The aircraft went into a flat spin and rotated slowly, similar to a falling leaf, until disappearing in the clouds . . .

A left turn was continued, as Olds 01 had sighted the first MIG and was maneuvering for a shot. As we turned to approximately 250° Olds 01 began a barrel roll, and was lost by Olds 02 in the sun. Approximately thirty seconds later Olds 01 was seen slightly low at 10:30.

About a minute after the first victory, Capt. Walter S. Radeker, III, and 1st Lt. James E. Murray, III, downed the second MIG. They later reported:

We continued the right turn to approximately 330° when Olds 03 called contact below the cloud layer. The flight then turned left and down, but the contact passed under the flight, exceeding radar tracking capabilities.

As the flight began climbing again, Ford flight,* which had just entered the target area, called MIG's at Olds's 6 o'clock. Olds 03 observed one MIG-21 at 6 o'clock, and Olds 01 and 02 concentrated on two MIG's, one at 8 o'clock and one at 10 o'clock.

Olds 04 then performed a high speed yo-yo which afforded us an excellent advantage on one MIG-21, who passed under us apparently tracking Olds 03. The second MIG-21 was no longer visible behind us so we dropped down behind this MIG. Initially we had a very poor Sidewinder tone. We then added some power and climbed slightly and the Sidewinder tone became excellent. The missile was fired after the radar-heat switch had been transferred to the heat position, and guided right into the MIG. It struck slightly forward of the tail, immediately resulting in a burst of black smoke and a violent tuck-under. The MIG was observed to be uncontrollable and violently falling, still trailing smoke.

As the MIG entered the overcast, Olds lead and 02 had just completed successful attacks on their MIG's.

*Ford was the call sign assigned to the flight led by Col. James.

Certain MIG tactics became obvious during the air battle. Directed apparently by ground control, two MIG's attacked from the 10 and 12 o'clock position while others simultaneously were vectored in from a 5 to 7 o'clock position. The purpose of such a double attack was to force the F-4's to turn from the rear encounter, putting the MIG's originally at 10 to 12 o'clock in position for a tail-on attack. Colonel Olds describes this tactic in the report of his first MIG kill:

At the onset of this battle, the MIG's popped up out of the clouds. Unfortunately, the first one to pop through came up at my 6 o'clock position. I think this was more by chance than design. As it turned out, within the next few moments, many others popped out of the clouds in varying positions around the clock.

This one was just lucky. He was called out by the second flight that had entered the area, they were looking down on my flight and saw the MIG-21 appear. I broke left, turning just hard enough to throw off his deflection, waiting for my three and four men to slice in on him. At the same time I saw another MIG pop out of the clouds in a wide turn about my 11 o'clock position, a mile and a half away. I went after him and ignored the one behind me. I fired missiles at him just as he disappeared into the clouds.

I'd seen another pop out in my 10 o'clock position, going from my right to left; in other words, just about across the circle from me. When the first MIG I fired at disappeared, I slammed full afterburner and pulled in hard to gain position on this second MIG. I pulled the nose up high about 45 degrees, inside his circle. Mind you, he was turning around to the left so I pulled the nose up high and rolled to the right. This is known as a vector roll. I got up on top of him and half upside down, hung there, and waited for him to complete more of his turn and timed it so that as I continued to roll down behind him, I'd be about 20 degrees angle off and about 4,500 to 5,000 feet behind him. That's exactly what happened. Frankly, I am not sure he ever saw me. When I got down low and behind, and he was outlined by the sun against a brilliant blue sky, I let him have two Sidewinders, one of which hit and blew his right wing off.

The MIG erupted in a brilliant flash of orange flames. As the wing fell off, the aircraft swapped ends falling, twisting, corkscrewing, and tumbling into the clouds. No one could see if the pilot had ejected. Looking for other MIG's, Colonel Olds checked his fuel level, and gave the order to head for home when Radeker reported Bingo fuel.

Although James did not get a MIG for himself, he observed the MIG kills. He also noted the NVN tactic of double attacks from MIG's located at different positions of the clock:

At approximately 1504 hours my flight was attacked by three MIG-21's, two from 10 o'clock high and one, simultaneously, from 6 o'clock low. I did not see the MIG at 6 o'clock at first, as I had already started to counter the attack of the two closing from the front quarter. My rear seat pilot called me (very urgently), stating a MIG was closing from 6 o'clock and was in missile firing range on my number three and four aircraft. I was a bit hesitant to break off the attack I already had started on the other two MIG's, as I had just seen Olds flight pass underneath us a few seconds before and I had a fleeting thought that this was who my rear seater was seeing. However, I quickly max rolled from a left bank to a steep right and observed the low MIG as called. I called a hard right break for 03 and 04. As they executed, the MIG broke left for some strange reason, and for a split second was canopy-to-canopy with me. I could clearly see the pilot and the bright red star markings.

I immediately started a barrel roll to gain separation for attack and fired one Sidewinder. As he accelerated rapidly and broke harder left, my missile missed, but he broke right into the flight path of my number two aircraft, flown by Capt. Everett T. Raspberry. I called Captain Raspberry and told him to press the attack as the two aircraft that I had initially engaged had now swung around into range, head-on. I had a good missile growl and fired two AIM-9's in rapid succession at them. I immediately rolled over to reposition in fighting wing position on my number two, Captain Raspberry. It was during this maneuver that I saw an F-4, which was Olds lead, blast the wing off another MIG in another fight in progress a few miles from us.

I continued down with Captain Raspberry and remember thinking he was getting a little inside optimum missile parameters. He then executed a rolling maneuver, placing him in perfect position.

Raspberry was flying with 1st Lt. Robert W. Western in Ford 02 during the encounter, when they rolled in for the fourth victory in Operation Bolo:

The maneuver positioned my aircraft at the MIG's 6 o'clock at a range of approximately 3,500 feet in a left turn. I assume that the MIG pilot was not aware of my position because he rolled out of his turn, placing me in a perfect position to fire the AIM-9B. I fired the Sidewinder and observed the missile home up his tailpipe. As soon as the missile detonated the MIG-21 swapped ends and stalled out. The aircraft went into a slow spiral, falling toward the undercast.

Colonel James related what happened to the MIG:

Captain Raspberry fired one AIM-9 which impacted the tail section of the MIG-21. The MIG pitched up violently, then started into a slow, almost flat, spin. I followed in down to cloud top level and observed it burst into flames (a large explosion just aft of the canopy) and disappear into the clouds. I called Captain Raspberry and directed him to rejoin in wing position. I headed for the Olds flight fight but they had already dispensed with their MIG's and were rejoining to proceed out of the area. I covered their egress from 6 o'clock high and departed the area with them.

The third West Force flight fought in two separate engagements. Captain John B. Stone, flight leader, had monitored the radio chatter of Olds and James and had asked if his flight could assist, but he received no intelligible reply. Nearing Phuc Yen, the number 2 aircraft in Stones' flight observed MIG-21's at 3 o'clock and at a distance of 6 nautical miles, coming up out of an overcast on a heading of about 20° in an easy left turn. Because of his radio failure, however, he could not alert Stone and the other members of the flight and himself take the lead, a practice which was a prebriefed procedure for a flight member making MIG contact. Aircraft 4 also observed the flight of four MIG-21's and an additional two in trail at a distance of 2 or 3 miles.

Stone sighted two of the MIG's crossing over Phuc Yen in a 3 o'clock position about 4,000 feet below at a range of 2 nautical miles.

As Stone's flight began closing, the MIG flight leader broke left and Capt. Stone steepened his turn to follow. This placed Maj. Philip P. Combies and 1st Lt. Lee R. Dutton in aircraft 4, on the outside of the echelon, in a position where they had to go high to clear the other members of the F-4 flight, who were turning into them. Combies later described the chase and the victory:

We were flying at 16,000 feet mean sea level and 540 knots true air speed. Shortly after completing the turn to the northwest we spotted a flight of four MIG-21's in loose formation, 2 o'clock low at approximately 6 to 8 miles. Approximately 1 to 2 miles behind were two more MIG-21's, making a total of six observed. Due to their position "ahead of the beam" I wonder now if they were being vectored against us or possibly against Olds or Ford flights, who were initiating their egress from the area.

As the MIG's crossed in front of Stone, he started in on them, breaking left and down. This caused the flight to slide to the right and I, as 04, wound up high and right from the remainder of the flight. I went "burner" and held minimum "burner" throughout the initial engagement. The MIG's broke left and our flight commenced the engagement. My pilot secured, by boresight, a full system lock-on on one of the MIG's. I had selected radar and interlocks out, as prebriefed for an ACT [air combat tactics] environment. I had no difficulty in tracking the MIG. I don't think I pulled over four G's at any time during the whole battle. Using the Navy tactic of disregarding the steering dot, I pulled lead on the MIG using the reticle. When I felt I was where I wanted to be, I pulled the trigger, released, pulled again, and held. I did not observe the first Sparrow at all. However, I saw the second from launch to impact. We were approximately 1 mile behind the MIG, in a left turn, at approximately 12,000 feet at the time of launch. The second Sparrow impacted in the tailpipe area followed by a large orange ball of fire and a chute sighting.

Meanwhile, two MIG's (probably the fifth and

sixth aircraft) maneuvered to gain an advantage on Stone and his wingman, who were attacking MIG's 1 and 2 from the flight of four. One of the pursuing MIG's passed low between the two F-4's and the other fired cannon at a angle off, with no effect. Captain Stone and 1st Lt. Clifton P. Dunnegan in the lead aircraft broke right in an evasive maneuver and reversed back to the left to continue attacks on the first and second MIG's. Stone in the meantime lost his wingman, who ended up in a left barrel roll, high, where he mistakenly joined aircraft 4, thinking he had rejoined Stone. Stone again closed behind the same two MIG's and fired three Sparrow missiles. He recalls:

I called for boresight and continued to turn to position for the kill. Due to the excessive chatter and not knowing for sure whether we were locked on, I fired three AIM-7E's.

I maintained illumination of the target by tracking with the pipper. I planned to fire in salvos of two. The first Sparrow was not observed, so I fired two more. The second missile detonated just at the wing root. The MIG caught fire and the pilot ejected.

Aircraft 3 had also attacked a MIG, probably the fourth plane in the four-ship flight. He had locked on at 2½ miles and launched two AIM-7's at a 1½ mile range. The first Sparrow did not guide and the second followed the MIG into the clouds. No impact was observed and this MIG could not be claimed.

Minutes later, Stone's flight had its second encounter. On a heading of about 20° Stone picked up three radar contacts 30° to his right and at a distance of 12 miles. Stone turned right to identify these contacts, but then he visually acquired two more MIG's at 10 or 11 o'clock, 3 miles away in a left turn. He turned left for position on these MIG's, intending to launch a Sidewinder, but he was unable to do so because at that moment aircraft 3 called a MIG on the tail of an F-4.

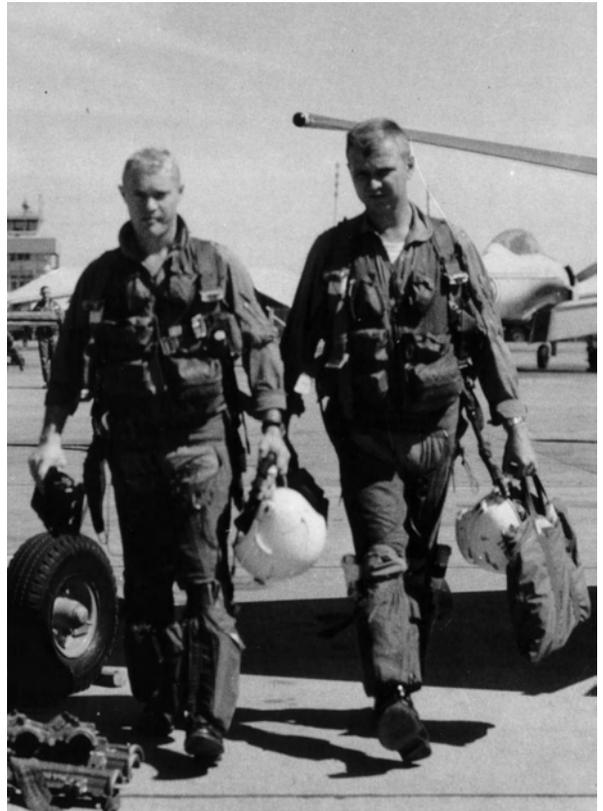
"I turned toward my 7 o'clock," said Stone, "and saw a MIG at 700 feet, firing. I initiated a hard break up into the MIG. When I reversed I could not see the MIG nor did I have my wingman. I then unloaded to make separation."

Aircraft 2 and 4 had tailed in behind other MIG's, which split, with one or more going left and down, and one going right and up. Aircraft 2, flown by 1st Lts. Lawrence J. Glynn and Lawrence E. Cary, followed one of the MIG's, and aircraft 4 followed another. Glynn fired two Sparrows at his MIG; the second one hit and the MIG exploded. Glynn flew through the debris, which caused some damage to the underside of his aircraft. The MIG pilot bailed out, thus raising the day's score to seven victories for the "wolf pack" of F-4's. Glynn then fired a Sparrow at still another MIG, but it passed about 2,000 feet in front of the enemy aircraft.

Combies and Dutton, in aircraft 4, fired two Sparrow missiles at the MIG they were pursuing, but neither missile made contact with the target. Combies then fired four Sidewinders at the MIG—two detonated near the aircraft, and as he was firing the last two Sidewinders, Combies heard a warning on the radio: "F-4C, I don't know your call sign, but there's a MIG on your tail. Break hard right!" When Combies broke hard right, he failed to see what happened to his missiles.

Glynn, in aircraft 2, spotted two more MIG's, but he could not attack because his radio was out and he did not desire to break formation with Combies. Aircraft 3, piloted by Maj. Herman L. Knapp, was the only F-4 still without a MIG victory in Stone's flight. He had attacked a MIG which had been in pursuit of Stone and fired one Sparrow as the MIG dove into a left spiral. The missile apparently failed to ignite, since it was never observed. Before the flight departed Phuc Yen, one other MIG attacked Glynn's F-4 with cannons and 8 to 10 rockets, but Glynn pulled hard left and escaped the barrage.

Without the loss of a single American aircraft, Operation Bolo had accounted for the destruction of seven enemy MIG-21's—nearly half of the North Vietnamese operational inventory at that time. Had the weather been more favorable, Olds' "wolf pack" would probably have destroyed several more enemy aircraft. Although these losses hurt the enemy, the NVN Air Force had more MIG-21's stored in crates at Phuc Yen. Operation Bolo, however, did without question establish the air-to-air superiority of the F-4C over the MIG-21. "We outflew, outshot and outfought them." Colonel Olds told newsmen following the spectacular air battle.



(Top left) Col. Robin Olds, commanding the 8th TFW, led Operation "Bolo," in which USAF Phantoms downed seven MIG-21's on 2 January 1967. Some of the crews participating appear on this page.

(Top right) Lt. Dunnegan is congratulated for one of the seven victories scored on 2 January 1967.

(Bottom right) Lts. Glynn (left) and Cary.

(Bottom left) Capt. Raspberry (left) and Lt. Western.

Another Successful Ruse

An opportunity to perpetuate another ruse presented itself a few days later, when RF-4C weather reconnaissance aircraft were forced to abort their planned weather reconnaissance missions in North Vietnam because of MIG attacks on 3 and 4 January 1967. To lure the MIG's into the air, two F-4C's on the following day flew, in close formation, a route similar to that normally flown by weather reconnaissance aircraft. The intent of the F-4C's was to deceive the enemy radar operators into believing that only one aircraft was flying a weather reconnaissance mission. The F-4C's flew above cloud formations topping out at 7,000 to 7,500 feet, but they made no radar contacts nor encountered any enemy aircraft.

Scheduled MIGCAP for an F-105 strike mission was cancelled due to weather conditions on the 6th, and the 8th TFW decided to try the ruse one more time. Capt. Richard M. Pascoe and 1st Lt. Norman E. Wells crewed the lead F-4; Maj. Thomas M. Hirsch and 1st Lt. Roger J. Strasswimmer manned the number 2 aircraft. They flew in a "missiles-free" environment, i.e., any sighting or radar contact could only be an enemy. When they encountered radar-controlled AAA near Phuc Yen, Pascoe turned on the ECM pod to deflect the radar lock and caused the flak to become inaccurate, falling either short or wide of the flight. Preplanned tactics called for an attempt to establish radar contact with MIG's, maneuver the F-4's to Sparrow parameters, (i.e., within the linear range of the missile) and then proceed from there. The ruse worked.

The flight made radar contact with four MIG's about 25 miles northwest of Hanoi, and immediately Pascoe pounced on them. Pascoe reports:

I maneuvered the flight by use of airborne radar to effect a visual identification of four MIG-21C aircraft and fired two AIM-7 radar missiles at the enemy flight leader. The second missile struck the MIG aircraft in the fuselage midsection and detonated. The MIG-21 was seen to burst into flame and [fell] in uncontrollable flight through the clouds.

Hirsch had launched an AIM-7 at this same aircraft, but his missile apparently did not guide and

there was no detonation. Pascoe continued the attack on the second MIG, which dove into the clouds. Seeing the third and fourth MIG's at Hirsch's 6 o'clock position, he barrel-rolled into them at their 6 o'clock, but they also disappeared into the clouds. Pascoe continued turning hard right, assuming the MIG's would continue their turns in the clouds.

When the third and fourth MIG's came out of the clouds in wing formation, level, Pascoe barrel-rolled left to decrease lateral separation and to drop to the rear of the enemy aircraft. But they spotted him during the roll and turned into him. As soon as he completed his roll, Pascoe put his gunsight pipper on the fourth MIG's tailpipe, switched to heat, heard a Sidewinder tone, and fired an AIM-9 to "keep their attention," even though he realized that his angle was too high. The missile passed about 300 to 400 feet behind the MIG. He fired another Sidewinder, which passed close to the MIG's tail but did not detonate.

The two MIG's reversed, and the fight degenerated into a slow-speed scissors during which Pascoe fired a third Sidewinder. It missed. The third MIG pilot seemed to realize he was getting into a disadvantageous position and left the area, but the fourth MIG continued the scissors maneuvers.

Hirsch wrote in his report about locking on to the fourth MIG at this time:

In rolling to watch one of the enemy aircraft dive away I lost sight of the flight leader. Approximately one minute later I picked him up and saw two MIG-21's reappear from the undercast in a climb. The lead F-4 engaged the MIG's as I turned to close on them. As I approached I obtained a radar lock-on to a MIG-21 which was in a right climbing turn. As I slid in from his 4 o'clock position to his 5 o'clock, I fired an AIM-7 with full radar computing system. The MIG steepened his climb to near vertical and appeared to lose airspeed. When next observed, the MIG was in approximately an 80° nose-down attitude and rolling slowly. Just prior to entering the undercast in this attitude, both crewmembers in the #2 F-4 observed the MIG pilot eject and separate from the seat.

Because he was in a turning maneuver, Hirsch could not follow the missile's track. The AIM-7 did

not seem to detonate, thus the MIG either flamed out, or the pilot lost control.

A Temporary Lull

The two MIG-21 kills of 6 January and the seven enemy losses earlier in the month dealt a serious blow to the North Vietnamese. For the next 2 months, NVN fighters showed an understandable lack of aggressiveness. The NVN Air Force was obviously stunned by its losses and entered another intensive training phase. Although American strike forces occasionally sighted MIG's in their normal operating areas, none of the MIG pilots challenged them to combat. During the latter part of January and through February and March, the northeast monsoon was in full swing. MIG activity was therefore curtailed as much by weather as by the need for additional training.

The lull in the air-to-air war was only temporary. The MIG's began to venture forth once again during March as American air strikes intensified. Although no longer rising in force, only in 4-aircraft flights, the North Vietnamese patrolled only their own bases. A few MIG-21's did attempt single aircraft attacks against American strike forces, while MIG-17's conducted their attacks on a more or less random basis, following the well-established tactic of attacking just as the strike aircraft entered into or recovered from a bombing run.

F-105 fighter-bomber pilots in March downed three MIG-17's which ventured too close or lingered too long. These were the first MIG losses since the January disasters. All three MIG's fell prey to fighters of the 355th TFW, two of them to Capt. Max C. Brestel on 10 March and the third one to the Wing Commander, Col. Robert R. Scott, on the 26th.

Brestel's aerial victories became the first USAF double kill of the conflict. At the time, he was flying the third Thunderchief in a flight of four and was tasked with suppressing flak in and around the Thai Nguyen steel mill and supporting other F-105 strike forces. Brestel relates how his two victories came about:

We proceeded to the target via the Red River to a point north of the target, where we turned south.

Numerous SAM and MIG warnings had been transmitted. Also, the 388th Wing, which had preceded us on the target, had encountered MIG's.

As the flight pulled up to gain altitude for delivering our ordnance, I sighted two MIG-21's making a pass at Col. Gast [Lt. Col. Philip C. Gast, the flight leader] from his 4 o'clock position. I was in lead's 8:30 o'clock position. I broke toward the MIG's and passed across his tail. They broke off the attack and I continued on my dive delivery. Flak was normal for the area. We delivered our ordnance as planned.

As the flight pulled out at an altitude of approximately 3,000 to 4,000 feet, Gast called MIG's at 2 o'clock low. "Let's go get them," he urged. "I'm with you," Brestel acknowledged as he spotted the flight of four MIG-17's in staggered trail heading north at approximately 1,500 feet. Behind them was another flight of four. Brestel's narrative continues:

I observed all MIG's light their afterburners. Colonel Gast began firing at one of the first two MIG's. I observed the second two begin to fire at Colonel Gast. I called a break and closed to within 300-500 feet of the number four MIG. I fired an approximate 2½ second burst at him as he was in a right turn. I observed hits in the wing and fuselage. The MIG reversed into a left turn. I fired another 2½ second burst into him, observing hits in the left wing, fuselage and canopy, and a fire in the left wing root. The aircraft rolled over and hit the ground under my left wing. I then closed 300 feet on the number three MIG, which was firing at Colonel Gast. He was in a right turn and again I fired a 2½ second burst, observing hits in wing, fuselage, etc. He also reversed to the left and I fired another 2½ second burst, observing more hits and pieces flying off the aircraft. The aircraft appeared to flip back up over my canopy and disappeared behind me. We broke off the engagement at this time after approximately 1½ to 2 minutes of combat. A SAM was fired at us and more flak as we exited the area.

I know I destroyed the first MIG, as I saw him crash. I did not see the pilot bail out and doubt if he was alive, since hits were observed in the cockpit and the canopy broke up. My wingman,

Lt. Weskamp [1st Lt. Robert L. Weskamp] also observed the MIG hit the ground.

I feel I also destroyed the second MIG, as the range was the same and hits were observed in the same areas, i.e., fuselage, wings, etc. Also, his last maneuver could not be considered normal. The aircraft appeared to be in a violent pitch-up or tumble and out of control . . . However, because he pitched up and over and behind, I did not see him strike the ground.

Brestel was given credit for destroying both MIG's.

The third MIG-17 destroyed during the month was credited to the 355th TFW commander, Colonel Scott, who was leading an F-105 flight on a strike mission not far from Hoa Lac airfield on 26 March. His account follows:

I had acquired the target and executed a dive-bomb run. During the recovery from the run, while heading approximately 250°, altitude approximately 4,000 feet, I observed a MIG taking off from Hoa Lac airfield. I began a left turn to approximately 150° to follow the MIG for possible engagement. At this time I observed three more MIG-17's orbiting the airfield at approximately 3,000 feet, in single ship trail with 3,000 to 5,000 feet spacing. MIG's were silver with red star. I then concentrated my attention on the nearest MIG-17 and pressed the attack. As I closed on the MIG it began a turn to the right. I followed the MIG, turning inside, and began firing. I observed ordnance impacting on the left wing of the MIG and pieces of material tearing off. At this time the MIG began a hard left-descending turn. I began an overshoot and pulled off high and to the right. The last time I saw the MIG it was extremely low, approximately 500 feet, and rolling nose down.

Heavy Opposition Again

The northeast monsoon ended, and the weather improved considerably during April. The impetus of U.S. air activity shifted northward. American strikes against key targets in the north grew heavier, smashing at the enemy's war-making capabilities in the

Red River delta and harassing his northern lines of communication. Increased numbers of aircraft, modernization, new munitions, and improved tactics made these strikes more effective than ever before. Stung by these punishing blows, North Vietnam sent it's MIG's aloft in larger numbers to protect its vital resources.

MIG-17's by now had initiated a tactic which had been popular with U.S. aviators in the First World War: the Lufberry circle defensive tactic. Remaining in a continuously turning orbit to provide each other mutual defensive support, two, three, and sometimes four MIG's formed the circle. This formation allowed coverage of everyone's 6 o'clock position—the most vulnerable point. The circle could tighten, keeping the faster-flying, heavier U.S. aircraft from entering. Or, each time a USAF aircraft attempted to engage a MIG, another MIG from across the circle could go to full power and pull across the circle, thus placing itself in a firing position on the attacking American plane. American aircraft were at disadvantage because the MIG's had a tighter turn radius.

To counter the Lufberry defense, U.S. pilots learned to coordinate their attacks and to break individual MIG's out of the orbit pattern. High speed was essential for success. U.S. aircraft crews were warned not to enter a duel with the orbiting MIG's and to make only hit-and-run attacks. With this maneuver, NVN gained a means of efficiently using a MIG-17 force composed of a small cadre of experienced pilots and large numbers of inexperienced pilots.

With surplus speed, MIG-21 pilots often employed a climbing turn as a defensive tactic because of the maneuverability and climbing advantage of their aircraft. For low-speed maneuvers, they often dived in a high-G turn. With lower wing-loading than U.S. models, the MIG-21 could accomplish a much tighter turn. MIG-17 pilots also employed dives to avoid missiles, which would then impact into the ground.

The first MIG engagements in April which resulted in kills came on the 19th. The 355th TFW's fighter-bomber pilots had reason to take pride in the four MIG-17's they destroyed that day. Three separate flights were involved in a hectic afternoon of aerial combat in the Xuan Mai army barracks target



area. While several other flights had engaged MIG's they achieved no victories.

The first MIG kill of the day was recorded by Maj. Leo K. Thorsness, pilot, and Capt. Harold E. Johnson, Electronic Warfare Officer (EWO), flying in an F-105F. Thorsness' flight consisted of four F-105F Wild Weasel aircraft, each plane being manned by a pilot and EWO and being specially equipped to locate and attack SAM sites. The flight was ahead of the main strike force and was committed to suppress SAM activity in the target area. About 8 to 10 MIG-17's attacked as the flight prepared to strike a SAM radar site with Shrike air-to-ground missiles. The Thorsness flight split up into three parts: the third and fourth aircraft entered into separate MIG engagements while Thorsness and his wingman continued the attack against the radar. The time was then about 4:55 p.m. Johnson provides an account of the encounter:

We found and delivered our ordnance on an occupied SAM site. As we pulled off the site heading west, Kingfish 02* called that he had an

*Radio call sign for aircraft 2.

overheat light. He also headed west, and the crew, Majors Thomas M. Madison, pilot, and Thomas J. Sterling, EWO, had to eject from their aircraft. We headed toward them by following the UHF-DF steer we received from their electronic beepers and saw them in the chutes . . .

As we circled the descending crew, we were on a south easterly heading when I spotted a MIG-17 heading east, low at our 9 o'clock position. I called him to the attention of Major Thorsness . . .

Thorsness continued the story:

The MIG was heading east and was approximately 2,500 feet mean sea level. We were heading southeast and at 8,000 feet MSL. I began "S" turning to get behind the MIG. After one and a half "S" turns the MIG had progressed from the foothills over the delta southwest of Hanoi. The MIG turned to a northerly heading, maintaining approximately the same altitude and airspeed. Captain Johnson continued to give me SAM bearings, SAM-PRF [pulse recurrence frequency] status and launch indications as I continued to maneuver to attain a 6 o'clock position on the MIG.

The first burst of approximately 300 rounds of 20-mm was fired from an estimated 2,000-1,500 feet in a right hand shallow pursuit curve, firing with a cased sight reticle. No impacts were observed on the MIG. Within a few seconds we were in the 6 o'clock position with approximately 75 to 100 knots overtake speed. I fired another burst of approximately 300 rounds of 20-mm. I pulled up to avoid both the debris and the MIG. While pulling up I rolled slightly to the right, then left. The MIG was approximately 100 feet low and to our left, rolling to the right. The two red stars were clearly discernible, one on top of each wing, and several rips were noted on the battered left wing. We continued in a turn to the left and after turning approximately 130° again sighted the MIG, still in a right descending spiral. Just prior to the MIG's impacting the ground, Captain Johnson sighted a MIG-17 at our 6:30 position approximately 2,000 feet back. I pulled into a tighter left turn, selected afterburner, and lowered the nose. I again looked at the crippled MIG, saw

it impact the ground in what appeared to be a rice field. After confirming the MIG had in fact impacted the ground I made a hard reversal and descended to very near the ground, heading generally westerly into the foothills.

Thorsness then left the battle area, but returned after refueling to provide rescue combat air patrol during the search for his wingman's aircrew. Thorsness and Johnson attacked another MIG and scored some damaging hits before they were themselves attacked by other MIG-17's. Although it is highly probable that Thorsness and Johnson destroyed a second MIG, this kill was not confirmed.

Another flight of F-105's striking Xuan Mai Army barracks entered the target area a few minutes after the Thorsness flight. This flight was soon attacked by about 11 MIG-17's. Maj. Jack W. Hunt was the first of their number to engage in aerial combat. Flying lead, Hunt missed the first MIG with an AIM-9 missile, got into another fight but missed with his 20-mm gunfire, and made his kill during his third engagement.

This time, he reported, "I observed numerous hits and flashes coming from the top of the fuselage just behind the canopy. My pipper at this firing position was just forward and a little high on his canopy. I observed no large pieces of materiel coming from his aircraft." The MIG broke hard right and down, trailing a small amount of smoke. Hunt's gun camera film pack did not operate properly, but his MIG kill was confirmed by other evidence. At the time that Hunt was preoccupied with his third engagement, the flight's number three pilot, Maj. Frederick G. Tolman also encountered a MIG-17. Tolman writes:

I closed to gun firing range, at which time the MIG broke hard left. I fired approximately 300 rounds of 20-mm at him and observed hits around his canopy section. The MIG passed by my aircraft going to my 6 o'clock position. I engaged afterburner and performed a high-climbing turn for re-engagement. Upon sighting the MIG again I noted a trail of white smoke coming from his tailpipe. He was in a climbing attitude, about 40° nose up, when I observed him, and approximately 2 miles away. I saw him roll slowly to the left and start a gentle descent.

Tolman's gun camera film confirmed his MIG kill.

The third flight encountered two separate MIG's over Xuan Mai army barracks. In the first aerial duel, Capt. William Eskew, flying aircraft 1, and Capt. Paul A. Seymour, flying his wing, each scored hits on MIG-17's, but apparently damage was not critical to either enemy aircraft. In the second encounter, while his F-105 flight was assisting in RESCAP operations for a downed F-105F, Capt. Eskew's gunfire proved fatal to another MIG-17. He provides the following account.

As we were approaching the area of the downed aircrews, Sandy 02* (an A-1E) made a desperate call for help. Sandy 02 stated that he had four MIG-17's making firing passes at him and that the MIG's had just downed his leader, Sandy 01.

I immediately headed for the area of Sandy 02. Spotting the four MIG-17's, I took my flight directly through the MIG formation in an attempt to draw them off Sandy 02 and thus allow [him] to egress the area. After my flight passed through the MIG formation at a speed of Mach 1.05-1.1, I turned back to the right in an attempt to engage the MIG's.

The lead MIG apparently decided to run for home at this time. I pulled in behind the lead MIG and fired my AIM-9B at him. My missile passed directly under his aircraft at a distance of approximately 15 feet, but failed to detonate. At this time I broke off to the left and observed my number three man—Capt. Howard L. Bodenhamer—firing at a MIG-17 while both were in a descending left turn. I saw number three score numerous hits in the left wing and wing root area of the MIG. Also, there was a second MIG behind number three, firing at him while he was firing at the MIG in front. Panda 04 was behind this MIG, firing. Behind me was a fourth MIG, and behind this MIG was Panda 02 (Seymour).

At this time the fight broke down into a Lufberry circle at approximately 3,000 feet actual ground level. The order of the circle was MIG, Panda 03, MIG, Panda 04, MIG, Panda 01†, MIG, Panda 02. Panda 02 fired at the MIG behind

*Radio call sign for an A-1E Flying RESCAP in the area.

†Eskew's aircraft.

me, causing this MIG to break off from the fight. I then fired two short bursts at the MIG in front of me. This MIG broke off to the right and started a gentle climb toward the Hanoi area. I pulled in behind this MIG and, at an estimated range of 800–1,000 feet, began firing. My pipper was directly on the canopy of the MIG. I continued firing to a range of 50 feet. I saw an estimated 50–75 hits on the upper fuselage directly behind the canopy.

As I passed through 100 feet, firing, the MIG started a slow, gentle roll to the left. The roll could not have possibly been an evasive maneuver as the MIG never exceeded $1\frac{1}{2}$ G's and his rate of roll was quite slow. As I pulled up to avoid a collision with the MIG, he exploded directly beneath my aircraft. I saw the red fireball and was shaken by the shock. At this time I broke back to help Panda 03 (Bodenhamer) who was engaging two MIG's. Glancing back at the downed MIG, I saw the wreckage of his aircraft burning on the ground . . . I could see smoke from both Sandy 01 and the MIG. As I passed behind the MIG which was firing at Panda 03, the MIG broke into me. Captain Bodenhamer then turned and fired his AIM-9B at this MIG. I did not see the missile impact. We then broke off the fight and proceeded to an emergency post-strike refueling.

MIG Fight for Survival

MIG aircraft enjoyed particular advantages in defending North Vietnam. Unlike USAF aircraft flying far from home bases and being subjected to heavy SAM, AAA/AW, and MIG threats in NVN, MIG's operated over friendly territory close to their six primary bases. This permitted far better dispersal and spontaneous recovery in the Hanoi area. Moreover, they enjoyed relative freedom of operation, because the U.S. restricted its aircraft from bombing bases in sanctuary areas. The MIG's made the best of these advantages, and, as NVN built up its air force, USAF and USN aircraft losses increased. And as they climbed, pressure mounted amongst Americans to remove the bombing restrictions. Indeed, because of this pressure the immunity ceased.



The United States finally, in April 1967, removed North Vietnamese air bases from the exemption status, and the Joint Chiefs of Staff approved air strikes against Kep and Hoa Lac airfields. Kep was probably the most active of the bases, and Hoa Lac was nearing completion at this time. Both were lucrative targets rich with MIG's. The first strike against the MIG's was carried out on 23 April followed by others. On the 23rd, USAF aircraft with certainty destroyed nine MIG's on the ground and possibly three more. Follow-up strikes on 28 April and on 1 and 3 May accounted for 20 more, although several assessments were in question. The strikes and aerial combat inflicted severe losses on the NVN Air Force, and the MIG's now struggled to survive.

The die had been cast and the MIG's had no choice but to accept the challenge. Their reaction was vigorous. During April, following the initial air strikes, and especially in May, air-to-air combat became particularly intense.

While flying an air strike mission on 23 April, three F-4C's from the 366th TFW encountered two flights of two MIG-21's each. Maj. Robert D. Anderson, aircraft commander in aircraft 3 position, flying with Capt. Fred D. Kjer as pilot, made the



Capt. Kjer (left) and Maj. Anderson. The MIG pilot they shot down never "knew what hit him."

only MIG kill during this encounter. According to the after-action report:

Chicago* saw the MIG's (two MIG-21's) turning into the strike force and jettisoned bombs and left outboard external wing tanks to engage. The MIG's were in a staggered trail formation and entered a left climbing turn to a general heading of west. Chicago was unable to turn tight enough to decrease angle-off and reversed to the right to rejoin the strike force.

The flight immediately sighted two more MIG-21's in staggered trail passing off the right wing. The MIG's entered a right climbing turn at max[imum] power. Chicago 01 began a right turn, attempting to set up an attack on the lead MIG. The other MIG was in the contrail level at this time in a left turn. The missile fired from Chicago lead was tracking the MIG when both went into a cirrus cloud.

Chicago 03 continued accelerating to attack the other MIG. With the pipper on the MIG, a boresight radar lock-on was obtained and then a full system lock-on. At this time the range was marginally close for a successful Sparrow shot. A climbing turn to the outside was initiated and the pipper placed again on the target. The radar was still locked on.

*Radio call sign for the flight.

One missile was fired that left the aircraft going slightly right of the MIG-21, but guided back to the target, striking the MIG in the right aft fuselage. A large explosion was observed and fire and fuel began streaming from the MIG. It continued the left turn and bank increased until inverted and the plane went straight into the ground. The MIG was hit around 32,000 feet. No chute was observed prior to aircraft impact, approximately 16 miles northeast of Thai Nguyen.

"The one thing I learned," Anderson later commented, "is that you can't afford to be complacent up there. You have to keep looking around. He [the MIG pilot] thought he was out of the fight, home free. He made no evasive maneuvers. I don't think he ever saw me or knew what hit him."

Three days later, on the 26th, the 366th destroyed another MIG-21—this one was hit by Maj. Rolland W. Moore and his pilot, 1st Lt. James F. Sears. They were flying the lead aircraft in a MIGCAP flight dispatched to cover a large F-105 strike force attacking the Hanoi transformer site. The flight met about ten MIG-21's with Moore engaging three of them in turn.

Moore looked up at 9-10 o'clock and picked out one of the several MIG-21's orbiting to the left over Phuc Yen. He turned hard, nose high, to get at the MIG's at a 7 o'clock position. He got one in his sight reticle, and selected radar, while Sears went boresight until he obtained a full system lock-on.

"We've got him," called out Sears. "Fire!"

Moore depressed the trigger. The AIM-7 tracked smoothly toward the MIG's 6 o'clock position. The deadly missile gained on the MIG—2,000 feet, 1,000 feet, trailing steady. The MIG rolled out of the turn and disappeared from Moore's sight into the cumulus clouds at the southern end of Thud Ridge, but this maneuver wasn't sufficient to escape the explosion.

This air battle had taken place near Phuc Yen airfield, where the F-4's came under AAA fire in spite of the proximity of the MIG's. All flight members felt that the MIG's could have landed at the airfield at any time, but chose instead to lure the flight over the field, where the enemy appeared to be coordinating the attack between SAM's, MIG's, and AAA.

Two MIG-17's were bagged by pilots of a flight from the 355th TFW on 28 April, while on strike missions against the Han Phong causeway, 12 miles west of Hanoi. The first was downed by flight leader Maj. Harry E. Higgins and the second by another flight leader, Lt. Col. Arthur F. Dennis. Higgins preceded Dennis into the target area by 6 minutes. His flight had just pulled off the target when a number of MIG-17's attacked—there were about nine of them. Higgins later reported on the battle:

After recovering from the bomb delivery, I observed a MIG-17 in my 2 o'clock position. I immediately turned into the MIG and engaged in a series of turning maneuvers, finally gaining the 6 o'clock position. While gaining this position, I completed my cockpit switch setting and, when reaching approximately 3,000 feet, fired the AIM-9 missile. The MIG immediately tightened his turn to the right and the missile missed by 1,000 feet behind and below the hostile aircraft.

By this time my wingman, 1st Lt. Gordon Jenkins, had regained excellent position and we continued our turn to the west for egress from the area. Rolling out westerly, we immediately spotted two MIG-17's in our 1 o'clock position. As the MIG's approached in a head-on pass we could see they were firing cannon. As the closure distance decreased, we also fired bursts at the MIG aircraft without any visible damage. We turned to pursue the MIG's; however, they continued southeast and were well out of range as we fell into their 6 o'clock position.

Again we turned to egress heading, and I spotted a single MIG-17 in a left turn, heading south. I immediately turned into the enemy and engaged afterburner for closure. I completed the switch settings for guns and began to close. The MIG tightened his turn, but was slow in doing so. This allowed me to gain a 30° cut-off angle and when I was approximately 1,500 feet I began to fire the 20-mm cannon. As I prolonged the firing I noticed the MIG began to smoke, and flames erupted from his left wing root section. He began a steep descending turn with the left wing down at approximately 1,000 feet.

I continued to position myself for another firing pass, but we were forced to break hard right to offset two more MIG's who were firing at us from

1,000 feet in our 5-6 o'clock position. The MIG's chased us at a high rate of speed until we finally outdistanced them by applying negative-G forces and obtaining a great amount of airspeed. My last glance at the MIG which I had hit showed him burning and spiraling toward the ground at less than 500 feet.

The Dennis flight did not encounter a MIG until the F-105's were departing the target area. The MIG was on the tail of another F-105 and Dennis went to his assistance. In his own words, the engagement proved easy:

I closed on the MIG-17, and when I obtained a missile tone in my headset I fired the AIM-9. The firing was normal; however, the missile did not guide. I continued closing until about 3,000 to 4,000 feet and began firing 20-mm, but realized I was still too far out for a good firing pass The MIG at this time was in a shallow right turn, level, and apparently did not see me because he did not attempt evasive action. I continued closing to approximately 1,500 feet, began firing, closing to about 700 feet, and the MIG burst into a large ball of flame. It continued to burn and trail smoke as it went into a steeper turn to the right and nosed over into a wide spiral toward the ground.

I continued to watch it in its spiral near the ground, but I had to reverse my turn to move out of the target area because I was receiving SAM launch indications. When I rolled back to the left toward my egress route, the MIG impact with the ground should have been in my 7-8 o'clock position but I was unable to see it.

Two days later, on the morning of the 30th, another 355th TFW pilot, Capt. Thomas C. Lesan, downed a MIG-17 while he was leading the third and last flight of F-105's striking rail yards northeast of Bac Giang. Lesan describes his part in the air battle:

Rattler* flight was attacked by three MIG-17's while ingressing, prior to pop and again at the top of the pop† prior to the bomb run. I continued my

*Radio call sign for the flight.

†This refers to a "pop-up maneuver," which tactical aircraft use in transitioning from the low-level approach phase of an attack mission to an altitude and point from which the target can be identified and attacked.



dive bomb run and jinked [constantly maneuvered] right after delivery at approximately 3,000 feet actual ground level and then back left and started a shallow climb. At this moment I sighted two MIG-17's at my 11 o'clock position, approximately 3,000 feet high and 3,000 feet out. I jettisoned my 450-gallon drop tanks and with my afterburner still engaged from the bomb run, began to pursue the two MIG's. I estimate that my overtake was in excess of 100 knots.

As I started to track the number two MIG they both started a rolling descending turn to the right and I followed, rolling to about 120° and descending at 30°. I tracked and opened fire at approximately 1,000 feet. I fired 100 rounds of 20-mm, noting hits impacting down the left side of the forward fuselage and on the left wing. With such a great rate of closure, I had to break left to avoid collision with the MIG. After clearing him and climbing to maintain an altitude advantage, I rolled right and observed the MIG slowly leveling out with his left wing in flames as his leader continued the right turn.

Trailing about 1 mile behind Lesan was Maj. James H. Middleton, Jr., who observed the flaming

MIG start to spin out of control at about 4,000 ft. It then disappeared to the right out of his field of view.

But there were also repercussions. On the same day the USAF also lost three F-105's. Since the beginning of the year, F-4 aircraft had been employed more for strike missions than for MIGCAP, but if the bombing campaign was to be continued without unacceptable losses of strike aircraft, it would be necessary to divert a portion of them back to MIGCAP role. Accordingly, USAF leaders in Southeast Asia began to sandwich a flight of F-4's behind a lead flight of F-105's and to place another Phantom flight in trail behind strike forces. As a result, during May, 26 MIG's were destroyed with a loss of only 2 Phantoms in 72 USAF and USN MIG encounters. Most of the MIG victories were credited to USAF fighters. While many of them were the victims of the MIGCAP Phantom crews, several were downed by aggressive Thunderchief pilots.

The first victory in which F-4C's were providing MIGCAP barrier for F-105 flights came on 1 May 1967, while the F-105's were on a RESCAP mission. Maj. Robert G. Dilger was flight leader; 1st Lt. Mack Thies was his back-seater. Dilger detected two or three enemy aircraft approaching from his 12 o'clock position at 8,000 feet and descending, at which time he warned his flight of the MIG's, which then pulled up vertical and rolled to the right, enabling the F-4's to end up in a 6 o'clock position to the first two MIG's. Dilger and his wingman engaged the enemy, and one of them fell. Dilger wrote:

I acquired a boresight lock-on and fired an AIM-7. The MIG-17 dove for the deck and made a hard turn into the attack. The missile missed. I yo-yoed and again was at the MIG's 6 o'clock. I fired a Sidewinder which could not turn with the MIG-17, as he broke into the attack and went even lower. In exactly the same manner I yo-yoed and fired two more missiles from his 6 o'clock. On each attack he would violently break into the missile. On the fourth pass he broke hard right and struck the ground while trying to avoid the missile, which was tracking toward his 6 o'clock. He spread in flames across a large area.

On 4 May, the 8th TFW at Ubon provided two



flights of Phantoms for MIGCAP for five F-105 flights of the 355th TFW which were on a strike mission. Col. Robin Olds, 8th Wing commander, led the rear flight, flying with 1st Lt. William D. Lafever. The other F-4 flight was sandwiched midway in the strike force. MIG warnings crackled on Olds' radio just before his wingman sighted two MIG-21's at 11 o'clock, attacking the last of the Thunderchief flights. Colonel Olds' account picks up the encounter at this point:

The MIG's were at my 10 o'clock position and closing on Drill [the F-105 flight] from their 7:30 position. I broke the rear flight into the MIG's, called the F-105's to break, and maneuvered to obtain a missile firing position on one of the MIG-21's. I obtained a boresight lock-on, interlocks in, went full system, kept the piper on the MIG, and fired two AIM-7's in a ripple. One AIM-7 went ballistic. The other guided but passed behind the MIG and did not detonate. Knowing that I was then too close for further AIM-7 firing, I maneuvered to obtain AIM-9 firing parameters. The MIG-21 was maneuvering violently and firing position was difficult to achieve. I snapped two AIM-9's at the MIG and did not observe either missile. The MIG then reversed and presented the best parameter yet. I achieved a loud growl, tracked, and fired one AIM-9. From the moment of launch, it was obvious that the missile was locked on. It guided straight for the MIG and exploded about 5-10 feet beneath his tailpipe.

The MIG then went into a series of frantic



Maj. Dilger (left) and Lt. Thies (right) explain to Lt. Col. Hoyt S. Vandenberg Jr. how they forced down a MIG-17 in a dogfight on 1 May 1967.

turns, some of them so violent that the aircraft snap-rolled in the opposite direction. Fire was coming from the tailpipe, but I was not sure whether it was normal afterburner or damage-induced. I fired the remaining AIM-9 at one point, but the shot was down toward the ground and the missile did not discriminate. I followed the MIG as he turned southeast and headed for Phuc Yen. The aircraft ceased maneuvering and went in a straight slant for the airfield. I stayed 2,500 feet behind him and observed a brilliant white fire streaming from the left side of his fuselage. It looked like magnesium burning with particles flaking off. I had to break off to the right as I neared Phuc Yen runway at about 2,000 feet, due to heavy, accurate, 85-mm barrage. I lost sight of the MIG at that point. Our number 3 saw the MIG continue in a straight gentle dive and impact approximately 100 yards south of the runway.

Colonel Olds then took his flight to the target area and covered the last of the 355th TFW strike aircraft as they came off the target. Leading his flight to Hoa Lac airfield and dodging two SAM's on the way, he found five MIG-17's over that airfield.

"We went around with them at altitudes ranging from 1,500 to 6,000 feet, right over the airdrome,"

Olds reported. The F-4's ran low on fuel before any real engagements occurred, however, and were forced to break off this encounter.

Capt. Jacques A. Suzanne, leading a flight of four F-105's on a strike mission on 12 May, scored the next MIG kill. As the lead aircraft in a flak suppression flight of four F-105's approached the target area, five MIG-17's intercepted the strike group. Trying to engage the lead flight, the MIG pilots ended up as targets for Suzanne's flight. Suzanne recalls:

At this time I turned into the MIG's and tracked the two that broke off to the right. Closing to 4,000 feet of range, I fired one burst of about 200 rounds. The MIG's then reversed to the left and at 800 to 1,000 feet I fired another burst until minimum range. Then I broke off as one MIG went under my left wing in a 70° dive, trailing white smoke. The MIG continued in this descent and disappeared under a shelf of clouds at approximately 1,000 feet of altitude. Crossbow 02* observed the MIG on the way down and saw a bright flash on the ground in the position that the MIG disappeared.

Seven Victories in One Day

On 13 May 1967, two Phantoms and five Thunderchiefs downed seven MIG-17's in aerial combat. The events of this day were reminiscent of Operation Bolo. Two flights of F-105's flew air strikes against the Yen Vien railroad yard, and a flight of F-4C's from the 8th TFW provided MIGCAP for them. Another flight of F-105's from the 388th TFW struck the Vinh Yen army barracks.

After bombing the first target, the F-105's detected three MIG-17's at an altitude of 1,000 feet and 10 miles away in a climbing right turn. The Thunderchiefs turned left to a position of 6 o'clock on the North Vietnamese, who commenced a head-on pass. Lt. Col. Philip C. Gast, flight leader, concentrated his attack on the lead MIG while Capt. Charles W. Couch in aircraft 3 focused his attack on

the third MIG. When the MIG's closed the gap to between 5,000 and 6,000 feet, Gast fired a Sidewinder, which lost thrust and passed about 200 feet from the enemy aircraft. Couch received a tone from his Sidewinder, but since his aircraft was pointed in the general direction of the sun, he felt that most of the growl came from that celestial body and did not use his heat-seeking missile.

"As they approached head-on," Gast later stated, "I began firing my Vulcan gun at 3,000 feet and fired down to minimum range." The MIG-17 did not return fire. "I think we really caught them off guard."

Gast's wingman, Maj. Alonzo L. Ferguson, supported his flight leader's claim. "As I looked to the rear [after the MIG's passed below] I noted a gray cloud of smoke, tinged with pink, receding in the distance."

Couch's attack was also successful. He stated:

I lined up on their number three man and fired a long burst from my 20-mm cannon. The MIG and I were closing head-on at this time, and at very close range he broke hard left and disappeared from my view. Another flight in trail with us observed a MIG pilot eject and another MIG in a spin. Major Ferguson saw pinkish smoke trailing from one MIG, presumably the one fired on by Col. Gast. The MIG-17 I was firing at took violent evasive action to avoid a head-on collision with me, and very likely could have entered a spin.

A second flight of F-105's, led by Maj. Robert G. Rilling, struck the Yen Vien railroad and encountered MIG's when leaving the target area. Rilling went after the first MIG:

I called for afterburners and we closed on two of the MIG's, and when in range I fired my AIM-9. The missile detonated just to the right and under the tail of the MIG. The aircraft began burning immediately and pieces were observed falling off. I followed the aircraft through a 180° left turn in an attempt to use the Vulcan cannon. After completing a 180° left turn the MIG rolled hard right and down and impacted.

Maj. Carl D. Osborne, flying in aircraft position 3 in Rilling's flight, went after a second MIG. He had

*Radio call sign for Suzanne's wingman, Capt. Lawrence D. Cobb.

no trouble tracking the enemy aircraft. In his account he writes:

I rolled into a slight right bank and the tone on the AIM-9 peaked up normally. Only a 10° left bank was required to hold the reticle on the MIG. The tone was holding good so I fired the missile and it began tracking and detonated at the MIG's 3-4 o'clock position. . . . He immediately turned left and began trailing smoke. My lead called [that] he had scored a hit also, on the other MIG, and to go after them. I made a hard left turn and observed the MIG that I had fired at still trailing smoke and descending, heading south-southeast. . . . My turn caused a great loss of airspeed and also allowed a third MIG-17 to turn inside of me by the time I had completed 180° of turn. This MIG was now at my 9 o'clock position and began firing. I didn't believe he was either in range of me or had any lead on me; however, my wingman was in a more vulnerable position, so I dropped the nose and unloaded the G's and began accelerating to 550-600 knots. As I began to dive I saw the MIG stop firing and break to his right and away from my element. He would have had a good pass on myself and aircraft 4, but I saw Captain Seymour, who had lagged in the left climbing turn and stayed low, in a good firing position on this MIG. Seymour was firing, but I was unable to assess any damage by Seymour except that my attacker broke off and stopped firing.

Capt. Paul A. Seymour, who had become separated from his flight and joined up with Rilling, not only observed the aerial victories of Rilling and Osborne but he himself may have damaged the MIG-17 which attacked Osborne. He claimed hits on the MIG's fuselage and right wing.

One of two F-4 flights providing MIGCAP for the Yen Vien air strike on 13 May was leaving the area when crews observed the air battle between F-105's and MIG-17's. Flight leader Maj. William L. Kirk and his pilot, 1st Lt. Stephen A. Wayne, and his wingman immediately broke off to go after the MIG's, while aircraft 3 and 4 remained high to provide air cover. Kirk accounted for his first MIG kill and reported:

I observed two MIG-17's firing at an F-105

which was in a hard left turn. The F-105 reversed underneath and dove for the deck. The MIG's started to reverse, then pulled up and started a left turn again.

In this reversal, I switched to heat-mode for Sidewinder missiles, obtained a good tone, and fired two Sidewinders. The first missile tracked well and exploded approximately 30 feet behind the MIG. The MIG started a very tight left diving spiral turn. The MIG was on fire from the trailing edge of his left wing to the tail section. I lost sight of the MIG in this spiral, as he went underneath my aircraft.

Kirk saw two more MIG-17's and fired a Sidewinder at them, but the missile did not have a tone and missed. He then attacked a third MIG with a Sparrow missile, but both the aircraft and the missile disappeared into a cloud with unknown results. Meanwhile, Lt. Col. Fred A. Haeffner* and 1st Lt. Michael R. Bever in aircraft 3 had observed Kirk's successful AIM-9 attack on the MIG just before Haeffner dove after two MIG's chasing Thunderchiefs. Haeffner attempted to fire only two AIM-7 missiles from an overhead position, but inadvertently fired three. Dropping below the nose and out of sight, the first missile failed to guide and missed the MIG by about 100 feet. The second fired from a slightly lower altitude, dropped out of sight, but reappeared. Haeffner and Bever saw it hit the MIG on the fuselage just behind the canopy. The MIG disintegrated. The third missile was last seen guiding to the vicinity of the destroyed MIG-17. Maj. Ronald E. Catton, flying in aircraft position 4, also saw the action. "The MIG seemed to blow up on the spot," he commented. "The second missile powdered the MIG; it broke up into many disorganized pieces."

The seventh MIG-17 of the day was destroyed by Maj. Maurice E. Seaver, Jr. of the 388th TFW. After pulling out from his bomb run, Seaver observed a camouflaged MIG-17 at his 10 o'clock position, about 1,000 feet away. He pulled in behind

*Haeffner was assigned to the 390th TFS, 366th TFW at the time of this aerial victory. However, he was serving a one-week exchange TDY with the 433d TFS, 8th TFW, and that squadron and wing earned the victory credit, rather than his parent squadron and wing.



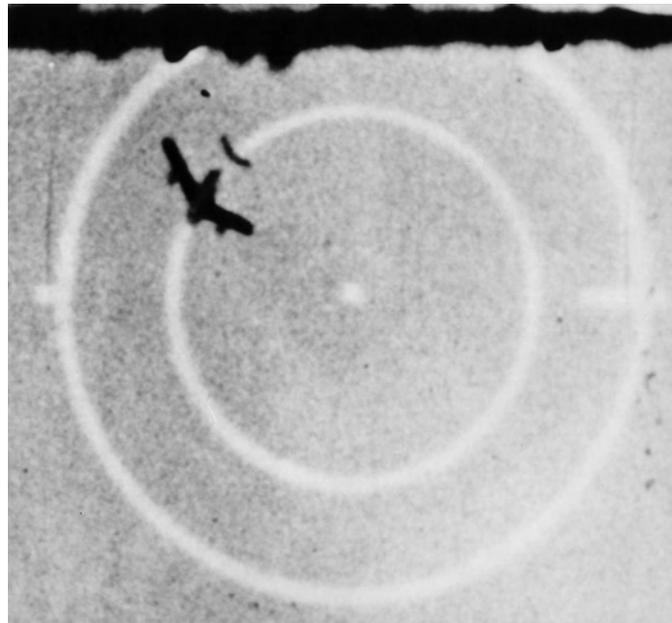
A close-up of a MIG-17 in flight.

it and opened fire with his 20-mm cannon. The MIG pilot apparently did not see the Thunderchief, for he made no effort to evade. When the MIG was hit, it broke sharply to the right and its wing exploded. The entire encounter lasted less than 90 seconds.

Over the months of air-to-air combat, many MIG's escaped destruction by the F-4's simply because there was a deficiency in the Phantom's short-range kill capability. At medium range, they could use the infrared heat-seeking AIM-9 Sidewinder; at long range, they had the radar beam-riding AIM-7 Sparrow. But aircrews were unable to maneuver their F-4's to fire these missiles at short range, and many of the MIG's escaped. In May 1967, however, the F-4's began carrying the SUU-16 gun pods to complement the missiles, and immediately the short-range deficiency was corrected.

The first MIG's fell prey to this weapon on 14 May, when F-4C aircrews of the 366th TFW destroyed three MIG-17's; two of them were shot down by the SUU-16. An F-4 flight trailed an F-105 strike force attacking the Ha Dong army barracks and supply depot; another F-4 flight was spaced between the F-105 flights. Both of the Phantom flights were providing MIGCAP. The first flight encountered 16 MIG-17's, destroying two of them; the other flight encountered 10 MIG-17's and destroyed one.

The first flight, led by Maj. James A. Hargrove, Jr., and 1st Lt. Stephen H. DeMuth, heard MIG warnings after it departed its refueling point. The lead F-105 called bogies at 9 o'clock, and Hargrove spotted two F-105's leaving the target area. Four MIG-17's in two elements were in hot pursuit.



On the gun camera of his F-105 Thunderchief, Maj. Seaver recorded this view of the MIG-17 he shot down in the 90-second encounter on 13 May.

Dropping their fuel tanks, Hargrove and his wingman headed for one element while aircraft 3 and 4 attacked the second. For the next 20 minutes the scene was a beehive of activity as the F-4's took on in combat 7 of the 16 MIG's. At least one SAM was fired at the U.S. flight during the air battle.

Hargrove's victory came after 5 minutes of battle, during which he fired Sidewinders and Sparrows against three other MIG-17's. He missed all three. On his fourth engagement, he elected to use the SUU-16 gun pod. According to Hargrove:

The MIG-17 was in a right-descending turn when we attacked from a 20° angle off its tail. I opened fire at approximately 2,000 feet from the MIG and continued firing until, at approximately 300 feet, flame erupted from the top of the MIG fuselage. Almost immediately thereafter the MIG exploded. . . . I broke left to avoid debris, then reversed to the right and saw the MIG, in two sections, falling vertically toward the ground. Due to other MIG's attacking our aircraft we were forced to exit the immediate area before the MIG struck the ground.



These two Phantom crews made history for the Air Force on 14 May 1967, when each crew shot down a MIG-17 with 20-mm Gatling guns mounted on their F-4's. Maj. Hargrove (l. to r.) and his pilot, Lt. DeMuth, Capt. Craig and his pilot, Lt. Talley.



An F-4C Refueling.

Five minutes later, Capt. James T. Craig, Jr., commander of aircraft 3, and his back-seater, 1st Lt. James T. Talley, also downed a MIG with a 20-mm gun after missing two other MIG-17's with Sparrow missiles. Craig describes his tactics:

Three MIG-17's were sighted at 9 o'clock low in a left turn. I barrel rolled to the right and rolled in behind the trailing MIG. He tightened up his left turn, then reversed hard to the right as I approached gun range. I followed the MIG through the turn reversal, pulled lead, and fired a 2½ second burst from my 20-mm cannon. Flames immediately erupted from his right wing root and extended past the tailpipe. As I yo-yoed high the MIG rolled out to wing level in a slight descent and I observed fire coming from the left fuselage area. I initiated a follow-up attack; however, before I could fire, the MIG burst into flames from

the cockpit aft and immediately pitched over and dived vertically into the very low undercast. The tops of the clouds were approximately 4,000 feet MSL* with the higher mountains protruding slightly above them. The attitude of the aircraft and the proximity to the ground would have precluded a successful recovery. No ejection was observed.

“The kills with the gun mode could not have been made with a missile,” Craig later commented. Both MIG’s were picked off from incomplete Wagon Wheel formations.

MIG’s encountered by the second flight also used the same circular tactics. Maj. Samuel O. Bakke and Capt. Robert W. Lambert, flying in the lead aircraft, got their victory at the same time that Craig and Talley made their kill. Unlike Hargrove’s aircraft, Bakke’s Phantom was not equipped with SUU-16 gun pods. All of the aircrews were in agreement that the 20-mm guns “would have been much more effective against the MIG-17’s than any of the missiles.”

The strike aircraft and Hargrove had alerted Bakke’s flight about the MIG’s. Bakke explains how he and his flight took the offensive:

I observed several enemy aircraft at my 11 o’clock low position. The flight attacked these MIG’s, diving from 17,000 feet MSL to the enemy’s altitude of approximately 6,000 feet MSL. My first engagement . . . was unsuccessful due to the two Sidewinder missiles not guiding to the target. An attack was commenced on another MIG-17 in the area and discontinued because of the target outmaneuvering the attacker. After a high-speed yo-yo to an altitude of approximately 10,000 feet MSL I noticed two MIG’s at my 10 o’clock low position.

Bakke and his wingman then attacked the enemy fighters by rolling outside in the direction of turn of the enemy. “As this roll commenced I saw a MIG-17 explode in flames and start spinning in a vertical nose-down attitude towards the ground,” he recalled.

Continuing the attack on the two MIG-17’s, Bakke chose one on the outside of his left turn and

called the pilot to try for a radar lock-on. “My pilot called that he had a radar lock-on, and I squeezed the trigger with the MIG-17 inside my gunsight reticle. The AIM-7 would not fire,” Bakke complained. His radar scope showed a “break-X” display, indicating that he was too close to the target for a successful Sparrow launch. Bakke then realized that with the interlock switch in the “in” position, the AIM-7 would not fire unless all missile firing parameters were satisfied. He continues in his account:

I retarded my throttles to idle and gained proper range separation from the target. I again glanced at my radar scope and observed an attack display with the steering dot in the center of the allowable steering error (ASE) circle. The ASE circle was very small, indicating I was at minimum Sparrow missile range. I fired two Sparrow missiles while pursuing the target in a left turn. One missile did not guide and the other “homed in” on the target, causing an explosion and fire in the right aft wing root of the MIG-17.

The MIG pitched up to a 30° nose-high attitude at approximately 5,000–6,000 feet altitude MSL and entered the clouds in a stalled condition. The average terrain in the battle area is from 1,000 to 3,000 feet with some mountain peaks of 4,500 feet present. I did not observe a parachute from the burning MIG.

During this engagement I noticed another MIG-17, on fire from the under fuselage, pass below me and to my right. I was in a left turn and about to fire at the time. Another flight of F-4C’s was in the area and engaged in aerial combat at the same time. The two MIG-17’s seen in flames while I was engaged in my successful attack were probably destroyed by Craig’s flight.

North Vietnam lost no MIG aircraft to USAF aircrews for the next 4 days, although air-to-air engagements continued daily. On the 20th, however, two MIG-21’s were downed by aircrews of the 366th TFW and four MIG-17’s were destroyed by 8th TFW aircrews. Both of the MIG-21’s were defeated by a Phantom flight providing MIGCAP for a strike force attacking the Kinh No motor vehicle repair yards.

As the Phantom flight approached the target area, two MIG-21’s were attacking the departing strike

*Mean sea level.

force. The F-4's immediately broke off to attack the enemy. Maj. Robert D. Janca, the flight leader, with 1st Lt. William E. Roberts, Jr. as his back-seater, reported the engagement:

I spotted a MIG-21 at my 9-10 o'clock high position. The MIG started turning left into us. I lowered the nose and began a left turn into the MIG, at which time the MIG reversed to the right and started to climb. I continued in the left descending turn to close and then commenced a climbing turn. As the MIG continued to climb I put the piper on him, received a good tone, and fired an AIM-9 missile with the MIG about 4,000 feet ahead, zero angle-off, and framed against the blue sky. The missile guided straight with very little flutter and detonated about ten to fifteen feet to the right of the MIG's tail. It appeared that a large piece of the MIG's tail came off along with other small pieces. The MIG pitched up and began a roll off to the right from about 8,000 feet, and then appeared to enter a spin. I continued my turn, watching the MIG as he disappeared from my line of sight at approximately 1,000 feet AGL (actual ground level). My pilot, Lt. Roberts, and Elgin 02 [Capt. Daniel S. Burr and 1st Lt. William A. Norton] saw the MIG strike the ground.

Meanwhile, Lt. Col. Robert F. Titus and 1st Lt. Milan Zimer (flying aircraft 3), who had initiated the attack, accompanied by aircraft 4, pursued the two MIG-21's they had seen as they entered the area. Before they could fire, someone called "break" and the flight broke off. The MIG's turned away, so the flight started to rejoin the strike force, when Titus spotted yet a third MIG. He attacked. Lieutenant Zimer, the back seat pilot, reported the engagement quite tersely:

While en route to target and at the north end of Thud Ridge, the strike flight was attacked by several MIG type aircraft. Colonel Titus and I engaged three MIG's, of which we shot down a MIG-21C with a Sparrow missile. We were moving in for the kill on the first MIG we engaged with a full system lock-on, when aircraft 4 called MIG's at 6 o'clock. Colonel Titus immediately broke off the attack. We then rejoined the strike flight. We observed another MIG-21C and engaged him; with a full system lock-on, we fired

three missiles. The first two did not guide, but the third missile destroyed the MIG-21C. [The] kill was observed by all members of the flight. We were returning to strike flight when we engaged a third MIG. This engagement we broke off because aircraft 4 was [at] minimum fuel.

Janca confirmed the Titus victory, observing how Titus fired "an AIM-7 missile which impacted on the right side of the MIG-21. The MIG exploded in flame and a short time later I observed the pilot, who had ejected, floating down in his chute."

An Old-Fashioned Dogfight

The other four MIG's destroyed during the afternoon of 20 May fell victims to two flights of the 8th TFW, Ubon, which were flying MIGCAP for an F-105 strike force attacking the Bac Le railroad yards. The first flight of Phantoms flew line abreast with the second Thunderchief flight. The other F-4 flight was high and to the right of the last F-105 flight. An EB-66 support and an Iron Hand SAM suppression flight were included in the strike force.

The force came in from the Gulf of Tonkin. As the aircraft crossed the coastal islands, the Phantoms jettisoned their centerline tanks. Shortly thereafter, about 20 miles east of Kep airfield, two SAM's streaked from the ground at the American aircraft, and the Iron Hand flight attacked the site with Shrike missiles. The SAM's immediately stopped guiding. But with the appearance of the SAM's, there simultaneously came a MIG warning. The mission called for the F-105 force to divide and strike two targets at the rail yards, with one Phantom flight accompanying the first division and the second remaining with the other division, so that each part of the strike force would receive protection. Fifteen miles short of the target, however, the first flight of F-4's sighted MIG's. The other flight sighted more MIG's several miles away. In the next 12 to 14 minutes there was a massive and aggressive dogfight with 8 F-4's battling 12-14 MIG-17's. Elements of each flight acted separately to provide support to other elements. While the F-4's engaged the MIG's, the F-105's proceeded to assigned targets.

Four MIG's were destroyed in a span of 5 to 6

minutes. The first fell to a Sidewinder of Maj. John R. Pardo, the aircraft commander, and 1st Lt. Stephen A. Wayne, the back seat pilot. Pardo reports:

As our flight approached the area of the sighting, I observed four MIG-17's turning in behind the F-105's. Col. Olds fired one missile and told me to "go get him."

I launched one Sparrow, which did not guide. I then launched one Sidewinder which guided and struck the number four MIG-17. I broke left to negate other MIG's at my 8 o'clock. I continued a 360° turn while positioning on another MIG-17 and observed an aircraft burning on the ground near where I observed my Sidewinder hit a MIG-17. This was at approximately 0830Z [Greenwich time].

The remainder of the missiles I fired did not guide or were not observed due to evasive action necessitated by the tactical situation.

This was Lieutenant Wayne's second aerial victory; a week earlier he had flown with Major William L. Kirk, when the pair had downed a MIG-17.

Two other MIG-17's became the victims of Col. Robin Olds and his pilot, 1st Lt. Stephen B. Croker. These were aerial victories three and four for Olds, making him the leading MIG-killer at that time in Southeast Asia. An ace from World War II, the 8th TFW commander was battle-tested and experienced. Olds termed the events of 20 May "quite a remarkable air battle." According to his account:

F-105's were bombing along the northeast railroad; we were in our escort position, coming in from the Gulf of Tonkin. We just cleared the last of the low hills lying north of Haiphong, in an east-west direction, when about 10 or 12 MIG-17's came in low from the left and, I believe, from the right. They tried to attack the F-105's before they got to the target.

We engaged MIG-17's approximately 15 miles short of the target. The ensuing battle was an exact replica of the dogfights in World War II.

Our flights of F-4's piled into the MIG's like a sledge hammer, and for about a minute and a half or two minutes that was the most confused, vicious dogfight I have ever been in. There were eight F-4C's, twelve MIG-17's, and one odd

flight of F-105's on their way out from the target, who flashed through the battle area.

Quite frankly, there was not only danger from the guns of the MIG's, but the ever-present danger of a collision to contend with. We went round and round that day with the battles lasting 12 to 14 minutes, which is a long time. This particular day we found that the MIG's went into a defensive battle down low, about 500 to 1,000 feet. In the middle of this circle, there were two or three MIG's circling about a hundred feet—sort of in figure-eight patterns. The MIG's were in small groups of two, three, and sometimes four in a very wide circle. Each time we went in to engage one of these groups, a group on the opposite side of the circle would go full power, pull across the circle, and be in firing position on our tails almost before we could get into firing position with our missiles. This is very distressing, to say the least.

The first MIG I lined up was in a gentle left turn, range about 7,000 feet. My pilot achieved a boresight lock-on, went full system, narrow gate, interlocks in. One of the two Sparrows fired in ripple guided true and exploded near the MIG. My pilot saw the MIG erupt in flame and go down to the left.

We attacked again and again, trying to break up that defensive wheel. Finally, once again, fuel considerations necessitated departure. As I left the area by myself, I saw that lone MIG still circling and so I ran out about ten miles and said that even if I ran out of fuel, he is going to know he was in a fight. I got down on the deck, about 50 feet, and headed right for him. I don't think he saw me for quite a while. But when he did, he went mad, twisting, turning, dodging and trying to get away. I kept my speed down so I wouldn't overrun him and I stayed behind him. He headed up a narrow little valley to a low ridge of hills. I knew he was either going to hit that ridge up ahead or pop over the ridge to save himself. The minute he popped over I was going to get him with a Sidewinder.

I fired one AIM-9 which did not track and the MIG pulled up over a ridge, turned left, and gave me a dead astern shot. I obtained a good growl. I fired from about 25 to 50 feet off the grass and he was clear of the ridge by only another 50 to 100 feet when the Sidewinder caught him.

The missile tracked and exploded 5 to 10 feet to the right side of the aft fuselage. The MIG spewed pieces and broke hard left and down from about 200 feet. I overshot and lost sight of him.

I was quite out of fuel and all out of missiles and pretty deep in enemy territory all by myself, so it was high time to leave. We learned quite a bit from this fight. We learned you don't pile into these fellows with eight airplanes all at once. You are only a detriment to yourself.

The final MIG destroyed that day fell to the leader of the first flight, Maj. Philip P. Combies, with 1st. Lt. Daniel L. Lafferty flying rear seat. This was Combie's second MIG victory. Having engaged several MIG-17's without results, Combies climbed to reengage when he saw a MIG-17 in hot pursuit of Olds, about 1½ miles away. When Olds broke hard left, the MIG overshot and headed directly toward Kep airfield, about 8 miles away. Combies got behind and fired an AIM-9 with good tone:

The missile impacted in the tailpipe area of the MIG and the MIG caught on fire. The MIG was at approximately 1,500 feet at the time of missile launch. The MIG went "belly up" and into an uncontrollable dive and eventually impacted into the ground.

Two days following this air battle, Lt. Col. Titus and his backseater, 1st Lt. Zimer, while leading a flight of four F-C's, repeated their earlier success. Titus' flight was one of two that was providing Phantom MIGCAP for a strike force directed against the Ha Dong army barracks and supply depot. Titus later related the afternoon's events:

I was carrying a SUU-16 [20-mm gun pod] two days later [May 22] when I got two more MIG's, the second with a SUU-16. In that particular case we were escorting the Thuds [F-105's] inbound to the target, headed for the heart of Hanoi, and I had a feeling that we would get some kind of reaction. The MIG's had been flying that month and, of course, with the strike force headed for Hanoi it did seem to be a fruitful mission to get on, although I had just happened to chum up on the mission that day.

I was leading the first flight that time, and we were south of formation, line abreast of the first



Col. Olds, the first quadruple MIG-killer of the Vietnam War, prepares to nail four more red stars to the 8th TFW scoreboard. Other victors in the 20 May encounter (l. to r.) are: Maj. Combies, Lt. Lafferty, Maj. Pardo, and Lts. Croker and Wayne (front center).

two flights at about 16,000 feet, headed west to east, when suddenly out in front 11 miles I spotted a couple of MIG's. I happened to see the sun reflecting off them. I called my backseater and told him to go boresight, and immediately called that I was Padlocked [a code word meaning, essentially, "I'm attacking the MIG's"] and accelerating. I went into afterburner and started pushing forward. Because of numerous MIG calls in the area, I had already cleaned off my external tanks, so we were in a good fighting configuration.

The MIG that we locked on to started a left turn and I lost sight of him and followed him on the radar. He made a turn around to the right, a hard climbing turn. I was unable to get lead on him. I



The 555th "Triple Nickel" Squadron was the first to receive improved Phantom models, F-4D's.

could merely keep him on the right hand of the scope. He stopped his climb and we leveled off. He was in a descent; he climbed again. Finally I told my back-seater that I thought there was something wrong with the radar. He agreed and we joined the Thud formation.

We were still in burner, came alongside the formation and came out of burner. I looked over my left shoulder and a MIG was making a pass on the formation. He fired a missile. I called him and turned into him just about the time he fired the missile. Having fired the missile, he started to climb—possibly after he saw me coming at him. In that particular area there was a scattered overcast condition, cirrus deck. It must have been around 20,000 feet. As I closed he went through the cirrus at a very high climb angle, at least 50°. It seemed a lot higher than that. I was in close pursuit, had a very strong Sidewinder tone, and I fired the missile. The missile was tracking as he disappeared into the cloud. The missile went through the same hole. I deviated slightly to the right, came out on top of the cloud deck, and noted some debris in the air and smoke off to the left. I don't know what it was, but there was some foreign matter in the air—very discernible. I mentioned it to my back-seater.

Then, almost instantaneously, I saw from my 1

o'clock position another MIG-21 . . . about a mile away. I turned toward him and put the pipper on him and got another Sidewinder tone and fired another missile. Almost immediately the MIG started a hard descending left turn and we went from, I would guess, 25,000 feet down to about 2,000 feet while he was doing all sorts of twisting, turning reversals, rolling all sorts of hard maneuvers. It was very impressive to see the rapid roll response and directional change ability of that airplane. I proceeded into the dive with him. We could not obtain a radar lock-on, presumably because of the ground return. We were right in the vicinity of the Hoa Lac airport. There was quite a bit of flak; SAM's were going off.

The MIG made a very high-G pull-out and leveled at approximately 1,500 to 2,000 feet above the ground. In his pull-out he was at wing level so I got the pipper on him and fired a long burst of the SUU-16 at him. I did not observe any impacts and thought I had missed him. However, he did slow down quite rapidly. I overshot, pulled up to the left, did a reversal, came back around and called for my number two to take him. About this time number two had overshot and came up to my right. I turned off watching the MIG and called for number three, and as I did so I observed the MIG was in a shallow, wing-rocking maneuver and continued on down in



the shallow dive and impacted with the ground. Where he was hit I don't know, but apparently he was out of it after the first hits were taken.

After these two MIG-21 kills, USAF crews flying into North Vietnam encountered a lull of several days during which no enemy aircraft were downed. The air-to-air posture was improved somewhat on 28 May when the 555th "Triple Nickel" Tactical Fighter Squadron of the 8th TFW, Ubon, received F-4D aircraft. This improved Phantom model soon entered combat.

Colonel Olds on 2 June flew an F-4D in a flight otherwise composed of F-4C's. Providing MIGCAP for an F-105 strike force, the flight engaged 8 to 10 MIG's. Three "probable" MIG kills resulted, one of them claimed by Olds. Had his kill been confirmed, he would have become the first "ace" of the Southeast Asia war.

On the following day, F-105 pilots of the 388th TFW flying a strike mission against the Bac Giang railroad and highway bridge and adjacent railroad yards, did produce confirmed air-to-air victories by downing two MIG-17's. Capt. Larry D. Wiggins, flying aircraft 3, and Maj. Ralph L. Kuster, Jr. in position 2, each destroyed one of the enemy.

They were in the lead flight of a force of four strike and one Iron Hand flights launched from Korat RTAFB, Thailand. Inbound to the target in a standard "pod" formation, the four strike flights penetrated the SAM defenses. When the F-105's were about 15 miles short of the roll-in point, enemy 85-mm and 100-mm anti-aircraft opened fire. During the dive-bomb run for flak suppression, Kuster fired a short burst in an effort to obtain photography of the active AAA gun emplacements adjacent to the target. He thus hoped to film the sites on the overrun of his gun camera. The flight recovered from the dive-bomb run with Kuster trailing 1,500 feet behind the lead, and Wiggins about a mile behind the flight leader.

Approximately 6 miles from the target the flight leader saw three MIG-17's at 10 o'clock low at a range of 2 miles. He called the MIGs' position and started a hard left turn. The second and third flight aircraft followed their leader, but aircraft 4 nearly collided with the second flight off the target and lost his flight in the turn. He elected to remain with the second flight during withdrawal.

Initial maneuvering did not permit a firing pass, and the three MIG's went into a tight left-hand orbit at about 500 feet altitude. The U.S. and enemy flights completed a circle and a half before Wiggins was able to fire his AIM-9B at the third MIG. The enemy plane attempted to evade the missile but was damaged. Wiggins' film showed that the missile went alongside the MIG's tailpipe and exploded. The aircraft began trailing a heavy white vapor. Continuing to close on the MIG as it rolled over and started down, Wiggins fired 376 rounds of 20-mm at a high angle-off. The MIG exploded in flame and crashed.

Meanwhile, the first MIG was at the flight leader's 11 o'clock position at a range of 1 mile, and a second MIG had crossed to the leader's 1:30 position at a range of 1/2 mile. Kuster reported these MIG's to his leader.

"If you can get one, go get him!" the leader told him. Being in a favorable position to attack the first MIG, Kuster tightened up his left turn, while the flight leader attacked the second MIG.

Kuster immediately obtained a 45° angle-off shot at MIG one at about 2,000 feet, while pulling

5 to 6 G's, he placed the pipper in front of MIG one and fired a short burst However, Kuster did not have enough lead and was unable to track the MIG through the turn. As he started a high-speed yo-yo to reduce his overshoot, MIG one reversed into a hard right turn, partially solving Kuster's tracking problem.

After a few maneuvers Kuster again fired a few bursts of 20-mm at a range of 1,200 feet, but observed no hits. The MIG rolled further left and banked into a 120° dive, with his nose about 20° below the horizon. Kuster closed rapidly at about 200 knots overtake speed, but the MIG pilot established a smooth, tight descending turn to the left, possibly reducing power to force an overshoot. Kuster, pulling maximum G's (just short of complete loss of vision) was able to align his Thunderchief fuselage with the MIG but was unable to pull lead. As a last resort, Kuster was able to rotate the F-105 fuselage by rapid aft stick movement, enough to put the sight well in front of the MIG. He opened fire at a little more than 200 feet range, forcing the MIG to fly through the stream of 20-mm cannon fire.

The underside of the MIG's left wing exploded two-thirds of the way between the fuselage and the external underslung fuel tank. Kuster relaxed back stick pressure as the fire and debris from the MIG engulfed the F-105. It passed about 25 feet below the MIG, as the MIG rolled inverted and crashed. Time from hit to impact was 4 to 5 seconds, during which no chute was observed, and the MIG did not roll from the inverted position

USAF pilots scored three more victories on 5 June. One flight of four F-4's (of the 555th TFS) downed the first of the enemy trio while flying MIGCAP for an Iron Hand flight in the vicinity of Thud Ridge during the mid-afternoon. Several MIG-17's jumped aircraft 3 and 4. During the ensuing engagement the F-4's became separated and departed the area. Maj. Everett T. Raspberry, Jr., flight leader, was flying with Capt. Francis M. Gullick. He and his wingman attacked seven or eight other MIG's in a Wagon Wheel formation.

"Upon sighting the MIG-17's," recalled Raspberry, "I immediately engaged them to prevent the MIG's from attacking an Iron Hand flight patrol-



Maj. Kuster (left) watches Capt. Wiggins as he describes the tactics he used in downing a MIG-17 on 3 June 1967. Both Thunderchief pilots received credits for victories.

ling the area. After making several turns with the MIG's, I disengaged and flew southeast some 3-4 miles and then turned back into the MIG's." Approaching them for the second time, he spotted one at 12 o'clock high and attempted to hit him with an AIM-4. However, the missile did not guide. Again he left the fight to gain separation and once again came back—at low altitude. With a radar lock-on, he fired an AIM-7 at a MIG in his 11 o'clock position and missed.

"On my third approach to the MIG's," Raspberry continues his narrative, "I was between 500 and 1,000 feet actual ground level on a northwesterly heading. I could see three MIG-17's; one in my 12 o'clock, slightly high, and two more in my 11 o'clock position, slightly low." At last he connected, scoring his second victory of the war:

"My GIB locked on to a target which was obviously one of the MIG's I had seen in my 11 o'clock position as I turned slightly left and down to center the steering dot. I observed the rate of closure to be 900 knots. When the ASE circle was maximum diameter, I fired an AIM-7. The missile appeared to be headed straight for the oncoming MIG. I was unable to watch the impact because Col. Olds, [flying lead aircraft in the adjacent flight] called me to break right as a MIG was in my 4 o'clock and firing. My wingman

[Capt. Douglas B. Cairns] was able to see the AIM-7 as it approached the MIG and observed the MIG as it struck the ground. I would estimate the MIG's altitude at the time of [missile] impact at 100-300 feet."

The second aerial victory took place about 5 minutes later. Maj. Durwood K. Priester and his rear-seater, Capt. John E. Pankhurst, were leading a flight of four F-4C's on MIG combat air patrol when they downed their enemy aircraft. "Inbound to the target area," said Priester, "I observed three MIG-17's at my 3 o'clock low position." Priester's flight attacked the MIG's, diving from 17,000 to the enemy's altitude of approximately 8,000 feet. Priester observed:

The number three MIG pulled up vertically as I started my dive. I pulled up and in trail with the number three MIG, as the MIG executed a hard right turn. I fired a short burst but saw no evidence of the 20-mm hitting the MIG.

I did not have a gun sight and relaxed stick pressure while assuming I had overled the MIG due to the close proximity while firing. The MIG-17 started to reverse his turn and I fired another burst of 20-mm. Two large balls of flame exited the MIG's tailpipe, but the aircraft failed to burn. I rolled over and observed the shallow dive, wings level, and straight course of the damaged MIG as it impacted the ground and exploded. The MIG pilot did not eject and crashed with his aircraft.

The final MIG accounted for during the afternoon was downed a few minutes later when Capt. Richard M. Pascoe and his back-seater Capt. Norman E. Wells,* flying wingman for Colonel Olds, knocked a MIG-17 from the sky—the second aerial victory for both officers.

Olds' flight was on MIGCAP for a strike force and was covering the departure of F-105's. Monitoring the radio chatter of Priester's engagement with the MIG's, Olds' flight immediately reversed course to join in the fight. Proceeding south along Thud Ridge, Olds' wingman saw four MIG-17's battling Priester's flight and single MIG-17's high at 9

o'clock and 3 o'clock. Olds and Pascoe pursued the MIG at 9 o'clock; and aircraft 3 and 4 of his flight attacked the one at 3 o'clock. Olds expended all AIM-4 and AIM-7 missiles without effect, then passed the lead to Pascoe. "We picked up a single MIG-17 at approximately 5 nautical miles in front of us," reports Pascoe, and then:

I fired two AIM-9's as the MIG started a slight climb and observed the first to impact at the extreme tail end and the second about three feet up the fuselage from the tail. The MIG continued in his left descending turn and struck the ground as the canopy was seen to leave the aircraft. The aircraft was totally destroyed.

Olds and his back-seater, 1st Lt. James L. Thibodeaux, saw the two AIM-9's of their wingman hit the MIG. The pilot ejected just before the MIG crashed "with a large fireball."

Another MIG Stand-Down

The heavy losses sustained by the NVN Air Force between April and June 1967 seriously undermined the effectiveness of the North Vietnamese fighter force. After 5 June the NVN Air Force stood down once more, obviously to take a fresh look at the situation. MIG's seldom ventured out during the remainder of June and July, but they did continue to train and to practice intercepts whenever U.S. forces were not in the northeastern corner of North Vietnam. In this period, American aircraft losses to MIG's were minimal, but SAM's and AAA began to take a heavy toll of them.

In the meantime, the U.S. air victory over the MIG force was believed to be so complete that Lt. Gen. William W. Momyer, commander of the Seventh Air Force, was prompted to report on 16 August to a Senate subcommittee that "we have driven the MIG's out of the sky for all practical purposes." While General Momyer's statement was momentarily true, the picture soon changed, and in late August the North Vietnamese pilots introduced new tactics. These called for the MIG's to approach American forces at low level, climb quickly to altitude, make a single firing pass, and then run for their home bases (including some in China).

*Pascoe and Wells were promoted following their aerial victory of January 6, 1967—Wells to Captain and Pascoe to Major. Pascoe however, had not yet donned his gold leaves.



Capt. Pascoe (left) and Wells add another star to an F-4C Phantom after claiming their second victory.

A contributing factor that aided MIG tactics after the June–July stand-down was the diversion of F-4's from MIGCAP to strike missions, leaving strike forces without adequate protection. Heavily-laden strike aircraft were unable to outrun the supersonic MIG-21's, and strike pilots were briefed to avoid confrontation whenever possible; and if MIG's were sighted, the former were to continue to the target at increased speed. When they could not outrun the MIG's and if the situation so dictated, the last strike flight could jettison its ordnance and attempt to short-stop the attack by engaging the enemy. Such a situation persisted through August and part of September.

On 23 August, five flights of F-105's from Korat—three flights in strike roles, one in a combined flak suppression and strike role, and one in an Iron Hand SAM suppression role—attacked the Yen Vien railroad yards. In addition, four flights of F-4's came from Ubon—three to strike and one for MIGCAP. All flights were composed of four aircraft each.

The five F-105 flights rendezvoused with the four F-4 flights in the refueling area, and then they crossed the Red River 6 miles southeast of Yen Bai, proceeding from there down Thud Ridge. The F-105 Iron Hand flight (two F-105D's and two F-105F's) led the force to the target area. The force then split into two "cells," the F-105 strike aircraft in a box formation and the F-4 strike aircraft follow-

ing in a triangular formation. The single F-4 MIG-CAP flight flew to the left rear of the F-105 box.

"Bandits, northwest at 60 miles, heading 360°," someone warned on the radio, as one of the F-4 strike flights turned down Thud Ridge at 15,000 feet. Two MIG-21's then descended out of a 25,000-foot overcast and attacked from 6 o'clock. Each MIG fired an air-to-air missile, one at the lead F-4 and the other at number 4. Both missiles impacted and destroyed the American aircraft. The crew members ejected; there were only three good parachutes.

The number three aircrew in this F-4D flight observed the missile which downed his wingman. It had hit the aircraft's tailpipe and exploded. "He burst into a ball of flames," the number 3 aircraft commander later reported.

The number two F-4D aircrew also saw the missile which hit the lead aircraft; it passed their own left wing and impacted with the lead F-4D.

From this point on, the air battle turned into a confused dogfight. The sky over North Vietnam was filled with numerous engagements: F-4C's, F-4D's, and F-105D's battling numerous MIG-21's and MIG-17's. In the confusion, one F-4C aircrew fired two AIM-7 missiles at what they thought was a MIG but was actually an F-4D. Luckily, the aircraft commander identified the friendly aircraft in time.

"I told the guy in the backseat to break lock. It was no problem," he later commented. The missiles, one of which had been tracking well, went ballistic as soon as the radar lock-on was broken, and they did no damage. The aircrew fired upon was unaware of the incident, but continued down Thud Ridge.

The only USAF kill of the day was awarded to 1st Lt. David B. Waldrop, III, who in a flight of four F-105's of the 388th TFW downed a MIG-17. In the confusion of the air battle it is difficult to reconstruct the events, but apparently Waldrop attacked a MIG soon after dropping ordnance on the target. He describes the action:

As I rolled to the right, I looked down and saw two MIG-17's. One was on the tail of an F-105 at the time. I picked up one and broke in on him. I plugged in my afterburner, picked up a little airspeed, closed in, and started hosing off my

cannon at him. Shortly afterwards, some fire shot out from his wingtips and about midway across the wing and he started a slow roll over to the right.

I backed off and fired again. He continued rolling right on in and blew up when he hit the ground.

"It was beautiful," reported Colonel Olds, flying the lead MIGCAP F-4D. "The MIG-17 was diving toward the ground with flames coming out of his tailpipe. It wasn't the afterburner; he was on fire. There was that great, great, huge Thud right behind him with fire coming out of his nose. It looked like a shark chasing a minnow." The MIG-17 was diving straight for the ground; Olds saw no parachute.

Maj. Billy R. Givens, Waldrop's flight leader, also engaged a MIG after his flight had left the target. He fired more than 900 rounds of 20-mm at the MIG, which had been chasing another F-105 and had in fact damaged that aircraft with gunfire. Givens initially was credited with a probable kill, but upon review by the Seventh Air Force's Enemy Aircraft Claims Evaluation Board, the claim was denied.

After Givens' engagement, Lieutenant Waldrop and his wingman pursued two more MIG's. Waldrop began a left roll and at 7,500 foot altitude began firing his 20-mm cannon at a range of 3,000 feet, 85° angle-off. He fired 300 rounds and observed hits on the MIG before ceasing fire at a range of 2,500 feet. Waldrop then rolled out and headed westerly in an inverted position, because he "wanted to see where he [the MIG] went." The MIG had disappeared into the clouds with Waldrop right behind him. Leaving the clouds and reacquiring visual contact, Waldrop found that his gun sight was inoperative. At 6,500 feet altitude and a range of 2,000 feet, Waldrop opened fire once more with a burst of 250 rounds. The burst struck the MIG's canopy area and Waldrop "worked the bullets back toward his tail." The MIG exploded, rolled into an inverted position, and impacted the ground. Flying at 3,500 feet, Waldrop pulled off and left the battle area, certain that he had two victories.

The 388th TFW's Enemy Aircraft Claims Board did in fact review and validate both of Waldrop's claims for 23 August using all available data—gun camera film, wingman testimony, testimony

from other witnesses, and operations reports. But when the claims were processed by the Seventh Air Force Enemy Aircraft Claims Evaluation Board at a later date, the Board confirmed Waldrop's second claim but denied his first. Apparently, the evidence was insufficient to warrant an award for the first encounter.

The MIG tactics employed during the 23 August engagements came "as a complete surprise" to Olds. Had he been informed, the commander felt, he could have avoided the mass confusion. He found out later that higher headquarters knew that the MIG-21's had changed their tactics prior to this engagement, "but the word hadn't filtered down to our wing. That made me pretty mad because I lost two aircraft because of this new tactic."

If I had known about the new MIG tactic, I would have split my MIGCAP elements up; 3 and 4 would have accelerated below the strike force and ingressed 10-15 miles ahead of them. My wingman and I would have turned easterly toward the Ridge prior to the strike force . . . accelerated . . . gained 15-20 miles separation . . . and swooped over the force as they turned southeasterly down the Ridge. The GCI controller would already have picked us up on radar; he would have observed our turn. I'll bet you one hundred dollars that he'd called off the MIG's. He probably would have said, "Break, break, they're on to you." Then we would have turned in behind the strike force and continued ingress.

When the battle was over, the U.S. Air Force lost two F-4D's to MIG-21's, another F-4 to enemy AAA fire, and still another when an F-4 ran out of fuel before reaching the post-strike refueling tanker. One F-105 was badly damaged by MIG cannon fire.

From 23 August through 17 October 1967 there were no further MIG kills by USAF fighters. During this period the Air Force assigned a larger number F-4's to a purely MIGCAP role, but apparently the North Vietnamese elected to avoid confrontations. Strike forces, meanwhile, continued to pound enemy support and war-making installations.

Renewed Opposition

On 18 October, MIG pilots once again initiated a



This MIG-17, trailing flames and smoke, heads earthward on 18 October 1967—a victim of Maj. Russell's 20-mm cannon.

campaign of dogged opposition against U.S. air forces. A strike force composed of four F-105 strike flights, one F-105F Iron Hand flight, and one F-4D MIGCAP flight struck the Dai Loi railroad bypass bridge on that afternoon. Three of the four strike flights encountered MIG-17's in the target area and one MIG was shot down. The F-4D MIGCAP flight trailed the Thunderchiefs into the target area and also encountered MIG-17's, but destroyed none. Maj. Donald M. Russell, flying an F-105 in number 4 position, provides an account of the victory:

After delivering my ordnance on the target, I broke hard right to join the remainder of the flight



Capt. Joseph E. McGrath, a senior weapons controller assigned to the College Eye Task Force, listens to Maj. Kirk discuss the MIG kill which resulted from McGrath's initial spotting of the MIG on his radar and passing the information to Kirk, who downed the MIG in a dogfight.

for egress. MIG's had been seen in the target area just prior to roll in. After about 180 degrees of turn, I saw a MIG-17 crossing from my left to right approximately 1,500-2,000 feet out. I came out of afterburner, extended the speed-brakes, and maneuvered to his 6 o'clock position. He rolled out of his right turn and started a slow left turn to position himself in an attack position on a preceding F-105. His left turn helped me to get into a good firing position, and I opened fire at an estimated 1,000 feet. I noticed flames from both sides of the MIG-17 aft of the cockpit area. I followed him for a few moments and saw the fire increase. The aircraft rolled right and headed straight down. I did not see the pilot eject and lost sight of him at about 2,000 feet going straight down in flames. There is no doubt that this MIG was destroyed in that, if the pilot were alive, he could not have recovered from the last observed altitude/attitude. Gun camera and KA-71 film show the MIG smoking profusely.

Renewed MIG opposition prompted Pentagon officials to authorize for the first time in the war a strike against Phuc Yen airfield, the largest of North Vietnam's air bases. Accordingly, 6 days after the Dai Loi strike, four strike forces of USAF F-105's and F-4's, working with U.S. Navy aircraft, struck the airfield. Pilots of the 8th, 355th, and 388th

Tactical Fighter Wings reported all bombs on target; the mission was highly successful in rendering the sprawling base unserviceable. Post-strike reconnaissance photos showed four MIG-21's, four MIG-17's, and one MIG-15 destroyed or badly damaged.

Seventh Air Force planners had anticipated a loss of 3 percent of the strike force to MIG's, flak, and SAM's during the Phuc Yen raid, but not one U.S. aircraft was lost. One MIG-21 was destroyed in air-to-air combat during the initial attack. It was downed by Maj. William L. Kirk and his back-seater, 1st Lt. Theodore R. Bongartz, who were leading a MIGCAP flight in support of the first strike force.

"This kill wasn't quite the same one as my first one last May 13," Kirk commented. "That one was a MIG-17 and there was only one pass. I got him with my air-to-air missile. This time it was a good old-fashioned dogfight and we fought him for a long time."

We took position as fragged, and I positioned my flight line abreast, high and to the left of the trailing F-105 flight. MIG calls were heard as we entered NVN. They proved to be extremely accurate. When the MIG calls indicated that the MIG's were 6 o'clock at 8 miles I turned our flight back into the attack. As I rolled out of the 180° turn my pilot (Lieutenant Bongartz) acquired a radar lock-on to a target 30° right at 4 miles. I immediately looked to that position and visually identified a MIG-21.

At initial contact the MIG was slightly right and head-on. He appeared to go into a steep climb, initially, but as I started up with him he then rolled into me and put his nose back down. He appeared to be aggressive for the first 360° turn, then it appeared he was trying to disengage.

After several hard maneuvering turns and reversals, in which the MIG would run through a cloud at every opportunity, I acquired AIM-7 missile firing parameters and launched two missiles. The first guided well and exploded very close to the MIG. I did not observe the second missile. The first AIM-7 could possibly have damaged the MIG, even though I could see no visible damage, in fact I had the impression that the MIG started to decelerate immediately after missile detonation. I then switched to guns,

closed to about 500-700 feet, and started firing. The HEI* impacted on top of his fuselage between the wing roots . . . I could see large pieces coming off the fuselage, and the entire fuselage section was engulfed in flames.

The MIG pilot bailed out; the MIG-21 rolled to the right and crashed in approximately a 15° dive. I then turned and flew by the MIG pilot, hanging in his chute. I was not able to get a look at his face in that when he saw me approaching he turned his back.

MIG's continued their aggressive assaults, and on 26 October six MIG-17's jumped a flight of four F-4D's flying MIGCAP for a photographic mission 3 miles northwest of Phuc Yen airfield. As soon as the MIG's appeared the reconnaissance aircraft departed. In the ensuing battle, three of the MIG's were downed by air-to-air missiles. The aerial victories went to the flight leader: Capt. John D. Logeman, Jr., and 1st Lt. Frederick E. McCoy, II; aircraft number 3: Capt. William S. Gordon, III, and 1st Lt. James H. Monsees; and number 4: Capt. Larry D. Cobb and Capt. Alan A. Lavoy.

"Approximately 6 nautical miles before reaching Phuc Yen," recalled Logeman, "I observed four MIG-17's climbing up through a cloud layer at our 2 o'clock position."

I called the flight to turn into the MIG's, who were in a right climbing turn approaching our 4 o'clock position at approximately 5 miles range. I also called the reconnaissance flight to egress the area at this time.

As I completed my right turn, heading approximately 090° at 17,000 feet, I placed the pipper on the lead MIG-17 and fired two AIM-7E missiles in boresight mode. Range to the MIG was 2.5 to 3 miles. The first missile did not guide. The second missile came up into the reticle and appeared to be on a collision course with the MIG. We were head-on at this time and his cannons were firing. I pulled up to avoid the cannon fire and did not observe missile detonation. I immediately turned hard left to re-engage the MIG's on a west heading. During this left turn I observed a parachute in the area of intended missile impact and a MIG-17

*High explosive incendiary.

was descending inverted, trailing sparks from the fuselage. Aircraft 2 [Maj. John A. Hall and 1st Lt. Albert T. Hamilton] observed this parachute at the same time. Another MIG-17 was attacking at this time from my 10 o'clock position. He turned away at a range of about 2 miles. My rear seat pilot obtained a boresight, full system lock-on, and I attempted to fire two AIM-7E missiles. One did not leave the aircraft, but the second missile fired and appeared to be guiding. I broke off the attack at this point to maneuver away from a MIG-17's cannon attack from my 7 o'clock position. At this point I called the flight to egress for Bingo fuel.

Gordon's aerial victory came minutes after Logeman's. Watching the attack come in from 3 o'clock, Gordon turned his element to attack the eight MIG's, but he was too close to fire a missile. "I disengaged," he reported, "then gained lateral separation and reattacked." He observed:

Two MIG-17's were in the piper head-on. My pilot obtained boresight, full system lock-on, and I attempted to fire two AIM-7E Sparrow missiles. . . . Only one fired. I was unable to see the missile detonate due to evasive maneuvering necessary to avoid the attacking MIG's.

I disengaged again and reversed back into the fight. At this time I observed a MIG pilot hanging in a white parachute in the same location that I had fired the missile. The MIG had been at approximately 16,000 feet in a slight climb and the parachute was at approximately 16,000 feet. Captain Cobb also saw the parachute. I disengaged and reengaged two more times without obtaining a good position to fire. On the next attempt I had a MIG-17 in my piper for a tail shot. By the time I selected AIM-4D's, cooled the missile, listened for a tone, and fired the missile with self-track selected, the MIG had turned to a head-on firing attack. I fired the AIM-4 with a full system radar lock-on at a range of approximately 6,000 feet. Again I was unable to observe the missile impact due to evasive action necessary to avoid the attacking MIG; however, it appeared to guide straight for the MIG. At this time my pilot observed another chute at lower altitude, approximately 8,000 feet. At the same time he could still

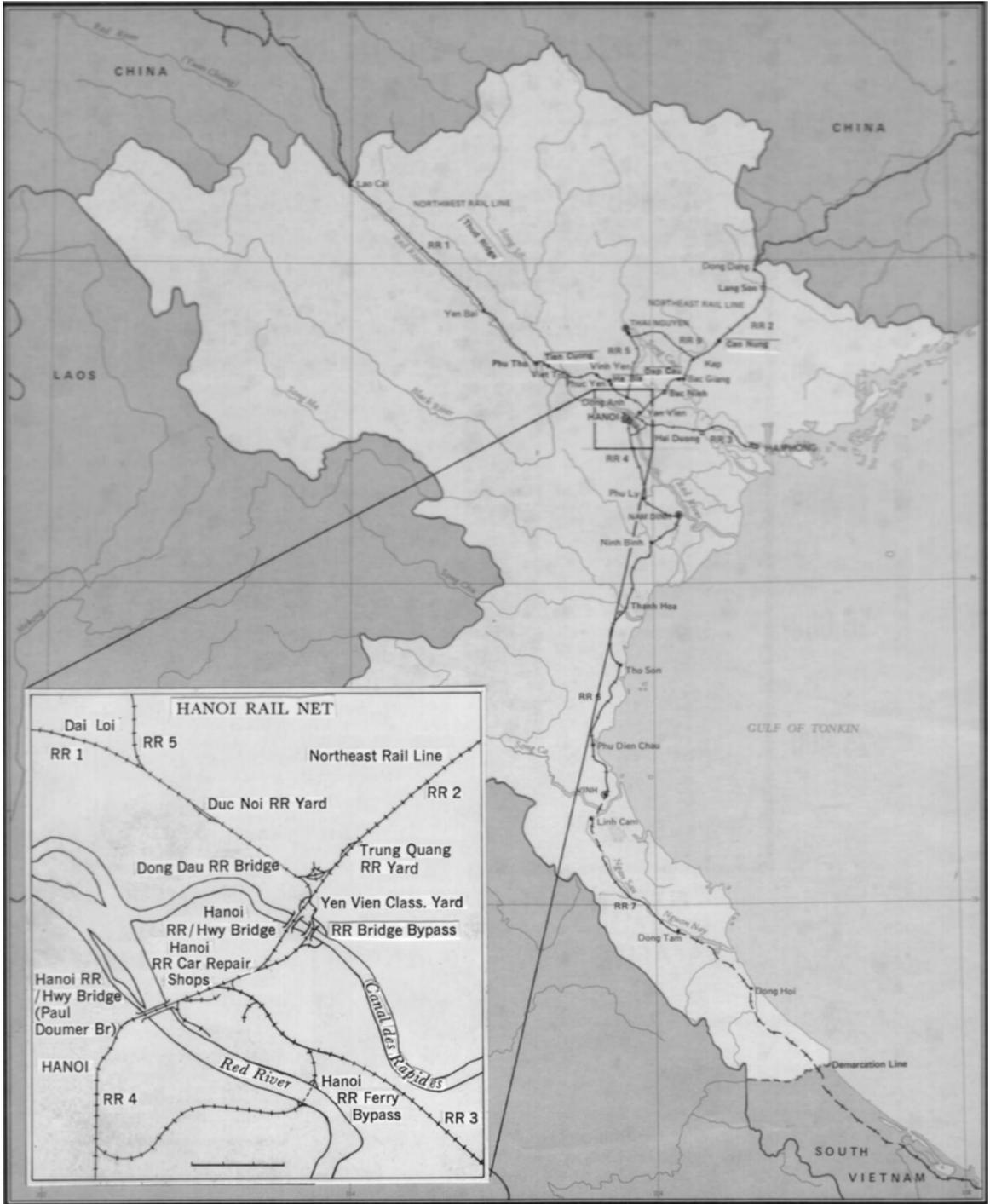
see the high parachute that we had observed first. After I had shot my second missile, my wingman observed two MIG-17's egressing the battle and pursued them, finally destroying one. Then Captain Logeman called the flight to egress due to low fuel.

The commander of aircraft 4, Captain Cobb, tells how he downed his MIG:

Gordon turned us into the MIG-17's and started to accelerate. On the first turn we were unable to fire, so he left the fight for separation. We then turned right and re-entered the fight. We were both able to fire a missile on this pass and we continued through the MIG's and out the other side of the fight. Gordon carried us out and up to the left. Again we turned to re-enter the fight. At this time, I observed an enemy chute in the middle of the battle. We again went through the battle but were unable to fire. We continued using these tactics during the attack.

On our last pass a MIG-17 obtained a 6 o'clock position on Gordon, but when I told him to break left, the MIG-17 broke off the attack. At this time I observed two MIG-17's at my 10 o'clock position. I cooled an AIM-4D, obtained a self-track lock-on, and fired the missile with 10-15° lead angle. I observed the AIM-4D impact on the tail of the MIG-17, and he exploded and started to roll right. At this time the MIG-17 pilot ejected and his plane spiraled earthward in flames.

On October 27 an F-105 pilot of the 355th TFW, Capt. Gene I. Basel, destroyed a MIG-17 in air-to-air combat. He was flying wing for the flight leader during large-scale attacks by USAF and USN fighters against railroad and highway bridges in the Hanoi area. His flight was one of three F-105 flights sent from Takhli to strike the Canal des Rapides bridge northeast of Hanoi. Their number 3 and 4 aircraft had aborted the mission over Thud Ridge when the fourth aircraft encountered wild pitch oscillations. The flight leader and Basel then joined a flak suppression flight in an attempt to maintain pod formation. About 2 minutes from the target the Takhli force encountered extremely heavy and accurate AAA fire and heavy SAM activity. Two F-105's were destroyed by surface-to-air missiles,





Capt. Basel points out on a map where he downed a MIG-17.

and one of the MIGCAP F-4D's was downed by AAA fire over Thud Ridge.

During target egress, Basel found himself in direct trail with his flight leader. As the leader pulled hard left to avoid flak and SAM's, Basel cut inside of him in a high-G turn, "belly up to him," in order to avoid a mid-air collision. Turning wide to assure separation, Basel rolled out at 3,000 feet on a southerly heading paralleling the Red River. His main thought at that moment was to join with anyone.

Looking about and flying straight and level, Basel sighted at his altitude two MIG-17's at 10 o'clock, heading due west at about 450 knots. "It was a perfect set-up for a high-speed pass," he recalled.

I switched to dive function on the mode selector and closed to within 2,000 feet pulling lead on him. He didn't see me, and was intent on positioning for an attack on the flight ahead of me until he felt the 20-mm impacts. At that time he reversed his direction abruptly, fire belching from his tailpipe. The MIG continued rolling left to a rear inverted position until lost from sight. At this time Lieutenant Tax [1st Lt. Cal W. Tax, flying the number four aircraft in the following flight] sighted the MIG jettisoning his tanks and torch-

ing* from the tailpipe. SAM's were launched at us at that time and we were forced to take evasive action, unable to further observe the crippled MIG's flight path. Lieutenant Tax and I then joined for mutual protection and egressed the area.

Although Captain Basel's claim for destroying a MIG-17 was initially denied because of a lack of information, it was confirmed after study of his gun camera film showed that the MIG-17 was on fire in its aft section and could not have recovered.

Heavy North Vietnamese MIG losses during October, both in the air and on the ground, were sufficient reason for another stand-down and more training, but the NVN Air Force did not resort to this action. Rather, in the next 2 months they gained a slight edge in the air-to-air war. As American aircraft losses mounted, USAF air strikes were conducted against every jet-capable airfield north of the 20th parallel except Hanoi's international airport: Gia Lam. Many NVN Air Force aircraft dispersed on a temporary basis to bases in China. Repairs in the meantime were made to North Vietnamese airfields and their MIG losses were replaced. By the end of 1967, the MIG inventory was thus still reasonably high. Yet, significantly during this 2-month period, USAF fighter crews succeeded in downing five MIG's in aerial combat.

On the afternoon of 6 November, two forces were sent out to strike Kep's airfield and railroad yard. The 8th TFW provided the MIGCAP F-4D's. Capt. Darrell D. Simmonds served as the MIGCAP flight leader, with 1st Lt. George H. McKinney, Jr., as his rear seat pilot. Since this flight was the only MIGCAP, it split into two elements to protect each side of the strike force should MIG's be sighted.

Approach to the target was uneventful; no SAM and no MIG warnings were issued. As the Iron Hand flight recovered from its Shrike release on Kep airfield, the first MIG warning came. The first F-105 strike flight was recovering from its bomb run when it was attacked by four MIG-17's. The F-4's at once turned south to engage the MIG's, but made no visual contact. The MIGCAP then turned back to the

*Because of a break or failure in the fuel system, raw fuel starts burning in the aftersection of the aircraft; and flame, rather than thrust, comes from the afterburner.

northeast to rejoin the departing strike force and now made MIG contact. In the next few minutes the two pilots in the lead aircraft destroyed two MIG-17's in short order. Captain Simmonds furnishes the account:

My initial contact with the MIG's came when my flight was on a 90° beam heading to the egressing force. A flight of four MIG-17's (not the same flight that we turned into) was closing in on the last egressing flight and started firing. I closed on the firing MIG and caused him to stop firing and take evasive action.

After several maneuvering tactics, I closed to within 1,500 feet of the MIG and fired my gun. At that time, the aft section of the MIG-17 burst into flames. We then pulled up and to the right and observed the canopy blow off, but no ejection occurred until just before impact with the ground. The chute of the MIG pilot streamered and disappeared into the trees just as the MIG impacted in a large orange fireball.

I turned the flight back toward the egress heading when my back seat pilot, 1st Lt. McKinney, spotted a lone MIG-17 at our 4 o'clock position, low and heading away from us. I called to the flight that we were going back in and turned to close on the MIG-17. He saw us coming and dropped to about 200 feet off the ground and started up a small valley. I dropped just below him and closed. When he saw me moving into lethal range, he broke hard left and climbed, giving me a tracking position. I moved to within 1,000 feet and opened fire. The MIG-17 disappeared in a large fireball and plummeted to the earth in many pieces.

Again I turned my flight toward the egress heading. MIG calls indicated that there were MIG's following us at six miles and closing. We did not have the fuel to engage and elected to accelerate and depart the area.

A U.S. Marine Corps aircraft commander flying with the 432d TRW teamed up with a USAF pilot for the next aerial victory. Eight F-105 and two F-4D flights were scheduled against three targets in Route Package 6A on 17 December. In support of the effort were two flights of F-105 Iron Hand aircraft, four flights of F-4D MIGCAP aircraft, and

two flights of EB-66 ECM aircraft. The entire effort was divided into two forces, one striking the Lang Lau railroad bridge and the other hitting Phuc Yen airfield. MIG opposition proved extremely heavy, and one F-4D and one F-105D were destroyed. A single MIG-17 was destroyed by the MIGCAP flight in the strike against Phuc Yen.

Capt. Doyle D. Baker, the Marine Corps exchange pilot, commanded aircraft 3. His "guy-in-back" was 1st Lt. John D. Ryan, Jr. According to their preflight briefing, if their flight leader could obtain an immediate visual contact on any MIG which another flight member called out, he would give that aircraft permission to attack. As the strike force crossed the Red River and headed toward Thud Ridge, the F-4 flight trailed south of the main force by about 8 miles.

Suddenly came the warning: "Red bandit airborne out of Gia Lam." Shortly thereafter, aircraft 3 and 4 established a visual contact, and Baker requested and received permission to attack. According to his report, the Marine captain turned right from a heading of 30° to 270°, made a high-speed diving pass at the MIG-17, and fired his SUU-23. The MIG turned into him and attempted to evade the attack. Passing beneath the hostile aircraft, Baker performed a high-speed yo-yo, followed by a scissors maneuver as the MIG reversed his turn.

Keeping the MIG-17 in sight, Baker waited for separation, then performed a Split-S and made a second high-speed pass and fired his SUU-23. The MIG continued to turn into the attack, so Baker returned to 10,000 feet to allow separation. He made another high-speed pass, trying to fire the SUU-23, but discovered it was empty.

The MIG turned into the attack. Baker overshot and made a high-speed yo-yo to 10,000 feet to try to get more separation. The MIG then leveled his wings at 2,000 feet and headed 120° at approximately 0.6 Mach. Baker maneuvered his Phantom into a 2-nautical mile stern attack and launched one AIM-4D while in a 10° dive, passing through 3,000 feet. The missile hit the tailpipe of the MIG, and Baker observed persistent fire and black smoke trailing from the hostile aircraft. The left wing of the MIG dropped sharply, and it began an uncontrollable downward roll from 2,000 feet. Baker executed a climbing right turn and lost sight of his kill.

New MIG Tactics

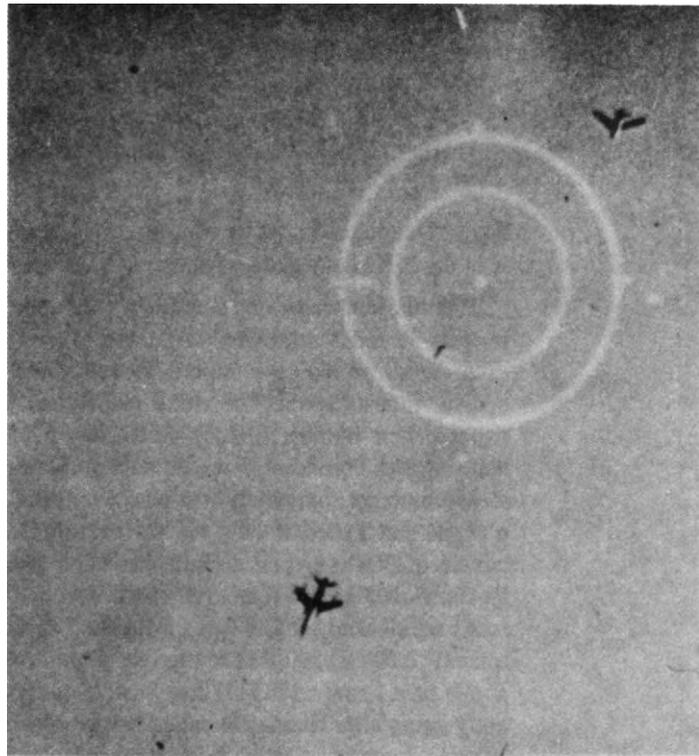
By mid-December 1967, MIG-21's were coordinating their attacks with those of MIG-17's, each from different quadrants, in multiple passes. These tactics were observed on the 19th, when two large strike forces were sent into North Vietnam to hit Viet Tri and Tien Cuong railroad yards.

The first force, which never reached its target, consisted of four F-105 and two F-4D MIGCAP flights. It was attacked by six MIG-21's and four to eight MIG-17's. The USAF aircraft jettisoned their ordnance and jumped into the numerous engagements. None of the aircraft was damaged, and one of the MIGCAP aircraft—number 01—crewed by Maj. Joseph D. Moore and 1st Lt. George H. McKinney, Jr., poured enough gunfire into a MIG-17 to receive credit for a one-half MIG kill; the other half was awarded to Majors William M. Dalton, pilot, and James L. Graham, EWO, in an F-105 Iron Hand aircraft in the second force.

Major Moore relates the engagement:

As the force crossed the Black River . . . another flight (also MIGCAP) called bogies closing at 6 o'clock. I turned my flight back into the bogies which were identified as F-4's after approximately 135° of turn. I completed 360° of turn and rolled out behind the force. At this time the F-105's called MIG's and jettisoned ordnance. I acquired four MIG-17's milling through the strike force. I selected one at 12 o'clock, approximately 2½ miles in range, and we obtained radar lockon.

As I was about to fire an AIM-7E, another MIG-17 popped up at 12 o'clock. I switched to guns and began tracking the second MIG-17, who was in a gentle left turn. I began firing at approximately 1,500 feet, but rate of fire was very slow as the gun was not up to speed. The MIG increased his rate of turn, then abruptly relaxed G's. At this time I observed smoke coming from the MIG's fuselage. I passed within 100 feet of the MIG and yo-yoed high. As I looked back to see the MIG go in, I observed another MIG closing on me from 5 o'clock high and was forced to unload and accelerate away. When I was confident of



A North Vietnamese MIG-17 makes a firing pass at an F-105 in the air battle north of Hanoi on 19 Dec. 1967. This action was filmed by the gunsight of another F-105.

sufficient separation I turned back to re-engage. I observed no MIG's, so continued northeast. The area of probable impact was the same area where the F-105's had jettisoned ordnance, so an exact impact point could not be determined.

The second force, consisting of four F-105 strike flights, one F-105F Iron Hand flight, and two F-4D MIGCAP flights, was more successful in accomplishing the day's mission. The four strike flights reached the Dai Loi railroad bridge, while the Iron Hand and MIGCAP flights engaged the same MIG's.

Maj. Robert R. Huntley, flying the lead aircraft in an F-105F Iron Hand flight, engaged and damaged one MIG-17. He thought he and his EWO, Capt. Ralph W. Stearman, had downed the enemy aircraft, but his claim was turned down by Seventh Air Force's Enemy Aircraft Claims Evaluation Board after careful study of all factors and sources of information.

Majors Dalton and Graham, flying aircraft 2 in Huntley's flight, attacked the MIG-17 earlier damaged by Moore and McKinney and were sub-

sequently credited with one-half of an aerial victory. Finally Capt. Philip M. Drew, pilot, and Maj. William H. Wheeler, EWO flying in aircraft 3, downed a MIG-17 for themselves.

Major Dalton tells how he completed the destruction of the MIG damaged by Moore and McKinney:

The mission progressed as normal until approximately 35 miles southwest of the target. At that time bomb smoke was noted to the right of course, indicating that the strike planes had jettisoned their bombs. Shortly thereafter, a MIG warning was broadcast. I saw a MIG pull up in a steep climb approximately five or six miles at 12 o'clock and called it out. As we continued on course of 068°, several aircraft came into view: F-4's, F-105's, and four to six MIG's.

As we slacked off G's I was inside and approximately 1,500-2,000 feet to the rear of lead, and at this time I saw a MIG-17 low and right, apparently going after Huntley. I called him and started slowing down and turning right to get behind him. I closed as much as I could and started tracking and fired. I fired a short burst but was not tracking him, so I let up on the trigger, repositioned the pipper ahead of the MIG, let him fly up to it, and tracked him. Again I opened fire. As verified by my gun camera film, I observed impacts on the left wing and left side of the fuselage under the cockpit, at which time the MIG broke up and left. I turned to follow him but he rolled and started down inverted off to my left. At this time my EWO, Major Graham, called another MIG at our 7 o'clock coming down. I broke left into him and noted that two F-4's were in pursuit. The MIG rolled inverted and headed for the deck; the F-4's followed and fired a missile. I did not see the missile impact the MIG. At this time we contacted lead again but were unable to rejoin, and started to leave the area to rejoin aircraft 3 and 4. During egress, I observed two impact points. . . which I assumed were downed MIG's.

About this time Drew and Wheeler destroyed their MIG-17 "We were warned that there were two MIG's closing at our 7 o'clock position," said Wheeler. Drew describes the kill:

I turned hard into them, dived down into a valley, picked up my airspeed, and did a hard

180° turn back to the south. I picked up a MIG at my 1 o'clock high position going about the same direction that I was going. He appeared to be by himself. I was low on him and I don't believe he ever saw me. As he started a gentle right turn (about 40° of bank), I started my attack.

I had no problem tracking him, so I continued my attack, firing 756 rounds of 20-mm, until I could see the end of the MIG's wing tips on each side of the canopy bow which put him about 100 feet away. Prior to breaking off my attack, I saw numerous 20-mm rounds impacting in his fuselage and his right wing root area. As I crossed over the top of him, I clearly saw the aircraft markings on the top of his left wing. Major Wheeler, my EWO, called that we had another MIG attacking us from our left and that he was shooting. I looked to my left and picked up the new attacker about 1,000 feet out at 9 o'clock with his guns ablaze. I looked back at my target one last time and saw him rolling further right into a 120° bank turn and a 30° dive from about 7,000 feet altitude. Due to my position, I could not see beyond the tail of the MIG that I had fired on to observe the intensity of the smoke and fire. I was still close to him, though, since I could now clearly see the red star on his fuselage and the same insignia on the under side of his left wing as was on the top. I then pushed over, obtained 2 negative G's, and continued rolling to the left until I reached 50 feet above the ground and lost my attacker.

I made a slow 360° turn back to the area, looking for more MIG's and to pick up my wingman. My wingman joined up as I completed my turn . . . I looked back at my 4 o'clock position and saw black and gray smoke mushrooming up from where an aircraft had impacted the ground. This is a point that coincided exactly with the direction and attitude of flight from my MIG. By this time we were all well below Bingo fuel and there were no other aircraft, friendly or enemy, in the area other than aircraft 2, 3, and 4, so we initiated emergency refueling as soon as possible and returned to base.

Beginning in January 1968, MIG pilots were less prone to flee toward China. Instead, they became

more aggressive and frequently returned for a second pass against American strike aircraft. The number of their kills increased and the MIG threat became more significant. U.S. forces therefore scheduled more MIGCAP missions and, at the same time, reduced the size of strike forces to provide better force protection.

The first confrontation of the new year took place on the morning of 3 January. The strike force was involved in a major effort and consisted of two separate forces. Alpha Force aimed at the Dong Dau railroad bridge in the Hanoi area and was made up of four F-105 strike flights, two F-105 Iron Hand flights, and two F-4D MIGCAP flights. This force was attacked by MIG-21's on its approach to the target. Bravo Force, consisting of three F-4D strike flights, one F-4D flak suppression flight, and two F-4D MIGCAP flights, was directed against the Trung Quang railroad yard. It was attacked by MIG-17's during withdrawal. The two forces approached from different directions and at different times, thus effectively splitting the NVN MIG forces.

No USAF aircraft was damaged. Bravo force engagements resulted in the destruction of two MIG-17's, one by a strike F-4D and the other by a MIGCAP aircrew. The strike aircraft was crewed by Lt. Col. Clayton K. Squier and 1st Lt. Michael D. Muldoon of the 435th TFS, 8th TFW. Squier's report describes his success:

I engaged four MIG-17 aircraft in a head-on pass during egress from the strike target approximately 6 miles south of Bac Giang. The MIG's passed within 200-300 feet of my aircraft, going the opposite direction. I chandelled in afterburner to the left, cooling an AIM-4 missile for the reengagement. After approximately 360° of turn I visually acquired two MIG-17's 3 miles ahead, in trail and in a gentle left turn. I selected the trailing aircraft, tracked, closed to positively identify the type aircraft, and launched the AIM-4.

The missile tracked directly to the aft section of the MIG-17, impacted in a ball of fire and smoke. The MIG immediately started a solid trail of gray/white smoke and continued in a gentle left turn with no maneuvering observed. As I passed to the right rear of the MIG-17 and slid to the outside of the turn, other aircraft in the immediate

area diverted my attention and I lost sight of the smoking aircraft. I gathered my flight together and continued the egress.

Other pilots witnessed the impact and saw the smoke trailing the falling aircraft.

While Squier was firing his AIM-4, he was attacked by another MIG-17 which aimed cannon fire at him from a range of 1,000 feet, but missed. His wingman in aircraft 2 was also fired upon by a flight of two MIG-17's, but again with no damage resulting. Meanwhile, the F-4 MIGCAP flight observed the engagements and descended to get a closer look at what was going on. Maj. Bernard J. Bogoslofski and Capt. Richard L. Huskey, flying lead aircraft, observed a MIG-17 firing on Squier's wingman and decided to get it. Bogoslofski reports the encounter:

The MIG-17 was tracking one F-4 in a tight left turn and gunfire was observed coming from the MIG-17. I was high and 5 o'clock to the MIG-17 and rolled in on him from 11,000 feet at an estimated 80° dive angle. I tracked the MIG-17 and began firing 20-mm. The MIG-17 tightened his left turn and I performed a vertical pirouette left in order to continue tracking him, using high-G and at least 80° of dive angle, high angle-off. A burst of fire appeared on the MIG's left wing and fragmentation of the aircraft's left wing was observed as I initiated a recovery.

Maj. Albert S. Borchik, Jr., in aircraft 4 of Bogoslofski's flight, and Maj. Ronald L. Markey, commanding aircraft 3, saw the pilot eject and the MIG hit the ground.

Approximately 2 weeks later, on the 18th, three large strike forces hit targets in North Vietnam. Alpha Force, scheduled against the Bac Giang thermal power plant, was made up of one F-105 Iron Hand flight, one F-4D flak-suppression flight, one F-4D strike flight, and one element of an F-4D MIGCAP flight; the other element aborted before entering North Vietnam due to ECM malfunctions. Alpha Force met coordinated attacks from SAM's, AAA, and MIG-17's, and in the air-to-air engagements the F-4D strike flight lost aircraft 1 and 2 but not before the flight leader had engaged and destroyed a MIG-17. Bravo Force consisted of four F-105 strike flights, one F-105 Iron Hand flight, and one F-4D MIGCAP flight. Bravo Force's target

was the Ha Gia railroad siding, but strong resistance from two MIG-17's and two MIG-21's, in coordinated attacks, forced the Thunderchiefs to jettison ordnance 2 minutes short of the target. Charlie Force, composed of one F-105 Iron Hand flight, four F-105 strike flights, and two F-4D MIGCAP flights was assigned to deliver its ordnance on the Dap Cau railroad by pass. There were no incidents involving this force.

As Alpha force approached the target, Capt. Robert L. Rutherford, flying an F-4D in the fourth slot, observed two MIG-17's at 1 and 2 o'clock, in a climbing left turn. The flight was then at 12,000-foot altitude, above the MIG's, and beginning a descent to the target. Rutherford released his Walleye air-to-ground missile early and started a hard right climbing turn together with aircraft 3. The flight leader and his wingman, meanwhile, continued their normal descent toward the target, released their ordnance, and then began a right climbing turn. By this time Rutherford saw two more MIG-17's in trail with the first two.

Aircraft 2, the target of the second MIG element, called out: "They're shooting," and seconds later his aircraft was on fire. Other members of his flight

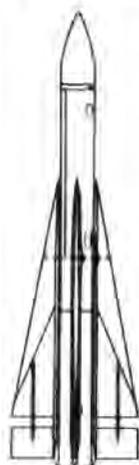
saw him crash about 1 to 2 miles from the target. No parachutes.

In the meantime, the lead aircraft, crewed by Maj. Kenneth A. Simonet and 1st Lt. Wayne O. Smith, continued in a right climbing turn and observed a third MIG in the 10 o'clock position. Simonet immediately reversed left, cooled an AIM-4D, and fired the missile. It went up the tailpipe of the MIG and exploded. The MIG caught on fire, went out of control, and crashed. No parachute was observed. During this encounter a fourth MIG-17 pulled in behind Simonet, firing his cannon. Simonet's F-4 took hits and began trailing smoke. The MIG broke off the attack and Simonet turned to the east, attempting to withdraw. His F-4 soon showed open flame and he and his back-seater ejected. Their parachutes were observed descending to the ground.

Although Major Simonet and Lieutenant Smith did not return from this mission, their commanding officer submitted in their behalf a claim for the destruction of enemy aircraft. "Post flight analysis and review of the mission tapes of the air battle that took place," he commented, "indicate that their aircraft fired a missile and destroyed a MIG-17 on this mission."

The next victory came on 5 February when a small strike force attacked a target in the Thai Nguyen area. The U.S. Air Force lost a Thunderchief but downed a MIG-21. The force consisted of one F-105 Iron Hand flight, one F-105 strike flight, and two F-4D MIGCAP flights. A MIG-21 downed one of the F-105's while the MIG pilot's wingman was destroyed by a MIGCAP Phantom crewed by Capt. Robert G. Hill and 1st Lt. Bruce V. Huneke.

Inbound to the target, the strike force had received MIG warnings: "Two blue bandits airborne, Phuc Yen." The warnings continued, indicating two MIG-21's headed northwest out of Phuc Yen, apparently intent upon intercepting the approaching strike aircraft. Hill was the first to see a MIG. His flight leader instructed him to take the lead and go after it. While the flight turned left to attack, the flight members lost sight of the MIG-21, and an F-105 was destroyed by his air-to-air missile. The American pilot safely ejected moments before his aircraft rolled over and disappeared into the undercast. Hill and his wingman were rolling out of their 360° turn at 23,000 feet when the F-105 was hit.



AIM-4E Falcon missile

Suddenly they saw a second MIG-21 climbing toward them. Hill picks up the story:

I sighted a MIG-21 at my 10 o'clock position, low, as he was breaking off from an attack on an F-105. I immediately attacked and positioned myself in his 6 o'clock. The initial engagement was with the SUU-23 and 100 rounds were expended with no visible effects. I then cooled an AIM-4D. It never got a high tone. But I fired it, thinking "it may track." The missile did not appear to guide. The second AIM-4D worked exactly as advertised, and was observed to detonate on the MIG-21's aft section. I then selected radar and fired two AIM-7E's and attempted to fire a third. The first missile was launched with a boresight lock-on and did not appear to guide. The second AIM-7E was fired with a full system lock-on and appeared to guide. The third missile did not fire. At this time, aircraft 4 called a break as we were passing through 40,000 feet with a second MIG-21 on our tail, firing a missile.

Hill's second Falcon hit the MIG in the tailpipe, resulting in a 40-foot diameter, gray-white explosion. The MIG then exploded in a large red fireball of flame, blowing off the tail section. It fell straight down and impacted. No parachute was observed.

American forces were often successful against such multiple MIG passes because of improved MIG warnings and vectoring by the warning platforms. At times, too, MIG pilots became careless and screamed down on U.S. aircraft without benefit of their ground control. One such attack occurred on 6 February. A flight of four F-4D's providing MIGCAP for a strike mission were egressing the target area when a MIG-21 suddenly appeared, making a pass from the rear quarter, high. The flight broke up and went after the MIG. Three F-4 aircrews missed with their missiles, but the fourth, crewed by Capt. Robert H. Boles and 1st Lt. Robert B. Battista, found the MIG-21 directly in front of their aircraft. "Upon ingress, our flight was to the rear and the right side of the force," reports Boles.

After several MIG calls, we turned into the threat and engaged two MIG-21's. I visually acquired the MIG's at approximately three miles. One MIG made a climbing turn away from the flight, while the lead MIG turned left and down.

The flight leader and his wingman went down after the MIG while Captain [Joel S.] Aronoff [in aircraft 3] and I stayed high, initially. During the ensuing engagement aircraft 1, 2, and 3 each fired several missiles at the MIG. Although I had a radar lock-on and was within delivery parameters, I did not fire because Captain Aronoff did not immediately answer my radio transmissions when I asked if I were cleared to fire.

During the engagement, the MIG tried evasive maneuvers which consisted mainly of climbing and descending turns. When Captain Aronoff cleared me to fire, I was line abreast, 1,500-2,000 feet out from his plane. I attempted to fire two AIM-7's. The first missile did not come off. The second missile fired as advertised and guided toward the MIG. At firing, I held the MIG at 12 o'clock. . . . The interlocks were in, and we had a full system lock. The aim dot was centered. We were in a slight climb at the time. I watched the missile guide and just prior to impact the MIG either initiated a left turn or rocked his wings to the left in order to look back at our flight. The missile detonated at the left aft wing root section, and the MIG exploded. I then exclaimed over the radio that I got the MIG and asked Captain Aronoff to confirm it. He acknowledged the MIG's destruction. At that time the flight leader called for the egress.

Kep airfield was the target for a mission on 12 February, but enroute the primary mission was aborted because of adverse weather. The strike aircraft, accompanied by two MIGCAP flights from Ubon's 8th TFW, proceeded then to the alternate target: Cao Nung railroad yard. The two MIGCAP flights escorted the withdrawing strike flight to the coast and returned to sweep the target area. While withdrawing for the second time, each flight tracked two MIG-21's. Only one flight met with any success; the lead aircraft, crewed by Lt. Col. Alfred E. Lang, Jr., and 1st Lt. Randy P. Moss, downed one MIG-21. "I sighted two bogies at my 9 o'clock position approximately 4,000 feet high in a shallow left turn about 75 miles east of Hanoi," said Lang.

I advised Col. Spencer that I had a lock-on at 22 miles and was maneuvering to accomplish an identification. I directed that his element fall into trail.

As I closed on the bogey, Lieutenant Moss (GIB) continually advised me of the bogey's azimuth, altitude, range and our overtake speed. He also had me recheck my armament switches and fuel status. At 8 miles Lieutenant Moss reaffirmed that the aim dot was centered, that we were in range, and then called out ranges at one mile intervals until I fired. At 6 miles I identified the second bogey as a MIG-21 and fired two AIM-7E's at 4½ miles, approximately 60° off his tail, with a full system lock-on, 600 knots overtake and the steering dot centered. Altitude was approximately 34,000 feet and airspeed 1.3 Mach. At this time I also cleared Col. Spencer to fire.

Lieutenant Moss and I both tracked our missiles visually and observed the first missile to explode in the MIG's 7-8 o'clock position and the second missile explode in the MIG's 10 o'clock position. As the MIG flew through the explosion he rolled inverted, yawed 30-40 degrees right to the direction of the flight, and then entered a tumbling spin. The pilot did not eject and the aircraft continued in an uncontrollable spin. I then sighted the other MIG, which had been approximately 3 miles in front of the destroyed MIG. We acquired lock-on from dead astern and closed to 9-10 miles, but had to break off the attack because aircraft 4 was minimum fuel. We recovered at our home base.

Colonel Robert V. Spencer, flying in aircraft 3 with 1st Lt. Richard W. Cahill as the rear-seater, had in the meantime fired two AIM-7 missiles at the lead MIG. The first, according to his account, guided and tracked toward the target, detonating short of the enemy aircraft. Spencer reported that the second missile guided, tracked, and exploded very near the MIG's 6 to 9 o'clock position. The MIG then "pitched violently upward and fell into an uncontrolled, tumbling spin."

Maj. Stuart W. Levy and 1st Lt. Gerald J. Crosson, Jr., observed the engagement from aircraft 4. Levy reported seeing Spencer's second missile "detonate on the MIG or within close proximity" and then observed the MIG "in an uncontrollable spin or tumble."

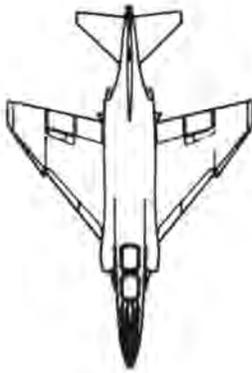
Lieutenant Crosson's report differed slightly; he

said that Spencer's first AIM-7 exploded "four ship lengths behind the MIG" and that the second Sparrow appeared "to have been further to the MIG's rear." He also saw the MIG roll and then go into a flat, nose-high spin which developed into a nose-down spin. The aircrews of numbers 4 and 2 (Capt. Alexander D. Kelly and 1st Lt. Allan R. Sweeny) also observed the "destruction" of the MIG-21 by their flight leader. The Seventh Air Force later confirmed the kill by Lang and Moss, but denied the claim submitted by Spencer and Cahill.

The next aerial victories for the U.S. Air Force were the last before a 4-year hiatus set in. Two MIG-17's were destroyed during a strike against Phuc Yen airfield on 14 February 1968. In the strike force were two flights of Iron Hand F-105's, one F-4D strike flight, and two F-4D MIGCAP flights (one fragged as "fast" CAP and the other charged with "slow" CAP). All of the MIGCAP aircrews were briefed to expect the standard coordinated MIG-17/MIG-21 effort, with the MIG-17's flying a low Wagon-Wheel orbit and the MIG-21's flying high altitudes, and both under GCI control. One F-4 flight was armed with AIM-7 and AIM-9 air-to-air missiles; the other with AIM-4 and AIM-7 missiles and SUU-23 gun pods.

MIG warnings proved to be excellent, and the second F-4 flight turned to approach two MIG-21's as the strike force was inbound to the target. The F-4's obtained a radar lock-on, but the MIG's withdrew without contact and the flight rejoined the strike force near Thud Ridge. These two MIG-21's avoided the F-4's, but then attacked one of the trailing F-105 Iron Hand flights. After a brief engagement, one element of the F-105's returned to Korat while the other continued on to the target area. As the strike force continued, the F-4 flight sighted four MIG-17's at 11 o'clock, range of 3 miles, headed toward it.

The MIG-17's were performing a left-hand Wagon Wheel maneuver at 8,000 feet over the flats northeast of Phuc Yen as the F-4 flight commenced a climbing spiral to the right to gain separation and to set up for a pass. The flight leader, Lt. Col. Wesley D. Kimball, and his wingman, Maj. Ray M. Burgess, went through the wheel with Kimball attempting to get a MIG with an AIM-4. The missile did not get a high tone, so he did not fire. Kimball



F-4D Fighter

and Burgess dived through the MIG orbit pattern, pulled up at 7,000 feet, and started to climb. It was at this moment that Maj. Rex D. Howerton and 1st Lt. Ted L. Voigt II, in aircraft position 3, entered the fray. One of the MIG's attempted to fall in behind the number one element. "Observing this," said the major,

I began my attack and rolled in approximately 2,500 feet behind the MIG and fired an AIM-4D missile. The missile appeared to guide, but thinking that I might be inside minimum parameters I selected guns and began firing the SUU-23 cannon. Cannon hits were noted on the MIG and shortly thereafter the MIG exploded and began to break up. The missile was not seen to impact or destruct. The MIG went down in flames with one wing and the tail section separated.

Kimball and Burgess then made another pass at another MIG. Kimball fired 350 rounds of 20-mm from a range of 2,000 feet, but saw no hits. Very low on fuel at this point, his flight left the area.

Within 2 or 3 minutes after this engagement began, the other MIGCAP flight attacked these same MIG-17's. The lead aircraft, crewed by Col. David O. Williams, Jr., and 1st Lt. James P. Feighny, Jr., soon downed one of them. Williams reports:

On February 14, following vectors given to the flight by surveillance agencies, we sighted four MIG-17's in a left-hand orbit pattern approximately 10 miles northwest of Phuc Yen, at approximately 15,000 feet. I observed Kimball's flight execute an attack on the MIG's and then

rolled in behind his 3 and 4 on a trailing MIG. I observed the MIG start a right hand turn and dove down from approximately 24,000 feet to his 5:30 to 6 o'clock position at approximately 1.2 Mach.

I asked my rear seat pilot if he was locked on and he replied he was, but wasn't sure it was the right target, so he asked me to put the piper on him and he selected gyro out and relocked, at which time he verified that we were now locked on to the MIG. I fired one AIM-7E Sparrow missile in full system lock-on, interlocks in, in-range light on at approximately $\frac{3}{4}$ mile. The missile tracked perfectly and detonated near the left side of the MIG's fuselage. The MIG immediately shed its empennage and burst into a bright orange fire in a flat spin. I immediately yo-yoed high and then rolled over to clear my tail.

As I looked back, I observed the MIG to be in a flat spin, burning profusely. At about the same time I observed a parachute with a man hanging from it. The chute was bright orange and white and was of a square pattern. I then turned back left and observed another MIG-17 in a nose-down snapping spin with no left wing. The left wing was 1,000 to 1,500 feet above the MIG and tumbling downward. I also observed what appeared to be pieces of the tail fluttering downward behind the MIG. This MIG impacted in rice paddy terrain northeast of a large river. When I rolled back to the right, I observed the first MIG impact in a rice paddy close to the foot of Thud Ridge, exploding in a large orange fireball.

In sum, USAF fighter crews, all flying F-4D

Phantoms, destroyed eight MIG's in aerial combat during January and February 1968. Yet a more significant factor becomes evident in these months. Of the possible causes for American aircraft losses, i.e., to MIG's, SAM's, AAA, and other unknown factors, it is noteworthy that the percentage of losses to MIG's was a mere 1 percent during 1965, 3 percent in 1966, and 8 percent during 1967. But this figure leaped to 22 percent during the first 3 months of 1968. With this increasing threat and the end of bad weather, the time appeared appropriate and opportune for another major American effort against North Vietnam's MIG force. But then, on 31 March, President Lyndon B. Johnson announced the first of a series of bombing restrictions. Effective 1 April, all bombing north of 20° North latitude would cease. Two days later, the bomb line was further moved southward to 19°, permitting air strikes only in Route Packages 1, 2, and the southern third of 3. Thus, nearly all of North Vietnam became a MIG

sanctuary; the only jet-capable airfields within the limited operating area of American forces were not being used by the NVN Air Force for MIG operations.

These bombing restrictions dramatically changed the character of the air-to-air war. After 3 April 1968 MIG's ventured south of the 19th parallel, for the most part, under radio and radar silence. They continued their high-speed, hit-and-run tactics but usually retreated north of the 19th parallel after making single firing passes.

Only on 23 May 1968 did any sizeable force of MIG's venture south of the bomb line. One MIG-21 was downed by a U.S. Navy Talos missile. Some MIG's were lost to the Navy later in that year, but the U.S. Air Force scored no additional aerial victories. After 28 September 1968, North Vietnamese MIG activity virtually ceased, and on 1 November 1968 all bombing in North Vietnam was halted by Presidential proclamation.

North Vietnamese prepare to launch a surface-to-air missile.



(Top) North Vietnamese pilots rush for their MIG-17's in response to alarm that USAF planes are in the area.

(Left) A single MIG with markings, in flight.



