
The -Ology War: Technology and Ideology in the Vietnamese Defense of Hanoi, 1967



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Abstract

The American air campaign against Hanoi in 1967 pushed Vietnamese air defenses to the brink of disaster. By the spring of 1967, continued improvements in U.S. tactics and electronic warfare technology had rendered North Vietnam's SA-2 missiles and radar-controlled anti-aircraft guns virtually impotent against U.S. Air Force aircraft. The Vietnamese were able to rise from the ashes of this potential defeat through intense political indoctrination; research and training; adjustments in the missions and deployment of North Vietnam's missile, anti-aircraft, and fighter units; assistance from communist allies; and American hesitancy and miscalculation.

OPERATION Rolling Thunder, the U.S. bombing campaign against North Vietnam, peaked in 1967 with a series of attacks on targets in and around Hanoi. In keeping with the nature of policy-making in Lyndon Johnson's White House and Robert McNamara's Pentagon, the campaign against Hanoi was conducted in fits, starts, and half-measures. The Vietnamese, however, saw the campaign as so crucial for their own survival that they pulled most of their air defense forces

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away from their infiltration and supply routes to help defend their capital.¹

Several times during the course of the battle, U.S. technological developments threatened to overwhelm the Vietnamese defenses. Each time the Vietnamese overcame the threat, barely managing to hang on until the 1968 Tet Offensive and U.S. internal dissension compelled President Johnson to halt the bombing north of the 20th parallel, ending the threat to Hanoi until the final spasm of Linebacker attacks in 1972. The following account, drawn primarily from official Vietnamese histories and internal studies, shows how a weak third-world country, with the help of powerful friends, exploited the time given it by American indecision and hesitation to develop ways to overcome the most sophisticated technologies. In light of the mysterious 1998 shootdown of an F-117 over Serbia and the endless cat-and-mouse game Iraq's air defenses continue to play against U.S. aircraft over the "no-fly" zones, it is a tale worth remembering.

The North Vietnamese air defense system was an integrated network of surface-to-air (SAM) missiles, anti-aircraft guns, and Air Force fighters. Unlike the Americans, who out of bureaucratic imperatives and interservice rivalries fragmented command of the air war over North Vietnam, all elements of North Vietnam's air defenses were unified under a single service, the Air Defense–Air Force Service (Air Force Branch, Missile Branch, Radar Branch, and Anti-Aircraft Artillery), and a single command, the Air Defense Command. The guns of North Vietnam's Anti-Aircraft Artillery (AAA) Branch were the heart of the Air Defense Service, but the SAMs played a vital role in North Vietnam's air defenses. The SAMs disrupted U.S. strike formations during their approach to the targets and drove them down to lower levels where the cannon and machine guns of the anti-aircraft artillery were most effective. Without SAMs, U.S. aircraft could remain at altitude, beyond the range of all but the heaviest-caliber North Vietnamese guns through most of their mission, diving into range of rapid-fire 57mm and 37mm guns only briefly during the actual bombing run. The heavy-caliber AAA guns were largely ineffective; the North Vietnamese admit they were unable to confirm a

1. Le Nguyễn Ba, *History of the Hanoi Air Defense Division (Internal Distribution Only)* [*Lịch Su Su Doan Phong Không Hà Nội (Luu Hanh Noi Bo)*], editorial supervision by Senior Colonels Nguyễn Văn Than and Nguyễn Xuân Cù (Hanoi: Hanoi Air Defense Division, 1985), 92; Senior Colonel Hồ Sĩ Huu, Senior Colonel Thái, Colonel Thế Kỳ, Lieutenant Colonel Đinh Khôi Sỹ, and Lieutenant Colonel Nghiêm Đình Tích, *History of the Air Defense Service*, volume II [*Lịch Su Quân Chung Phòng Không, Tập II*], editorial supervision by The Party Current Affairs Committee and the Headquarters of the Air Defense Service (Hanoi: People's Army Publishing House, 1993), 123, 182.

single U.S. aircraft shot down by their 100mm guns during the entire year of 1965.²

North Vietnam's SAM missile forces were born in early 1965, when the Vietnamese Communists won the support of the new leader of the Soviet Union, Leonid Brezhnev, for the war against the Americans. Relations between Brezhnev's predecessor, Nikita Khrushchev, and the communist leadership of North Vietnam had been poor, but on 17 November 1964, only a month after Khrushchev was deposed, the Soviet Communist Party Politburo approved the dispatch of military aid and military advisors to Vietnam. The aid included SA-2 SAM missiles.³

North Vietnam's first SAM regiment, the 236th, was formed on 7 January 1965. With orders giving the regiment the highest national priority, officers scoured the armed forces, civilian universities, and technical schools of North Vietnam to find the best engineers, electricians, technicians, and mechanics to form the new regiment. Once the regiment's equipment, missiles, and seventy Soviet missile advisors arrived aboard a Soviet ship in April 1965, the regiment began a crash training program at a training facility near Son Tay.⁴

On 24 July 1965 the regiment fought its first engagement, shooting down one U.S. Air Force (USAF) F-4C and damaging three others. Because there had not been enough time to train the Vietnamese missile crews, Soviet "advisors" personally took part in this missile launch.⁵ Ironically, U.S. pilots were denied permission to attack the missile launch site during its construction for fear of harming Soviet personnel; the Soviets obviously had no similar concerns about killing Americans. Soviet soldiers continued to participate in combat missile launches for some time. The Vietnamese admit it was one full month before, on 24 August 1965, the first all-Vietnamese missile crew conducted a combat missile launch.⁶ Soviet missile advisors and technicians served with North Vietnamese missile units at the battalion and regimental level

2. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 46.

3. General Oleg Sarin and Colonel Lev Dvoretzky, *Alien Wars: The Soviet Union's Aggressions against the World, 1919–1989* (Novato, Calif.: Presidio Press, 1996), 91.

4. Ho Si Huu et al., *History of the Air Defense Service*, 40–41; Sergei Blagov, "Missile Ambushes: Soviet Air Defense Aid," *Vietnam*, August 2001, 28. See also conversation between Zhou Enlai and Ho Chi Minh, 1 March 1965, in *77 Conversations: Cold War History Project Working Paper 42*, ed. Odd Arne Westad, Chen Jian, Stein Tønnesson, Nguyen Vu Tung, and James G. Herschberg (Washington: Woodrow Wilson Center for Scholars, May 1998), 78.

5. Ho Si Huu et al., *History of the Air Defense Service*, 45–46; Blagov, "Missile Ambushes," 28; Wayne Thompson, *To Hanoi and Back* (Washington: Smithsonian Institution Press, 2000), 35.

6. Ho Si Huu et al., *History of the Air Defense Service*, 53.

throughout the war, and eighteen Soviet personnel, including a number of missile “advisors,” were killed in combat during the Vietnam war.⁷

U.S. responses to the SAM threat included long-range electronic jamming aircraft targeted on missile and AAA radar frequencies, special “Iron Hand” aircraft (USAF F-105s and U.S. Navy A-4s targeted against the SAM sites themselves), and equipping each strike aircraft with its own electronic jammer. During the first years of the war, long-range jamming by electronics warfare aircraft (primarily EB-66s) flying just outside the battle area and Iron Hand strikes gave North Vietnamese missile crews the most problems. The Vietnamese immediately began targeting the EB-66s, setting SAM ambushes and sending MiG fighters to attack them. While MiGs were initially unsuccessful, SA-2 ambushes shot down two EB-66s during 1966, forcing these aircraft to shift their jamming orbits out of North Vietnamese airspace and reducing the effectiveness of jamming in the vital Hanoi–Red River Delta area.⁸

Iron Hand missions severely affected North Vietnamese SAM operations. A Vietnamese account of an early Iron Hand operation, a series of U.S. Navy attacks on the 236th Missile Regiment southeast of Hanoi on 7 November 1965, details the destruction of two of the regiment’s four missile battalions and of the regimental technical support battalion, responsible for assembling and transporting missiles to re-supply the launch battalions. The 236th Missile Regiment would be out of action for some time.⁹

The impact of these attacks on the missile crews was devastating. Unlike most North Vietnamese soldiers, the crews were largely well-educated urban youth unaccustomed to hardship, whose training had concentrated on technical skills rather than combat and ideology. Entire missile units wavered, afraid to fire a missile for fear a launch would expose them to attack. In 1966 a senior Air Defense Command officer, observing combat operations with a missile battalion near Haiphong, was so frustrated by the reluctance of the battalion commander (who claimed U.S. jamming made it impossible to identify a target) to fire on U.S. aircraft that he finally exploded in anger. “Even my old eyes can see the target on your screen,” he shouted at the young officer. “Launch your missiles, damn it! They’re attacking the Uong Bi power plant!”¹⁰

7. Blagov, “Missile Ambushes,” 27.

8. Marshall L. Michel III, *Clashes: Air Combat Over North Vietnam, 1965–1972* (Annapolis, Md.: Naval Institute Press, 1997), 34–38; Ho Si Huu et al., *History of the Air Defense Service*, 103–4; Captain Gilles Van Nederveen, “Sparks Over Vietnam: The EB-66 and the Early Struggle of Tactical Electronic Warfare,” *Air Research Institute ARI Paper 2000-03*, 40–43, 99.

9. Ho Si Huu et al., *History of the Air Defense Service*, 61–62.

10. Major General Nguyen Xuan Mau and The Ky, *Defending the Skies: A Memoir [Bao Ve Bau Troi: Hoi Ky]* (Hanoi: People’s Army Publishing House, 1982), 133.

The Air Defense Command's commissars and political officers, who represented the Communist Party in the Vietnamese command structure and were responsible for the ideological preparation and the morale of their units, devoted considerable time and attention to group "criticism," "self-criticism," and propaganda sessions with their men to restore their morale and keep them in the fight.

For the United States, the concept of electronic jammers mounted on each strike aircraft held the most promise for neutralizing the SAMs. However, early Air Force interference jammers failed their initial combat test in the summer of 1965 and were recalled from service. Unlike the Air Force jammers, the Navy's ALQ-51, introduced in late 1965, was a "deception" jammer which, rather than trying to overpower the missile radar receivers, created a number of false radar returns on the SA-2 missile radar screens in addition to the signal of the real target. The Navy ALQ-51s initially gave the Vietnamese problems, and for a three-month period in the summer of 1966 the Navy aircraft loss rate in SAM-defended areas dropped precipitously.¹¹

With study and practice, however, Vietnamese missile crews developed procedures for distinguishing between false and actual targets. These methods included comparing differences in the signal quality and characteristics of each target, analysis of each target's *delta* rate (its rate of change in bearing and elevation), flipping the radar screen range-scale settings back and forth to detect anomalies, and briefly switching the radar antenna to the stand-by position. By 1967 the Vietnamese became so proficient against the Navy's deception jamming that during an engagement on 13 August 1967, two SA-2 missiles hit and destroyed three Navy A-4s.¹²

The glacial pace of U.S. escalation and the numerous bombing restrictions that President Johnson and Secretary of Defense McNamara imposed on the Rolling Thunder bombing campaign spared Hanoi from attack for the first sixteen months of the war. Finally, on 29 June 1966, the Americans hit the Hanoi area, bombing the Duc Giang petroleum storage tanks on the outskirts of the city. The Vietnamese admit that the American attack on Duc Giang caught them flat-footed:

11. Thompson, *To Hanoi and Back*, 48.

12. Lieutenant Colonel Vu Huu Tu, "73rd Battalion, 285th Missile Regiment's Engagement against U.S. Navy Attack Aircraft at the Trinh Huong Combat Position, Haiphong, on 31 August 1967," in Industrial Science Office of the Air Defense Service, *A Number of Anti-Aircraft Battles During the Resistance Wars Against the French and the Americans*, volume III; *Classification: Secret* [Mot So Tran Danh Phong Khong Trong Khang Chien Chong Phap, Chong My, Tap III; Mat] (Hanoi: People's Army Publishing House, 1995), 47–65; Ho Si Huu et al., *History of the Air Defense Service*, 227; Michel, *Clashes*, 38. An account of the U.S. side of the 31 August 67 shootdown of three A-4s can be found in Jeffrey L. Levinson, *Alpha Strike Vietnam* (New York: Pocket Books, Simon and Schuster, 1990), 234–35.

The Air Defense Command's system for reporting enemy activities and directing combat operations was slow and ineffective. In truth, during this battle the enemy achieved both strategic and tactical surprise.¹³

In the words of another official Vietnamese history, "The flames from the fires at the Duc Giang petroleum tank farm and our poor performance in this battle caused much thought and severe self-criticism among commanders at all levels."¹⁴

Taking quick action to correct deficiencies in Hanoi's air defenses, the Vietnamese General Staff made the defense of Hanoi and Haiphong the Air Defense Command's highest priority. By late October 1967 the new Hanoi air defense plan was complete. Three missile regiments, four anti-aircraft artillery regiments, and both Air Force fighter regiments were committed to the defense of the Hanoi area.¹⁵

Instead of taking advantage of North Vietnamese confusion, President Johnson refused to permit attacks against other targets in the Hanoi area, giving the Vietnamese the respite they so desperately needed. Hanoi targets would not be attacked again for almost six months. American pilots would pay dearly for this delay.

In September 1966 the Air Force began combat tests of the new QRC-160-1 jamming pod. These pods, carried by individual strike aircraft, were designed to disrupt North Vietnamese missile and anti-aircraft fire control radars. At first few such jammers were available, and only a small number of F-105s in each strike were equipped with the pods. Although there were not enough pods to protect entire strike formations (by the end of 1966 there were only fifty-one QRC-160-1 pods in all Southeast Asia), the pods were an immediate success. Only one pod-equipped aircraft was lost during the first two months of jamming pod operations.¹⁶

In November 1966 President Johnson approved strikes against rail yards and truck parks on the outskirts of Hanoi. By this time, however, the northeast monsoon had begun, bringing almost constant cloud cover over Hanoi, which would last until spring. Not until 2 December did the weather clear enough for a few days of bombing strikes.¹⁷ By now the Vietnamese Air Defense Command was ready. The movement of American aircraft carriers deeper into the Gulf of Tonkin alerted the Vietnamese that a major attack was imminent.¹⁸ Although the jamming pods protected the individual aircraft carrying them, there were too few pods

13. Ho Si Huu et al., *History of the Air Defense Service*, 88.

14. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 56.

15. Ho Si Huu et al., *History of the Air Defense Service*, 101-2.

16. Michel, *Clashes*, 61, 71-72.

17. Thompson, *To Hanoi and Back*, 41, 43.

18. Ho Si Huu et al., *History of the Air Defense Service*, 108.

to protect everyone. On 2 December North Vietnamese defenses inflicted the heaviest American air losses of the war, destroying five Air Force and three Navy aircraft, including five downed by SAMs (the Vietnamese claimed twelve aircraft shot down).¹⁹ Weather permitted three more strikes (on 4, 13, and 14 December) before President Johnson suspended all strikes in the Hanoi area in support of another peace initiative.²⁰

The abbreviated bombing offensive revealed a number of deficiencies in the new Hanoi air defense plan. The Hanoi Air Defense Division conducted a “stern self-assessment” of the 2 December attack, concluding that

the enemy was able to destroy a number of targets, a number of our anti-aircraft artillery and missile positions were hit, and units deployed close-in did not fight as well as those deployed on the outer perimeter. In general, all units wasted ammunition.²¹

These problems prompted reviews of Hanoi’s defenses by the General Staff and the highest levels of the Vietnamese Communist Party. These reviews concluded that “although Hanoi’s air defense forces are numerous, their quality is low, and their cadre [leaders] at all levels are weak.”²²

As soon as the December 1966 strikes ended, Hanoi began redeploying anti-aircraft guns and missiles to cover gaps exposed during the recent attacks.²³ The Vietnamese recognized the reason behind the respite given them by the Americans. A Vietnamese history states:

During the first three months of 1967 the enemy launched no large attacks against Hanoi and Haiphong. This was due in part to poor weather, and *in part to the restrictions of the American imperialist policy of escalation*. In this situation the Air Defense Service directed forces in both cities to vigorously prepare for combat.²⁴

In early January 1967 the Air Defense Command sent four SA-2 battalions (twenty-four launchers) to an area northwest of Hanoi to “ambush” the EB-66s and drive them out of effective jamming range. On 4 February 274th Missile Regiment’s 89th Battalion shot down an EB-66C over Bac Can province. Four crewmen from the downed aircraft were captured. In the words of an official Vietnamese history, “The wreckage of this EB-66C yielded numerous documents and provided

19. Ibid., 108–9; Michel, *Clashes*, 66.

20. Thompson, *To Hanoi and Back*, 43.

21. Le Nguyễn Ba, *Hanoi Air Defense Division (Internal Distribution)*, 63.

22. Ho Si Huu et al., *History of the Air Defense Service*, 119–29.

23. Ibid., 120–22.

24. Ibid., 125. Emphasis added.

extensive information on enemy electronic warfare to the Air Defense Command's research and analysis components, to the Military Technical Institute, and to the General Staff." The Air Defense Command proclaimed the EB-66 shootdown as the Command's most important achievement during the first three months of 1967 and awarded 89th Battalion the Military Achievement Medal, First Class, North Vietnam's highest unit citation.²⁵

Meanwhile, another branch of the Air Defense Command had suffered a crushing blow. On 2 January 1967 USAF F-4s set a trap to lure North Vietnamese fighters into the air and shoot them down. American pilots claimed seven MiG-21s destroyed; the North Vietnamese admit five MiG-21s were shot down but say all pilots survived. On 6 January a second USAF "MiG-trap" shot down two more MiG-21s (a figure both sides agree on), and this time one North Vietnamese pilot was killed.²⁶ Two days later the Air Defense Command issued new orders: "MiG-21s will temporarily suspend combat operations to derive lessons learned, to study and refine MiG-21 combat tactics, and to conduct further training to improve technical and tactical skills."²⁷ While the 923rd Fighter Regiment's MiG-17s continued combat operations, half of North Vietnam's fighter force, the 921st Fighter Regiment with the North's most modern fighters, was out of action.

On 15 January 1967 USAF bombers attacked a bridge near Hanoi. The jamming patterns on the radar screens of the 236th Missile Regiment, covering Hanoi's inner defensive perimeter, were unlike anything the radar operators had ever seen. Only one of the regiment's four battalions was able to launch missiles, and no U.S. aircraft were hit. That night Tran Xanh, commander of the 236th Regiment, reported that the United States was using a new type of electronic jamming. Five weeks later, on 23 February, 236th Regiment again reported such heavy jamming that it was unable to launch against a USAF eight-aircraft strike group flying over the suburbs of Hanoi. The 274th Regiment, located north of Hanoi, was able to detect this strike group through the jamming and fired at the formation, shooting down one F-4. During the December attacks the Air Defense Command had noted that units stationed close to Hanoi had not performed as well as those on the outer perimeter. Now 236th Regiment, North Vietnam's most experienced SAM regiment, had been immobilized while another, less-experienced unit had scored a suc-

25. Ibid.

26. Colonel Ta Hong, Lieutenant Colonel Vu Ngoc, and Lieutenant Colonel Nguyen Quoc Dung, *History of the People's Air Force of Vietnam (1955–1977)* [*Lịch Sử Không Quân Nhân Dân Việt Nam (1955–1977)*], editorial direction by Air Force Party Current Affairs Committee and Air Force HQS (Hanoi: People's Army Publishing House, 1993), 155; Michel, *Clashes*, 73–74.

27. Ta Hong et al., *People's Air Force*, 156.

cess. The commanders and political officers of the Air Defense Command immediately searched for the cause of this problem, and the first place they looked was inward.²⁸

North Vietnam's decision to take on the Americans directly had not been easy. North Vietnam's communist leaders had not attained power by being stupid. They knew the United States was the most powerful nation in the world and that war against the United States should not be taken lightly. The leadership worried that their soldiers might be so intimidated by U.S. might that they would decide their cause was hopeless. Communist commanders and political officers in both North and South Vietnam worked to convince their troops that they were capable of defeating the United States in spite of America's military might and sophisticated technology. Commanders and political officers were constantly on the lookout for signs of what they called "wavering" and "rightist deviation," by which they meant defeatism and despair. When communist forces had difficulty coping with American weapons and tactics as the United States poured combat forces into South Vietnam in 1965 and 1966, communist defeats were attributed to internal ideological weaknesses and mistakes, not to U.S. superiority in firepower and technology.²⁹ North Vietnamese leaders knew if they ever allowed themselves and their subordinates to blame their problems on U.S. material and technological superiority, defeatism would spread through the ranks like wildfire. Faith in the ultimate success of their cause was a matter of dogma, like Papal infallibility. The political officers were the Jesuits of the Vietnamese Communist Party, always ready to restore the faith of those who wavered and to take action against those who "fell from grace."

When the 236th Regiment experienced failures in January 1967 while other units were able to score victories, the Air Defense Command's initial reaction was to suspect what their political commissars called "ideological jamming" in their own ranks.³⁰ In early April, as the 236th's problems worsened and other units began to report similar difficulties, the Command's Missile Branch held a conference in Hanoi to discuss the situation. The commander of the 236th Regiment insisted that the United States was using a new type of jamming device mounted on the strike aircraft themselves. Senior commanders were reluctant to accept this assessment, seeking rather to place the blame on ideological weakness and fear. In his memoirs the Air Defense Command's deputy political commissar described his thoughts after the meeting:

28. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 130–31.

29. Military History Institute of Vietnam, *History of the People's Army of Vietnam*, volume II [*Lịch Su Quân Đội Nhân Dân Việt Nam, Tập II*] (Hanoi: People's Army Publishing House, 1994), 246–47.

30. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 132.

The battle becomes more savage day by day and the enemy has begun to attack our missile positions on a regular basis. As soon as we fire a missile, enemy aircraft swarm in to destroy our firing positions. Could the problem be that our people are afraid to fight?³¹

The deputy political commissar frequently expressed his suspicions of ideological wavering to his subordinates. On one occasion the commander of the 236th Regiment's 62nd Battalion, one of the Command's best young officers, reported to him that "Enemy jamming has turned our radar screens white. We cannot identify a single target." "Jamming has turned your screens white?" the commissar retorted incredulously. "What about that bald head of yours? Is there any jamming inside there?"³²

As the debate about the problem raged, the failure of Lyndon Johnson's latest peace initiative and improving weather brought a resumption of attacks on the Hanoi area in the spring of 1967. Johnson now authorized attacks on railyards, bridges, and Hanoi's source of electrical power.³³

Anticipating the renewed attacks, the North Vietnamese had used this respite to beef up Hanoi's air defenses. The 365th and 367th Air Defense Divisions moved in to reinforce Hanoi's own 361st Air Defense Division. Because of the increasing impotence of SAMs and radar-controlled AAA guns, anti-aircraft gun positions were built as close as possible to primary targets (including the two main bridges and the city's electrical power plant). This would enable the guns to fire directly at American aircraft when they were most vulnerable—during their dive-bomb runs. By 21 April, when the Air Defense Command held a meeting to issue assignments for the defense of Hanoi, ten AAA regiments and five SAM regiments, representing 60 percent of the Command's AAA batteries and 52 percent of its SAM launch battalions, together with virtually the entire North Vietnamese Air Force, were committed to the defense of Hanoi.³⁴

One element of the reinforced air defenses was not North Vietnamese. According to the history of Vietnamese air defense forces, in early 1967 "a new fighter regiment" arrived from an unnamed foreign country to reinforce the 921st and 923rd Fighter Regiments.³⁵ The new unit was North Korean, sent pursuant to a North Korean Party decision

31. Ibid., 132–33.

32. Ibid., 135.

33. Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: Free Press, 1989), 105–7; Thompson, *To Hanoi and Back*, 62.

34. Ho Si Huu et al., *History of the Air Defense Service*, 123; *Hanoi Air Defense Division (Internal Distribution)*, 73.

35. Ho Si Huu et al., *History of the Air Defense Service*, 123.

reached in October 1966.³⁶ While rumors circulated during the war that North Korean pilots were fighting in North Vietnam, the North Korean role was not publicly confirmed until 1996, when the U.S. Defense Department released newly acquired Soviet military records regarding North Korean combat sorties against U.S. aircraft in 1967–68.³⁷ In 2001, more than twenty-five years after the end of the war, the North Vietnamese government finally acknowledged that North Korean pilots had participated in the 1967 air battles over North Vietnam.³⁸

When the attacks on Hanoi resumed, the increasing use of the QRC-160-1 jamming pods, which now equipped almost all USAF strike aircraft, blinded the SAM and AAA fire-control radars. Between 25 and 29 April USAF aircraft hit Hanoi's railyards, electrical transformer stations, and one of the city's bridges. On 26 April SAM units, desperate to overcome the heavy jamming, shot down one of their own MiGs.³⁹ The official Air Defense Command history records that

All missile battalions reported such heavy jamming that it was difficult for them to fire missiles. Many battalions experienced great confusion when trying to identify targets through the heavy interference.⁴⁰

The burden of the defense increasingly fell on optically sighted AAA weapons and the Air Force. The Air Defense Command ordered the Air Force to step up its combat operations. In April 1967 U.S. pilots noted a sudden increase in the combat proficiency and aggressiveness of the MiG pilots opposing them and at first the Vietnamese had some success.⁴¹

36. FBIS [Foreign Broadcast Information Service] East Asia KPP20010707000029, P'yongyang Korean Central Broadcasting Station in Korean, 0800 GMT 06 Jul 01; see also FBIS East Asia KPP20000406000088, Seoul Yonhap in English, 1224 GMT 06 Apr 00, and *Indochina Chronology* 19 (April-July 2000): 34.

37. *New York Times*, 22 December 1966 and 20 September 1967; Defense Prisoner of War/Missing in Action Office (DPMO) report "1992–1996 Findings of the Vietnam War Working Group," TFR 210-19 (p. 56), TFR 210-20 (p. 57), TFR 210-32 (p. 61), accessed at www.dtic.mil/dpmo/special/96_compre_vietred.pfd on 3 February 2002.

38. Military History Institute of Vietnam, Senior Colonel Nguyen Van Minh, editor, *History of the Resistance War Against the Americans to Save the Nation, 1954–1975*, vol. 5, *The 1968 General Offensive and Uprising* [Lich Su Khang Chien Chong My Cuu Nuoc, 1954–1975, Tav V: Tong Tien Cong Va Noi Day Nam 1968] (Hanoi: National Political Publishing House, 2001), 271. "Under terms of an agreement between Korea and Vietnam, in 1967 a number of pilots from the Korean People's Liberation Army were sent to Vietnam to provide training, give us the benefit of their experience, and to participate in combat operations alongside the pilots of the People's Army of Vietnam. On a number of flights Korean pilots scored victories by shooting down American aircraft."

39. Ho Si Huu et al., *History of the Air Defense Service*, 135.

40. *Ibid.*, 136.

41. Michel, *Clashes*, 91.

American pilots claimed ten or eleven MiGs destroyed in April for the loss of seven U.S. aircraft; Vietnamese pilots claimed fifteen U.S. aircraft shot down in April.⁴² The more aggressive tactics of the Vietnamese MiGs produced one immediate effect. At the end of April 7th Air Force in Thailand increased the number of fighter escorts for each strike and switched all F-4s to the escort role, ending the previous practice of arming the F-4s with both bombs and air-to-air missiles to allow them both to defend the bombers and to bomb targets themselves.⁴³ The Vietnamese Air Force had achieved one of its primary goals: "To force the enemy to strengthen his fighter escorts and reduce the number of aircraft carrying bombs."⁴⁴

On 5 May, after a lull of almost one week, USAF aircraft again attacked targets around Hanoi. Intense jamming from QRC-160-1 jamming pods, combined with long-range jamming from EB-66s northwest of Hanoi, covered the screens of the SAM units and blinded the radars controlling Vietnamese 57mm and 100mm guns. Every missile launched by 274th Regiment either self-destructed or crashed back to earth. The AAA guns were forced to use optical fire control equipment or iron sights on the guns to engage the attackers.⁴⁵ While several aircraft were shot down, the situation was now desperate. Now even the hard-line political commissars were convinced: in May 1967 the Air Defense Command formally concluded that the problems were caused by QRC-160-1 jamming pods mounted on USAF strike aircraft.⁴⁶

The 5 May battle did produce one bright spot for North Vietnamese missile forces: 63rd Missile Battalion, located southwest of Hanoi, fired at USAF aircraft from the rear as they exited the area, destroying one F-105. This engagement provided an explanation for the puzzling phenomenon of missile units on the periphery being able to score victories while missile units close to the city were blinded by jamming. The Vietnamese realized the jamming transmitters were designed to direct most of their power forward of the aircraft. Jamming signal strengths to the sides and rear of the pod were weaker than in front of the aircraft. This explained why the radars of missile units protecting targets such as Hanoi were overwhelmed as USAF strike formations approached, while units located farther from the target could still detect targets and, if they were in range, get off a shot at the attackers. The Air Defense Command

42. Ibid., 92; Vietnamese claims are from Istvan Toperczer, *Air War Over North Vietnam: The Vietnamese People's Air Force, 1949-1975* (Carrollton, Tex.: Squadron/Signal Publications, 1998), 63.

43. Michel, *Clashes*, 99.

44. Ta Hong et al., *People's Air Force*, 160.

45. Le Nguyễn Ba, *Hanoi Air Defense Division (Internal Distribution)*, 75-77; Ho Si Huu et al., *History of the Air Defense Service*, 136-38.

46. Ho Si Huu et al., *History of the Air Defense Service*, 160.

and the Missile Branch immediately provided all SA-2 units full details of 63rd Battalion's successful engagement and encouraged them to try similar tail-chase launches.⁴⁷

In a desperate search for information to help solve their growing air defense dilemma, the Vietnamese turned for answers to prisoner interrogations. In 1973 returning American prisoners of war reported that focused, brutal interrogations of newly captured pilots aimed at gaining tactical and technical information increased significantly during this period.⁴⁸ According to Vietnamese accounts, these interrogations quickly hit pay dirt. The Vietnamese claim a pilot told them the United States was planning to attack Hanoi's electrical power plant with Walleye television-guided bombs.⁴⁹ On 18 May the Air Defense Command ordered the 230th and 241st AAA Regiments into new firing positions to strengthen the defenses of the power plant. By the next morning, when the attack began, the Hanoi power plant was defended by eighteen six-gun batteries of 57mm guns and three batteries of 14.5mm AAA machine guns mounted on armored cars.⁵⁰

The advance warning was not the only Vietnamese good fortune. President Johnson approved an attack on the power plant, which was close to the heart of the city, on the condition that the plant would be attacked only by highly accurate "smart bombs" to limit collateral damage. The Navy's Walleye was the only weapon available with the accuracy Johnson demanded, so Navy aircraft would make the attack.⁵¹ The Navy, however, had not adopted the Air Force QRC-160-1 jamming pods, preferring to keep their own "deception" jammers even though Vietnamese SAMs were now enjoying considerable success against Navy aircraft.⁵² American "ideological" differences, in the form of the dogma of interservice rivalries, would again cost American lives.

47. Ibid., 137–38; Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 76–77. See also Industrial Science Office, *A Number of Anti-Aircraft Battles During the Resistance Wars*, 82.

48. Stuart Rochester and Frederick Kiley, *Honor Bound* (Annapolis, Md.: Naval Institute Press, 1998), 301–2.

49. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 81; Colonels Nghiem Dinh Tich and Dinh Khoi Sy, *History of the Hanoi Air Defense Division (361st Division)* [Lich Su Su Doan Phong Khong Hanoi (Su Doan 361)] (Hanoi: People's Army Publishing House, 1995), 81–82. Page 95 of this second source admits that the North Vietnamese General Staff's Military Intelligence Office was responsible for conducting and analyzing these interrogations.

50. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 81; Nghiem Dinh Tich and Dinh Khoi Sy, *Hanoi Air Defense Division (361st Division)*, 82.

51. Thompson, *To Hanoi and Back*, 65.

52. According to Michel, *Clashes*, 103, during this period SAMs accounted for 50 percent of Navy aircraft losses as compared to 16 percent of USAF losses.

On 19 May, President Ho Chi Minh's birthday and a Vietnamese national holiday, the Navy struck the Hanoi area. Hanoi's SAM radars, identifying and filtering out the Navy's false-target jamming, were again able to lock onto targets. A total of forty-four SA-2 missiles were launched against the Navy strikes. Vietnamese missile units alone claimed to have destroyed four Navy aircraft. In fact, six Navy aircraft were lost in the attack on Hanoi, at least two of which are known to have been destroyed by SAMs. The heavy air defenses disrupted the attack, and the two Walleye guided bombs failed to hit the power plant.⁵³ On 21 May a follow-up Navy strike succeeded in hitting one of the power plant's generators and the turbine house, but at a cost of two more aircraft (the Vietnamese claimed three).⁵⁴ One final Walleye attack was made on 10 June. The attack left an unexploded Walleye embedded in the walls of one of the power plant boilers, where it was immediately recovered for study by Vietnamese engineers. Discouraged by public outcry, the heavy Navy losses, and increasing disputes among his advisors about the value of the bombing campaign, President Johnson once again placed Hanoi and its environs off limits to U.S. air attacks.⁵⁵

The Vietnamese desperately needed this new respite. Not only had USAF jamming rendered the SAMs and radar-controlled guns defending Hanoi impotent, but also the increased fighter escorts for U.S. strike formations had hammered the MiGs out of the sky. During a series of intense battles in May, U.S. aircraft shot down twenty-three MiGs while losing only three aircraft in air combat.⁵⁶ The Vietnamese admit that their fighters, especially their MiG-17s, suffered horrendous losses. During a few short days in late May and early June, ten North Vietnamese pilots were killed. The Vietnamese Air Force's official history concedes that these losses had a "tremendous impact on morale" and that "a number of pilots became fearful of engaging enemy fighters."⁵⁷ Between March and June 1967 North Vietnam lost half of its fighter pilots, leaving insufficient pilots to staff even a single fighter regiment. General Van Tien Dung, Chief of the North Vietnamese General Staff, ordered the Air Force to "focus your efforts on preserving your forces to enable the Air Force to conduct combat operations over the long term." The Air Defense Command quickly reduced combat operations, ordering MiG-17s to fight "only small engagements when victory is certain" and giving

53. Ho Si Huu et al., *History of the Air Defense Service*, 142–44; Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 81–84.

54. Ho Si Huu et al., *History of the Air Defense Service*, 145.

55. Thompson, *To Hanoi and Back*, 66, 69; Clodfelter, *Limits of Air Power*, 108.

56. Michel, *Clashes*, 103. Note, Thompson, *To Hanoi and Back*, 64, provides figures of twenty-four MiGs shot down for the loss of two U.S. aircraft in air-to-air combat.

57. Ta Hong et al., *People's Air Force*, 168.

the MiG-21s a noncombat mission: developing tactics to attack U.S. EB-66 long-range jamming aircraft.⁵⁸

During a semiannual review in June the Air Force Party Committee decided the MiGs had bitten off more than they could chew. "Because our forces are limited," the Party Committee said,

we should not engage the enemy every single time he attacks Hanoi and our network of dikes. . . . We must select the proper sector, the proper individual flight group, and the proper opportunity before launching our attacks.⁵⁹

The Party Committee reassessed the role of the MiG fighters in North Vietnam's overall air defense posture and set forward the following roles as being suited to the Air Force's capabilities:

- Block enemy attacks in one sector, destroy a number of enemy aircraft, and force his bombers to miss their targets.
- Disrupt enemy strike formations and force them to attack with only part of their strength, thereby rendering their attacks less effective.
- Force the enemy to increase the proportion of fighter escorts and reduce the number of bomb-carrying strike aircraft.
- Enable the other elements of the Air Defense Force to successfully defend our targets.⁶⁰

Hanoi's SAM troops spent the summer desperately searching for an answer to the jamming problem. Missile control crews spent long hours in their stifling hot Soviet-made vans, staring at radar screens with the brightness controls turned to the maximum to try to adapt their eyes to the screens glowing white with intense jamming in the vain hope of being able to discern a target through the glare. Food rations for radar operators were increased to improve their vision. Some radar operators even suggested that dark glasses be issued to help the operators pick out targets.⁶¹

Meanwhile, work on a practical solution was already proceeding. During the April Air Defense Command conference on the jamming problem, 236th Missile Regiment Commander Tran Xanh recommended use of a new guidance technique called the "three-point method."⁶² Because the jamming incapacitated the SA-2's automatic lock-on and

58. Ibid., 157, 168–69.

59. Ibid., 159.

60. Ibid., 160.

61. Ho Si Huu et al., *History of the Air Defense Service*, 160–61; Nguyen Xuan Mau and The Ky, *Defending the Skies*, 137–39.

62. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 132.

tracking mode, the three-point method relied on “track on jam” tactics, with the radar operating essentially in a receive-only mode (if the radar transmitter was at full power the combination of the radar return signal and the jamming signal overloaded the radar receiver and turned the radar screens white). The operators could see and track the jamming signal by manually keeping their target designators on a specific point on the jamming signal, thereby generating course corrections which were transmitted to the missile via the missile guidance data link.⁶³ After some initial resistance, in May the Air Defense Command designated one of 236th Regiment’s battalions as a trial unit to test the feasibility of this “track on jam” system.⁶⁴

The battle now shifted away from the Hanoi area. The city of Haiphong and railroad and road networks came under intense attack. A number of AAA and missile units committed to the defense of Hanoi were shifted away to defend other areas. Finally, in early August President Johnson authorized renewed attacks on targets in the Hanoi area, including the long-inviolable Paul Doumer Bridge.⁶⁵ On 10 August a small unmanned photo-reconnaissance drone flew over the city. Recognizing the significance of the drone’s flight, the Hanoi Air Defense Commander requested the immediate recall of a number of dispersed units, but the General Staff deferred his request, believing attacks on Hanoi would not begin for several more days.⁶⁶

In the late afternoon of 11 August a large force of USAF F-105s conducted a surprise attack on Hanoi, hitting several logistics targets and knocking out the Paul Doumer Bridge. That evening the Air Defense Command conducted a “stern” self-criticism session, which concluded,

In addition to our incorrect assessment of enemy intentions and our failure to move forces back to Hanoi quickly enough, another reason for this failure was the inadequate technical skills of many missile and radar-controlled AAA units, which were unable to locate targets through the heavy enemy jamming.⁶⁷

That same night Air Defense Command recalled three missile regiments and numerous AAA units for the next round of attacks. Hanoi’s defenses quickly grew to unprecedented levels—111 AAA batteries and

63. See description of the three-point method in the classified study, Industrial Science Office, *A Number of Anti-Aircraft Battles During the Resistance Wars*, 66–84, 142–65. The three-point method was also the primary guidance method used against B-52s during the 1972 Christmas bombing campaign.

64. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 136–37; Ho Si Huu et al., *History of the Air Defense Service*, 161.

65. Thompson, *To Hanoi and Back*, 85.

66. Ho Si Huu et al., *History of the Air Defense Service*, 156.

67. *Ibid.*, 157.

20 SA-2 missile battalions.⁶⁸ The SAM force, however, still had not found a solution to the USAF QRC-160-1 jamming pods, which were increasing in numbers and constantly being upgraded. Most of North Vietnam's missile battalions were still trying to duplicate 63rd Battalion's success of 5 May, using the automatic target lock-on mode for missile guidance while redeploying their launchers to try to get side or rear shots at weak spots in the jamming pattern. Only 14 percent of the missile battalions were using the new "three-point" track-on-jam technique.⁶⁹ Following the disastrous results of the 11 August battle, during which three missile battalions located on Hanoi's inner perimeter were able to launch only one missile (which missed its target), the Air Defense Command held a conference to review the situation. Air Defense Commander Dang Tinh ordered the entire missile force to test the new and unproven track-on-jam tactic.⁷⁰

During the afternoon of 12 August, after SAMs failed to score any successes against morning USAF attacks on the Canal des Rapides Bridge, 63rd Battalion (the same unit that scored the 5 May tail-chase victory) shot down an RF-4C using the "three-point" method. It was the first victory for track-on-jam. That night a celebration was held at 236th Regiment Headquarters. Attending the celebration were the Deputy Air Defense Commander and senior Soviet advisors. Soviet advisors may have played a role in introducing the track-on-jam concept, since the Vietnamese record that during the celebration the senior Soviet missile advisor personally congratulated each member of the missile control crew and hugged and kissed the commander of 63rd Battalion.⁷¹

This first victory did not bring immediate success to the Vietnamese missile force. The "three-point" method required great skill, manual dexterity, and coordination between the bearing and elevation trackers, who had to keep their respective target designators centered on a single three-dimensional point in the broad jamming signal (aircraft equipped with jamming pods flew in a precise formation to enable the signals from the pods to form a large single signal). Because the thirty-foot-long SA-2 missiles were not agile and the SA-2 missile control signal was transmitted in a very narrow beam, the slightest over-control by the trackers or the slightest confusion between the bearing and elevation trackers could take the missile out of the data-link signal beam or send it tumbling out of control. During the August strikes against Hanoi 66 percent of all missiles launched lost control and self-destructed, and over 6 percent of the

68. Nghiem Dinh Tich and Dinh Khoi Sy, *Hanoi Air Defense Division (361st Division)*, 93.

69. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 140, 146.

70. Ibid., 146; Ho Si Huu et al., *History of the Air Defense Service*, 162.

71. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 146–47; Ho Si Huu et al., *History of the Air Defense Service*, 162.

missiles crashed back to earth.⁷² Civilian deaths and property destruction caused by crashes of the giant missiles, filled with rocket fuel and high explosives, were so serious that the Party Politburo held a special meeting to consider the problem. A senior Air Defense Command officer was sent to meet with Ho Chi Minh himself to explain what the Command was doing to correct the problem.⁷³ The next success for the “three-point method” was not scored until 17 September 1967, when another RF-4C was shot down.⁷⁴ The continuing impotence of the SAMs is reflected in the fact that in what the United States called “Route Package 6,” Hanoi and the Red River Delta, only five pod-equipped USAF aircraft were shot down by missiles during the nine-month period from 1 January to 31 September 1967.⁷⁵

As the August air assault on Hanoi continued, as more and more ground targets were destroyed, as the SAMs inflicted more destruction on their own side than on the enemy, as AAA radars were blinded, and as close-in AAA batteries were pummeled by American cluster-bomb attacks, the Air Defense Command again turned to the Air Force to take up the slack. The Command’s official record states: “Because our missile and AAA units were experiencing problems and in view of the urgent requirement to defend Hanoi, Air Defense Command decided to make aggressive use of our Air Force fighters.”⁷⁶

On 23 August Vietnamese fighters swung into action, launching two MiG-21s and eight MiG-17s to intercept an incoming USAF strike against the Vinh Yen railway. After two months of rest and retraining, North Vietnamese tactics had greatly improved. The MiG-21s made a surprise attack, thoroughly disrupting the strike. Two F-4s were shot down (the Vietnamese claimed to have shot down six aircraft), and after the dog-fights another F-4 ran out of fuel while trying to reach a tanker. The two MiG-21s, flown by two of North Vietnam’s leading aces, scored both victories.⁷⁷ The MiGs continued to refine their new tactics and improve in effectiveness for the rest of the year.

The next day, on 24 August, President Johnson terminated the bombing campaign in the Hanoi area for yet another peace initiative.⁷⁸ Attacks against Hanoi would not resume until October, giving the North Vietnamese another much-needed respite. They used the time to perfect

72. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 142.

73. *Ibid.*, 143–45.

74. *Ibid.*, 147.

75. Michel, *Clashes*, 127.

76. Ho Si Huu et al., *History of the Air Defense Service*, 167.

77. Ta Hong et al., *People’s Air Force*, 172–73; Ho Si Huu et al., *History of the Air Defense Service*, 167; Michel, *Clashes*, 128. The two Mig-21 pilots were Nguyen Van Coc, North Vietnam’s top ace, and Nguyen Nhat Chieu.

78. Thompson, *To Hanoi and Back*, 87.

their use of the three-point missile guidance method. After the initial success in August, the 17 September F-4C shootdown, and a 3 October engagement in which two F-105s were shot down using the three-point method,⁷⁹ the Missile Branch held a conference on 17 October 1967 to discuss the three-point method. All SAM regiment and battalion commanders and all missile control officers attended this conference. The conference approved the use of the three-point method to engage USAF aircraft equipped with jamming pods and decided the missile branch must fight “massed” engagements, concentrating the fire of many missile battalions in order to destroy large numbers of U.S. aircraft. The conference developed a detailed combat procedure covering all aspects of the use of the three-point method, which was disseminated to all missile units.⁸⁰

The missile conference ended just in time. In mid-October President Johnson approved a new round of attacks against targets in the Hanoi area, including the first strikes against Noi Bai Airfield (which the Americans called Phuc Yen), where the bulk of North Vietnam’s MiG-21s were based.⁸¹ Once again the pattern of American aerial reconnaissance missions alerted the North Vietnamese to a resumption of attacks in the Hanoi area. Air defense units were pulled in to strengthen Hanoi’s defenses. When U.S. air attacks resumed on 24 October, they were facing the greatest concentration of air defense firepower of the war: fourteen AAA regiments and twelve separate AAA battalions, with a total of more than one thousand guns, and twenty-six missile battalions (156 launchers), more than 80 percent of North Vietnam’s entire missile force.⁸²

The American attacks focused on Noi Bai Airfield, the Hanoi power plant, and Hanoi’s bridges. During the first several days both Air Force and Navy aircraft were used in the attacks. Vietnamese missile controllers were initially confused, because the differences between Navy and Air Force jamming equipment required two entirely different SA-2 engagement procedures. On the first day of the attack the missile branch fired more SAMs than on any other single day during the three years of Operation Rolling Thunder.⁸³ On the second day, the twenty-fifth, in spite of massive missile firings U.S. aircraft knocked out Hanoi’s Paul Doumer Bridge.⁸⁴ On 26 October SAMs engaged U.S. Navy aircraft attacking the Hanoi power plant, and North Vietnam’s leading missile

79. Ho Si Huu et al., *History of the Air Defense Service*, 187.

80. Ibid., 187–88.

81. Thompson, *To Hanoi and Back*, 90.

82. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 92; Ho Si Huu et al., *History of the Air Defense Service*, 182.

83. Ho Si Huu et al., *History of the Air Defense Service*, 191.

84. Ibid., 193–94.

officer, 61st Battalion's Nguyen Xuan Dai (later awarded the title of Hero of the People's Armed Forces) shot future Senator John McCain's A-4 Skyhawk out of the sky over Hanoi.⁸⁵ The following day USAF F-105s mounted strikes against Hanoi's Canal des Rapides and Paul Doumer Bridges. At least four missile regiments engaged the attackers. Three battalions of the 236th Regiment mass-fired their missiles, downing one F-105. Later that day another F-105 was shot down by a SAM. At least five Navy aircraft and two Air Force aircraft were lost to SA-2s during the four-day period from 24 to 27 October; the Vietnamese missileers claimed twenty-two aircraft shot down.⁸⁶ A final USAF attack on 28 October against the Canal des Rapides Bridge was met by "more than 10" missiles barrage-fired using track-on-jam tactics; the Vietnamese claim that two more aircraft were shot down. The Air Defense Command exulted that "Vietnamese missile troops have found the answer to the U.S. Air Force's use of QRC-160 jamming pods."⁸⁷ The Command, however, knew the U.S. strikes had inflicted substantial damage. In an assessment of its own performance, the Command stated,

We did not attain a high level of success in fulfilling our mission, progress was not uniform, and we did not fully exploit the capabilities of the different branches and units to destroy more enemy aircraft and protect the targets more effectively. We allowed the enemy to knock out the Paul Doumer Bridge during his first attack, Noi Bai Airfield suffered heavy damage, and a number of our aircraft were destroyed or damaged.⁸⁸

The Americans added a new element to their next round of attacks on the Hanoi area: on 1 November a long-range radar site in Laos (Lima Site 85), capable of controlling all-weather strikes over Hanoi, became operational, initiating a radar-controlled bombing program codenamed "Commando Club."⁸⁹ The system required the bombers to fly in close formation on a straight, steady course and at relatively high altitude when dropping their bombs. An effective system for neutralizing the SAMs was essential to the successful use of the Commando Club system. Up until October the QRC-160 jamming pods had provided such a system. Unknown to the Americans (who did not realize the Vietnamese were using a new missile guidance system), the Commando Club bomb-

85. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 95.

86. Ho Si Huu et al., *History of the Air Defense Service*, 200; Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 96; Thompson, *To Hanoi and Back*, 93.

87. Ho Si Huu et al., *History of the Air Defense Service*, 203.

88. *Ibid.*, 205.

89. Timothy N. Castle, *One Day Too Long: Top Secret Site 85 and the Bombing of North Vietnam* (New York: Columbia University Press, 1999), 57.

ing formations were tailor-made for the new barrage-fire track-on-jam SAM tactics.

On 6 November 62nd Missile Battalion shot down an F-105, the first victory for the test unit that had pioneered the track-on-jam concept. The Vietnamese were so proud of this success that the wreckage of the F-105 was shipped to the Soviet city of Leningrad as a war trophy.⁹⁰ Finally, on 18 November, the Vietnamese missileers got the target they wanted. A USAF Commando Club strike of twenty-four F-105s flew in to attack Noi Bai Airfield—the bombing system was still only accurate enough to be used to attack area targets such as airfields, railyards, and large industrial sites. After a sneak attack by two MiG-21s shot down two F-105s, the MiGs peeled off to allow the SA-2s to take over. Six missile battalions fired thirteen missiles in less than three minutes, shooting down two more F-105s and forcing the rest to jettison their bomb loads; the Vietnamese claimed four F-105s shot down by missiles.⁹¹ The losses so discouraged the Air Force that the size and frequency of Commando Club missions in the Hanoi area were greatly restricted. The next day, after sending up two MiG-21s which drove the EB-66s out of effective jamming range, SA-2s firing massed barrages and using track-on-jam guidance shot down four more aircraft (Vietnamese missile units claimed eight aircraft).⁹² In four days North Vietnamese missiles had shot down between eight and ten U.S. aircraft. U.S. planners, finally realizing they had a problem, thought the Vietnamese were using new radars, new radar frequencies, or an optical guidance system. They did not suspect the Vietnamese were aiming at the jamming signals themselves.⁹³

By sheer good luck the Vietnamese had found a partial solution to the USAF QRC-160-1 jamming pods at the very moment the Commando Club bombing system went into operation. The Vietnamese advantage, however, would not last. While bad weather returned in December with the northeast monsoon, a few days of clear weather brought U.S. air strikes which revealed a shocking new development. On 14 December, when the Americans launched large strikes against bridges and ferry crossings in the Hanoi area, almost every missile launched crashed back to earth as soon as it left its launcher. The only missile that guided properly was aimed at a Navy A-4. On 15 December the 236th and 275th Mis-

90. Le Nguyen Ba, *Hanoi Air Defense Division (Internal Distribution)*, 98–99; Ho Si Huu et al., *History of the Air Defense Service*, 210.

91. Ho Si Huu et al., *History of the Air Defense Service*, 215–16; Thompson, *To Hanoi and Back*, 103–4; Castle, *One Day Too Long*, 59.

92. Ho Si Huu et al., *History of the Air Defense Service*, 218–20; Michel, *Clashes*, 136; Ta Hong et al., *People's Air Force*, 181–82; Van Nederveen, "Sparks Over Vietnam," 50.

93. Michel, *Clashes*, 136; Thompson, *To Hanoi and Back*, 104–5.

sile Regiments launched a total of eleven missiles against a USAF strike attacking the Canal des Rapides Bridge; every missile crashed back to earth shortly after launch.⁹⁴

Once again 236th Regiment took the lead in identifying the cause of the problem. In August one of its battalions first detected a new jamming signal directed at the missile guidance data-link frequency.⁹⁵ On the night of 14 December the regiment reported that it believed the Americans were jamming the missile guidance data link.⁹⁶

The Air Defense Command, which was still congratulating itself for finding a solution to the QRC-160-1 jammers, was in a state of shock. Once again, the Air Defense Command's political commissars refused to accept 236th Regiment's conclusions. They again looked inward for the source of their problem. In the words of the Air Defense Command Deputy Political Commissar,

[We] were still cautious and suspicious when we received reports from our units on this latest problem. How could this happen again? . . . Less than a month before, on 19 November 1967, we had scored a complete victory, . . . making the enemy quake in his boots and forcing him to abandon his attacks. How could he have taken counter-measures so quickly? *Could this be a manifestation of our own subjectivism and self-satisfaction?* [emphasis added] Could this be the reason for our inability to shoot down enemy aircraft? . . . When revolutionaries like ourselves seek the cause of any problem, *we always focus first on the problem of subjectivism.* [emphasis added]⁹⁷

On the night of 15 December the Air Defense Command held an emergency meeting in a Buddhist pagoda near Hanoi. Dang Tinh, North Vietnam's Air Defense Commander, presided over the meeting, which was attended by all senior Air Defense Command officers, all missile regiment and battalion commanders, and missile guidance crews from every regiment. The official Air Defense history records that,

During the review session on the night of 15 December a violent disagreement split the meeting into two separate factions. The first argued that the enemy Air Force had altered the technical equipment on its aircraft. The second maintained that the problem was a human problem. This group said that subjectivism had reared its ugly head among our missile cadre and combatants and that our troops were experiencing "ideological jamming" inside their own heads. *This position was held by a considerable num-*

94. Ho Si Huu et al., *History of the Air Defense Service*, 225; Nguyen Xuan Mau and The Ky, *Defending the Skies*, 152.

95. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 152.

96. *Ibid.*, 150.

97. *Ibid.*, 149.

ber of the Service's political cadre [emphasis added]. The argument lasted late into the night, but no conclusion was reached.⁹⁸

In fact, the USAF had introduced the new, more powerful QRC-160-8 (AN/ALQ-87) jamming pod and had begun jamming the SA-2 missile guidance data link, preventing the missiles from receiving guidance commands from the ground after launch. U.S. Navy aircraft continued to be vulnerable to Vietnamese SAMs because the Navy insisted on using its own jammers.⁹⁹ Once again U.S. interservice rivalries (our own "ideological jamming") were costing American lives.

The Air Defense Command launched a crash program to find the source of the problem. Vietnamese and Soviet missile technicians were immediately sent to every missile battalion to inspect and adjust every piece of equipment, with special emphasis on the missiles themselves. The General Staff ordered the Military Intelligence Department and the Military Technical Institute to investigate the problem.¹⁰⁰

In spite of the detailed inspection and alignment of the missiles, during U.S. attacks on 16, 17, and 18 December, missiles failed to guide every time they were launched at USAF aircraft. To make up for the failure of the missile force, Air Defense Command ordered its MiGs to substantially increase their operations.¹⁰¹ U.S. pilots immediately noted the more aggressive MiG operations and tactics as MiGs shot down three U.S. aircraft on 16 and 17 December.¹⁰²

Finally, on the morning of 19 December, Air Defense Commander Dang Tinh, Deputy Missile Branch Commander Hoang Van Khanh, and other senior officers went down to individual missile battalions to sit in the missile control vans during an attack to evaluate personally the source of the problem. After watching an unsuccessful attempt to engage a morning strike, Deputy Missile Branch Commander Khanh personally assumed command of the 62nd Missile Battalion when USAF strike aircraft approached Hanoi in the afternoon. Overriding objections from radar operators and missile technicians who said the jamming was too intense for the missile to guide, Khanh ordered a missile launched. The missile immediately crashed back to earth.¹⁰³

98. Ho Si Huu et al., *History of the Air Defense Service*, 226–27.

99. Michel, *Clashes*, 136–37; Thompson, *To Hanoi and Back*, 105.

100. Ho Si Huu et al., *History of the Air Defense Service*, 226; Lieutenant General Mark Vorobyov (retired), "Dvina Guarding Vietnam's Skies," *Military Parade* no. 28 (September–October 1998), accessed at <http://www.milparade.com/1998/28/101.htm> on 23 January 2001.

101. Ho Si Huu et al., *History of the Air Defense Service*, 227.

102. Michel, *Clashes*, 137–38.

103. Ho Si Huu et al., *History of the Air Defense Service*, 227–28; Nguyen Xuan Mau and The Ky, *Defending the Skies*, 156–60.

This personal experience, combined with interrogation reports from captured American pilots,¹⁰⁴ finally convinced Air Defense senior officers that the problem in fact was USAF jamming of the missile guidance data link. Air Defense Commander Dang Tinh admitted that “some aspects of this problem are beyond our capacity to resolve” and that the “assistance of Soviet specialists” would be required to overcome the problem.¹⁰⁵ A joint Vietnamese-Soviet task force was formed to study the problem and work out a hardware fix for the missiles to protect the data-link signal. Eventually these efforts produced an upgraded version of the SA-2 missile with a different antenna for the guidance data-link signal and other major modifications.¹⁰⁶ In the interim, the Air Defense Command again redeployed its missile forces to “avoid the most intense portion of the enemy jamming and enable us to launch our missiles,” seeking again to fire at USAF aircraft from the side and rear.¹⁰⁷ These new tactics enabled the missile forces to score one final victory which contributed greatly to the redesign of the SA-2. On 14 February 1968 61st Missile Battalion shot down a USAF F-105, which provided Vietnamese and Soviet technicians with a piece of equipment they desperately needed: an intact jamming pod. In the words of a senior Vietnamese officer, “The secrets of the enemy’s jamming of our missile guidance channel, which had caused us so much heartache, now lay revealed right there in front of our eyes.”¹⁰⁸ This success was scored just in time. North Vietnamese missiles would not shoot down another pod-equipped USAF aircraft until 22 March 1971, more than two years later, when the modified SA-2 system finally went into service.¹⁰⁹

Fortunately for the Vietnamese, the northeast monsoon closed in after 19 December, halting further visual bombing attacks. For three months only U.S. Navy A-6 all-weather aircraft and USAF Commando Club strike aircraft were capable of regularly striking the Hanoi and Red River Delta area through the heavy cloud cover. Except for harassment by MiGs, the Air Defense Command was totally impotent against Commando Club strikes. The official Air Defense history describes the Vietnamese problem:

In October 1967 the U.S. established three radar sites at Danang, Nakhom Phanom, and on Pha Thi [Lima Site 85 in Laos] to guide U.S. aircraft making level bombing attacks against North Vietnam

104. Vorobyov, “Dvina Guarding Vietnam’s Skies.”

105. Ho Si Huu et al., *History of the Air Defense Service*, 229; Nguyen Xuan Mau and The Ky, *Defending the Skies*, 161.

106. Ho Si Huu et al., *History of the Air Defense Service*, 229; Blagov, “Missile Ambushes,” 32; Vorobyov, “Dvina Guarding Vietnam’s Skies.”

107. Nguyen Xuan Mau and The Ky, *Defending the Skies*, 162.

108. *Ibid.*, 162.

109. Michel, *Clashes*, 192.

during periods of bad weather. The U.S. Air Force . . . also equipped their Air Wings with a new modification of the QRC-160 jamming pod. The QRC-160-8 jamming pod had more power than the QRC-160 pod, allowing the strike aircraft to fly higher to avoid our 85mm and 100mm guns. The QRC-160-8 jamming pods could be used by small flights of four to eight aircraft to attack areas such as Hanoi with powerful air defenses without having to worry about our surface-to-air missiles.¹¹⁰

The Air Defense Command had to destroy the radar control station on top of Pha Thi Mountain (Lima Site 85) in Laos to stop these attacks. The Command first tried a desperate tactic. Four North Vietnamese transport aircraft, slow, ungainly AN-2 biplanes specially modified to fire 57mm rockets and drop 120mm mortar shells as bombs through holes cut in the floor of the fuselage, were sent to attack the radar site. On 12 January 1968 the AN-2s struck, bombing and rocketing the hilltop but doing no serious damage to the radar site. Two AN-2s were lost, shot down by an Air America helicopter operated by the Central Intelligence Agency. The AN-2 squadron commander, who was killed in the attack, was awarded North Vietnam's highest decoration: "Hero of the People's Armed Forces."¹¹¹

After the failure of the air attack, North Vietnamese "sappers," Vietnam's elite commando force, were tasked with destroying the site. On 11 March a team from the 41st Sapper Battalion, supported by powerful infantry and artillery forces, overran the radar control station on Pha Thi Mountain, killing or capturing twelve USAF personnel.¹¹² The threat from Commando Club bombing strikes had ended.

The Air Force never took full advantage of Commando Club. As a result of the shock of the Vietnamese success against the large Commando Club strike in November and because the growing threat of a ground attack on the radar site diverted bombing missions to the defense of the site, between 1 December 1967 and 11 March 1968 only three hundred Commando Club strike sorties were flown against North Vietnam.¹¹³

On 31 January 1968 the Tet Offensive exploded throughout South Vietnam. The size and timing of the offensive shocked the American military, the American public, and the American President himself. Two months later, faced with growing opposition to the war and with no end

110. Ho Si Huu et al., *History of the Air Defense Service*, 207.

111. Ta Hong et al., *People's Air Force*, 204–5; Castle, *One Day Too Long*, 76–79.

112. Nguyen Quoc Minh, Vu Doan Thanh, Pham Gia Khanh, and Nguyen Thanh Xuan, *History of the Sapper Forces*, volume I [Lich Su Bo Doi Dac Cong, Tap I] (Hanoi: People's Army Publishing House, 1987), 205–7; Castle, *One Day Too Long*, 111–37. See *One Day Too Long* for detailed discussion of the possibility that one or more of the USAF personnel manning the site may have been taken prisoner.

113. Castle, *One Day Too Long*, 61–62.

to the conflict in sight, President Johnson threw in the towel. On 31 March 1968 the President announced a halt to all bombing of North Vietnam north of the 20th parallel, ending the threat to Hanoi and the Red River Delta until the penultimate phase of the war in 1972.

It is easy for Americans to deride the ideological blinders that made the Vietnamese political commissars resist technological explanations for their problems and to blame the commissars for Vietnamese mistakes and blunders. The Vietnamese do not share that view. To them, it was because of the commissars, not in spite of them, that North Vietnam survived the three-year long American air offensive. The Vietnamese political commissars may have been poorly educated and dogmatic, but they were ultimately successful. Time after time, when SAM, MiG, and AAA units were on the ropes, the political commissars helped bring them back. Working like football coaches whose team is down by thirty points at halftime, the commissars kept their troops focused on the possibility of victory. They told their men that their failures were caused not by American strength but by their own mistakes. As long as failures were caused by their own mistakes and “ideological weaknesses,” the mistakes and weaknesses could be corrected and they could still win. If the men were ever allowed to believe that the failures were the result of overwhelming American power, they would lose hope and might give up the fight. Using a combination of self-criticism, threats, and group therapy techniques, acting like a bizarre combination of Nazi storm trooper, Catholic priest, and New-Age self-help guru, the commissars focused their troops on correcting “errors” and convinced them to hang on just a little longer. On the other hand, whenever the Air Defense Command was down for the count, the United States refused to “go for the jugular” and instead, time after time, reduced U.S. operations and allowed the enemy a chance to recover. Ultimately the soldiers and political commissars of this ideological army, with their blind and unquestioning faith in their cause, outlasted the proud, cold professionals of a modern superpower.

More than three decades later, the Vietnamese Communists continue to study the lessons of this victory. They believe the primary reason for their victory was the devotion of their troops to their cause. The American professional military, which emphasizes technology and training over motivation and zeal, would do well not to ignore these lessons.