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THE AIR FORCE IN SOUTHEAST ASIA

THE B-57G -- TROPIC MOON III
1967-1972

by
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and
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FOREWORD

(U) As in World War II and the Korea police action, the enemy in Southeast Asia sought the protective concealment of darkness to move his troops and supplies. Although U.S. tactical aircrews cut roads and destroyed moving vehicles during daylight hours, they were ineffective at night. Jungle vegetation and mountainous terrain amplified their difficulties in finding and attacking the trucks, watercraft, and troops that poured southward each night through the maze of roads, footpaths, and streams that constituted the so-called Ho Chi Minh Trail in eastern Laos. Casting about for an aircraft capable of interdicting the infiltration flow at night, the Air Force finally settled on a modified B-57 as the most suitable vehicle on which to mount and test new sensors and weapons in a night attack role.

(U) Conceived in 1967 as Project Tropic Moon III, the B-57G was the first jet bomber specifically configured for self-contained night attack sorties in Southeast Asia. Within a relatively short time, the Air Force modified, tested, and flew the B-57G against hostile targets. When the Air Force decided that the time had come to withdraw the B-57Gs from Southeast Asia, Secretary of the Air Force Robert C. Seamans, Jr., wrote to the Chief of Staff of the Air Force that "it seems to me appropriate that we record and evaluate our experiences with the B-57Gs from concept formulation through redeployment to highlight those lessons which would be valuable in developing and employing similar systems in the future." That task was assigned to the Director of

Operations in the office of the Deputy Chief of Staff for Plans and Operations at HQ USAF. Maj. Gen. Clifford W. Hargrove, the Deputy Director of Operations, asked the Chief of Air Force History for "assistance in preparing a historical study of the B-57G program . . . . "

(U) Mr. Richard A. Pfau a temporary staff member of the office of the Chief of Air Force History, undertook the task of preparing the desired monograph. Although he found most of his material in the files of the Albert F. Simpson Historical Research Center at Maxwell Air Force Base, he exploited other repositories wherever possible. Before he returned to his university studies, Mr. Pfau prepared a first draft of the desired study. That manuscript and his notes remained inactive until early 1977, when they were sent to the Albert F. Simpson Historical Research Center for historical review. Mr. William H. Greenhalgh, Jr., a staff historian at the center, conducted additional research, edited Mr. Pfau's work, and added material where necessary. The result is this study of the B-57G program from inception to termination.

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CHAPTER I -- NIGHT ATTACK AIRCRAFT SYSTEMS

Background

(U) Military forces traditionally have felt more secure when hidden by the blackness of night while shifting forces, moving supplies, building defensive works, or otherwise preparing to attack enemy forces or withstand an assault. Even though possessing certain disadvantages, night movement has been used widely throughout recorded history as part of military operations. With the advent of the military aircraft, night movement became even more essential, particularly in the earlier years before night flying was practical. Observers in balloons and observation aircraft during World War I directed accurate artillery fire and an occasional air strike on enemy troops and vehicles during the daylight hours, forcing both sides to confine most of their troop and supply movements to the hours of darkness.

(U) Between the end of World War I and the outbreak of World War II, most air forces placed little emphasis on night aerial reconnaissance or night tactical air strikes. Tactical aviation became highly effective during the early months of World War II, forcing both sides to limit their surface movement to the night hours once more. Each side then sought aircraft that could prevent night movement. The British Beaufighter, although used primarily as a night interceptor aircraft, also performed well as a night intruder to harass enemy night movement. The United States tried the P-70 and the P-61 Black Widow in that role, with little

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success, and conventional bombers such as the B-17 and B-25 unsuccessfully attempted night missions against motor transport and other logistic targets. Nevertheless, some form of night interdiction was essential to military success. When the Germans below Rome were cut off from northern Italy by effective day interdiction, for example, they continued to supply their forces, and even to shift divisions, by moving only at night.1/

(U) Similarly, the Japanese forces in the Pacific made good use of darkness to carry out movements largely denied them during the day by U.S. Army and Navy aircraft. The Army successfully used a few B-24 bombers, reconfigured for night snooper operations and redesignated SB-24s, against shipping and well-defined island targets, although the inflated claims of their crews cast some doubt on their true effectiveness. Experiments with P-38s and other single-place aircraft demonstrated the inability of a pilot alone to cope with the myriad actions required on a night intruder mission. To illuminate their targets, some squadrons tried dropping flares, which not only proved undependable, but also were more of a hindrance than a help since they alerted enemy defenses, thus increasing the threat to the strike aircraft. The variety of weapons, illuminants, procedures, and aircraft tested in the Pacific failed to improve the night tactical interdiction capability.2/

(U) At the start of the Korean war, the Air Force again did not have a single unit trained for night intruder operations or an aircraft suitable for such a mission. The F-82, an escort fighter modified for night intercept operations, proved a failure, even though it did shoot down the first enemy aircraft of the war--in daylight. Its successor, the jet-powered F-94, was almost as

unsuccessful, unsuited for either night strike or night intruder missions. Okinawa-based B-29s flew many night bombing missions against the growing North Korean fighter opposition, but their targets were fixed and rather easily located. The entire night intruder mission became the responsibility of the B-26, an obsolete World War II light attack bomber formerly designated the A-26.3/ Once again the fighting ended without any significant improvement in the ability of the U.S. Air Force to stop enemy movement at night.

(S) Well before the fighting ended in Korean, combat flared in Southeast Asia. The insurgent communists (the Viet Minh) already had learned to conceal their movements from their opponents--the French military forces--by moving only at night or during bad weather. Once the Viet Minh defeated the French and launched their campaign against South Vietnam and Laos, they achieved maximum speed and efficiency by moving largely by day because their opponents lacked airpower. As South Vietnamese aircraft became more numerous and U.S. aircraft appeared on the scene in the mid-1960s, the North Vietnamese moved more than 80 percent of their vehicles at night. Because both the South Vietnamese and U.S. aircraft were ill-equipped for low altitude night operations in the mountainous terrain of Southeast Asia, the North Vietnamese succeeded in maintaining the flow of troops and supplies to South Vietnam, even though darkness slowed their convoys. Early in 1964 the U.S. Air Force and Navy concentrated their attacks against targets in North Vietnam, greatly reducing the number of night attacks against infiltration targets in Laos. U.S. Navy air crews used A6A aircraft

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with moving indicator radar features to locate vehicles and deliver ordnance, but with less than satisfactory results.

(S) Typical of these results: when ground observers reported 154 enemy trucks along a particular stretch of road, Air Force air crews were unable to find a single vehicle. During one period when 514 night sorties covered the road system of eastern Laos, the pilots claimed the destruction of only eight trucks. In desperation, the Air Force even used F-102 interceptor aircraft with infrared sensors to find targets and to attack them with rockets. The short range of the sensors and the poor performance of the aircraft at low altitudes, where they never had been intended to fly, caused the Air Force to call off that test after only a few missions.4/

(S) Frustrated by criticism of its inability to stop the infiltration flow, the Air Force tried to improve its night strike capability. Unfortunately, its only night hunters were two RB-57s with infrared sensors, and even those aircraft were still under test. In February 1966, the Air Force assigned the 433d and 479th Tactical Fighter Squadrons of the 8th Tactical Fighter Wing the sole mission of night interdiction in Laos. Their F-4C aircraft had night sensors but no real-time cockpit displays, and their forward-looking radar provided only a navigation capability. The crews had received almost no night bombing training and had little night experience, causing one of the squadron commanders to evaluate the Air Force night interdiction effort in Southeast Asia as "sporadic and ineffective."5/

(S) The U.S. Army in 1966 probably had a better night hunter capability than either the Air Force or the Navy. One model of the

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Army's OV-1 Mohawk aircraft--the OV-1B-- carried a Motorola side-looking airborne radar with a moving target indicator capable of detecting motion down to less than 10 miles per hour radial velocity. The sensor mapped 10-nautical-mile-wide swatches on either side of the aircraft from an altitude of 5,000 feet, and the resultant imagery could be displayed to the crew in near real time, or electronically relayed to a ground station for display and recording on film. Another version of the Mohawk carried an H.B. Singer infrared sensor with a resolution of about 6 feet at 1,500 feet above ground level, but it was not as productive as the radar equipped version because rain cancelled out the infrared return.6/ Even though night interdiction was a traditional Air Force mission, the Army was making better progress toward acquiring an effective mission capability.

Advocates of Night Interdiction

Disturbed by the inability of U.S. tactical aircraft to stem the flow of men and materiel through Laos into South Vietnam, President Lyndon B. Johnson in December 1965 asked the Air Force if it could improve its night operations. The Air Force had already contracted with the Dalmo-Victor Corporation for low light level television in four A-1E aircraft for tests in Southeast Asia. In addition, a tentative plan called for equipping a cargo aircraft with sensors and weapons for use in night interdiction.7/ The two projects represented only a small effort, however, and the program needed additional impetus.

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(S) President Johnson next asked his science adviser, Dr. Donald F. Hornig, to investigate existing technology and potential research projects for applicability to the night air attack problem. Dr. Hornig replied that limited money had hampered research, but more rapid prograss was possible with increased funding. Dr. Vincent V. McRae of Dr. Hornig's staff and Dr. Richard L. Garwin of the President's Scientific Advisory Council discussed night operations with Air Force research and development managers, including Gen. Bernard A. Schriever, commander of the Air Force Systems Command, and Lt. Gen. James Ferguson, Deputy Chief of Staff for Research and Development at Air Force headquarters.8/ The upshot of these conversations was a project labeled Shed Light.

Operation Shed Light

(S) General Ferguson reacted to his discussions with Drs. McRae and Garwin by establishing a task force within his staff on 7 February 1966 to examine the problems associated with night attack. On 5 March, the group proposed 29 actions to improve night navigation, target acquisition, and ordnance delivery. The task force further proposed that the Air Force acquire four special aircraft: a self-contained night attack aircraft for use in lightly defended areas, a hunter aircraft to guide strike aircraft to well-defended targets, an airborne illuminator for close support night operations, and a forward air controller aircraft for use at night.9/

(S) Once the task force conclusions were presented to the Air Staff Board, Gen. William H. Blanchard, Vice Chief of Staff, told General Ferguson on 18 March to initiate a formal project, which

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became Shed Light. Blanchard also told all Air Force major commands to support Shed Light fully, and invited R&D personnel from the other services to participate.[10]

Air Force Systems Command then began planning for Shed Light. At the call of the System Command's Deputy for Limited War at Aeronautical Systems Division, members of Tactical Air Command, Air Force Logistics Command, and Air Training Command gathered at Wright-Patterson AFB, Ohio, and on 9 June 1966, sent to the Air Staff a proposal for nearly simultaneous R&D, aircraft modification, equipment testing, and personnel training. Having identified nine new weapons systems and 77 R&D tasks, they grouped these according to their expected contribution to night capability and the date when each should be ready for use in Southeast Asia. On 15 July, Gen. John P. McConnell, Chief of Staff, United States Air Force, a-proved the proposal " . . . for planning purposes and implementation as specific programs are directed and funds are made available."[11]

To provide an Air Staff focal point, Maj. Gen. Andrew J. Evans, Director of Development, on 1 July 1966, named Col. Wirth H. Corrie as his assistant for Shed Light and gave him a staff of three. Other Air Staff managers continued to handle individual Shed Light efforts, but they reported to Colonel Corrie who, in turn, informed Generals Evans, Ferguson, and McConnell. Operation Shed Light thus became a management device to focus attention on night air attack problems and to allow key decision-makers to react quickly to crises.[12]

Officials within the Department of Defense focused considerable attention upon the Air Force's night operations. In August 1966, for example, Maj. Kenneth P. Burns of the Air Staff

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Plans and Operations Directorate briefed Secretary of Defense Robert S. McNamara and his staff on night operations in Southeast Asia. General Evans also explained Operation Shed Light to McNamara. When questioned by Deputy Secretary of Defense Cyrus R. Vance, General McConnell reported that the Air Force had increased its night attack sorties over North Vietnam from 506 in April to 1,935 in July. However, in the same period, sorties over Laos decreased from 637 to 376, but a decline in the number of day sorties resulted in the night sorties being a larger percentage of the total. When that percentage dropped significantly during September, Air Force headquarters reminded the Seventh Air Force, successor to the 2d Air Division, of a continuing "high level interest."13/

(S) That same high level interest caused General McConnell's office to ask Gen. Hunter Harris, Jr., Commander-in-Chief, Pacific Air Forces, why the night attack sorties continued to decrease. General Harris replied that the divided responsibility for missions over North Vietnam and Laos prevented PACAF and the Seventh Air Force from maintaining enough flexibility in managing resources. The Air Force also lacked the sensors, aircraft, and weapons capable of accurate acquisition and destruction of vehicles at night.14/

(S) On 24 November, Lt. Gen. William W. Momyer, Seventh Air Force commander, told General Harris that his main problem was one of finding " . . . a substitute for the eyeball which will tell the pilot where the vehicle is, how fast it is going, and when to drop his munitions for destruction." Displeased with Shed Light, General Momyer said, "The sensors we have and [those] being proposed are for [a] 120-knot force, while the requirement as dictated by the enemy is sensors for a 500-knot force."15/

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[redacted] Operation Shed Light slowed dramatically after General Ferguson left the Pentagon in September 1966 to assume command of the Air Force Systems Command. By year's end, General Evans agreed with Maj. Gen. Henry B. Kucheman, Jr., Aerospace Systems Division commander, that Shed Light was not moving quickly enough because its competing projects wasted time and energy. Air Force headquarters then enjoined the major commands to cooperate instead of compete, but Shed Light remained behind schedule. Further, no Shed Light aircraft had yet reached Southeast Asia.

[redacted] Searching for a quick way to provide a Shed Light aircraft, the Air Force searched for one it could quickly convert to carry low light level television, laser-ranging sensors, and an automatic weapons delivery system. All of these items and more had been recommended earlier in February 1966 when civilian scientists met at Ramey Air Force Base and concluded that an increased night attack competence was more important in Vietnam for successful interdiction than was an all-weather strike capability.17/ At any rate, the Air Force finally chose the U.S. Navy's Grumman S-2, designed originally for antisubmarine warfare. The Office of the Secretary of Defense and the Navy agreed in September 1966 that the Air Force could modify two S-2D aircraft as prototypes and an additional 12 for operations as the first self-contained night attack aircraft in Southeast Asia. Despite an immediate allocation of $7 million and the full support of Dr. John S. Foster, Director of Defense Research & Engineering, and top Air Force officials, by January 1967, the Air Force Systems Command had not contracted for modification of the two prototypes even though the Navy said they were available. The Air Force finally took delivery of the two S-2Ds in May and contracted

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with Grumman Aircraft Corporation the following month for modification. Grumman promised the first aircraft by 31 May 1968, and the second by 30 November 1968.18/

(S) Secretary of the Air Force Harold Brown was well aware of the problems in night strike operations. While in Development, Research and Engineering, he had sponsored night vision research, particularly low light level television. During a visit to 2d Air Division headquarters in January 1966, Secretary Brown asked pointed questions concerning the apparent lack of initiative toward improving Air Force capabilities for night attack. Consequently, Maj. Gen. Gilbert C. Meyers, Deputy Commander of the 2d Air Division, told his staff to prepare a Southeast Asia Operational Requirement (SEAOR 35) for a self-contained night attack aircraft, one carrying every device needed to acquire and attack ground targets and totally independent of ground or airborne assistance. Citing advanced in forward looking infrared and low light level television sensors, SEAOR 35 suggested a 3-phase program beginning with a slow cargo or bomber aircraft, progressing to a small jet bomber such as the B-57, and culminating in a high performance fighter such as the F-111D.19/

(S) When Systems Command received SEAOR 35, the Aerospace Systems Division already was working on three projects that might partially satisfy the requirement. The first of the projects, designated Tropic Moon I, was the already mentioned installation of low light level television in A-1E aircraft; and while it had begun a test cycle, it was not expected in Vietnam before the end of 1967, if then. A second project, Lonesome Tiger, involved the installation of a forward looking infrared sensor in a B-26. It, too, had been tested, but shelved in July 1967 because the sensor range

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proved too limited to permit an attack on the first pass. The third project, Black Spot, called for testing a C-123 with forward looking radar, forward looking infrared and low light level television. Testing of Black Spot became entangled with the desire to install a Navy sponsored ignition detection sensor known as Black Crow; consequently by July 1967, it was not underway.20/ None of these projects met the total requirement nor did they combine multiple sensors in a jet, the final two phases called for by SEAOR 35. Still, the Air Force had hoped for some contribution, which failed to materialize.

(S) Yet another project where the Air Force felt Brown's stinging criticism was Tropic Moon II, an effort designed to test an improved low light level television system. Brown was unhappy that by January 1967, the Air Force had not even selected an aircraft. Selection finally was made on 29 March 1967, with the decision to install the Tropic Moon II equipment in three B-57 aircraft to be sent to Southeast Asia as soon as possible. The Air Force notified all concerned commands on 12 April, and soon thereafter Westinghouse received the modification contract for the aircraft that PACAF chose and ferried from Southeast Asia to Baltimore, Maryland. By mid-1967, the Air Force estimated that the Tropic Moon II planes would be sent to Southeast Asia by late September.21/

(S) Meanwhile, General Momyer in April 1967 had added increased impetus to the overall Shed Light project by sending in SEAOR 117, asking for development of a more extensive line of sensors, additional weapons and aircraft, and techniques for night and all-weather interdiction of moving vehicles. Still, by mid-1967 the Air Force seemed as far as ever from having a self-contained night attack aircraft.22/

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CHAPTER II -- TROPIC MOON III

Maj. Gen. Albert W. Schinz, Tactical Air Warfare Center commander, had long advocated an improved night strike capability. He had won TAC and PACAF support by May 1967 for a General Dynamics proposal to equip fifteen B-57 aircraft with low light level television, forward looking radar, and infrared sensors under a project labeled Night Rider, but initially the Air Staff had rejected the idea as too costly and unnecessarily risky. General Schinz, however, later convinced representatives of Air Force research, testing, and operating agencies that the B-57 was the best vehicle for existing sensor technology until the Air Force could move on to the F-111D aircraft as the next self-contained night attack system. Within weeks the Air Staff directed implementation of Tropic Moon III, the conversion of B-57s to self-contained night attack configuration.1/

Concept and Definition

Because the Air Force need for a self-contained night attack aircraft was so urgent, General Schinz proposed that Systems Command skip the conceptual and definition phases and proceed directly to acquisition.* In SEAOR 35, the 2d Air Division had specifically mentioned the B-57, which already was in use with Tropic Moon II, and the available sensors seemed to match B-57

*(C) AFSC Manual 375-4, System Program Management Procedures, divided a system's life cycle into four phases: conceptual--the genesis of both the technology and the need; definition--mating the technology to the need by designing a system both technically and economically feasible; acquisition--procuring and testing the system; and operational--using the system to fulfill its mission.

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performance. The war in Southeast Asia would not wait, and the Air Staff advised that " . . . the urgency of need suggests departure from normal procedures . . . ." Consequently Systems Command reluctantly agreed to skip the first two phases.2/

The Air Staff then left no room for hesitation or doubt when it told Systems Command to build a prototype "immediately" for testing by September 1968, and to plan for simultaneous procurement of a full squadron of B-57s "to be deployed as soon as possible." The Southeast Asia Projects Division wanted a plan for the prototype within 2 weeks and a procurement plan within a month. The B-57 aircraft would carry forward looking radar with terrain warning and moving target indicator features, low light level television, and forward looking infrared if such a sensor could be installed. Systems Command's reaction to the task was hardly optimistic. Maj. Gen. Joseph J. Cody, Jr., Systems Command's Chief of Staff, noted, "Here we go again. I wonder if anyone thought of describing the environment/state-of-the-art and then asking the developer to accomplish design." Within a week, however, Systems Command asked Air Force headquarters to select a B-57 for the prototype Tropic Moon III aircraft. By the end of October 1967, an Aerospace Systems Division task force--with augmentation from Air Force headquarters, Tactical Air Command and Systems Command--submitted its plan for a prototype aircraft.3/

A further step took place when TAC on 7 November 1967 issued Required Operational Commitment 62-67 calling for a night attack wing composed of three squadrons of B-57s and a composite Shed Light squadron of NC-123, RC-130, S-2D, and A-1E aircraft. TAC reasserted General Schinz's argument that earlier Shed Light

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aircraft were too slow, carried too few munitions, lacked growth potential, and were not able to detect targets at long range or attack well defended targets. The B-57 aircraft were available, had room for several sensors, and could carry 9,000 pounds of bombs at speeds of 160 to 500 knots. On 8 November, Systems Command told the Aerospace Systems Division to be ready for immediate action when the Air Staff released funds for Tropic Moon III, and to prepare a Request for Proposal--the document used to solicit bids from contractors--assuming a fixed-price contract and incentives for both bombing accuracy and early delivery. The Systems Division also was to prepare a procurement plan by 20 November 1967.4/

(S) As the Aerospace Systems Division developed its procurement plan, it also briefed key officials on the Tropic Moon III project and solicited their support. Following a 28 November Air Staff Board recommendation, General McConnell approved the modification of sixteen B-57 aircraft and Secretary Brown authorized reprogramming to shift the required funds from other Air Force projects. For an estimated $51.99 million, the Systems Division expected to put sixteen Tropic Moon III B-57s into combat by April 1969.5/

(S) Meanwhile, Gunship II, an AC-130 equipped with 7.62mm and 20mm guns, already in Southeast Asia for testing, had proved itself an effective truck killer and provided a potential yardstick for evaluating Tropic Moon III. The Southeast Asia Projects Division commissioned Analytic Services, Inc. (ANSER) to compare the two. Based on ANSER's model, Tropic Moon III would have " . . . a better than 2 to 1 cost advantage . . . ," an advantage that the Southeast Asia Projects Division staff had failed to exploit fully. Instead, they had stressed Tropic Moon III's survivability where enemy

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defenses were too concentrated or effective for Gunship II missions, arguing for a mixed force of Gunship II and Tropic Moon III planes rather than Tropic Moon III as a replacement for Gunship II. The most spectacular staff claim was that: "Considering the present North Vietnamese truck inventory and their replacement rate during 1966, the Tropic Moon III force could reduce this inventory to between 40 and 50 percent of its present level in 6 months of operation."6/

The stated primary mission of the Tropic Moon III aircraft was to restrict the enemy's ability to move and support his forces during darkness. The Tropic Moon III aircrews would fly at night along enemy lines of communications to detect and destroy moving vehicles, shipping on rivers and canals, and some selected stationary targets as small as jeeps. As a self-contained night attack aircraft, Tropic Moon III would carry appropriate sensors and weapons to enable it to find and destroy targets at night on the first pass without the use of visible artificial illumination. The term "self-contained" did not exclude the use of ground-based navigation systems, such as long range navigation (LORAN), but encouraged the inclusion of on-board navigation systems for long-range interdiction missions.7/

Because the Gunship II prototype had been so successful on interdiction missions in SEA, Secretary Brown in November 1967 authorized the conversion of seven additional C-130s to gunships. Shortly thereafter, on 12 December, the three Tropic Moon II B-57s reached Phan Rang Air Base, South Vietnam, and four crated Tropic Moon I A-1Es left California by ship on 22 December. Shed Light projects finally began showing some progress.8/