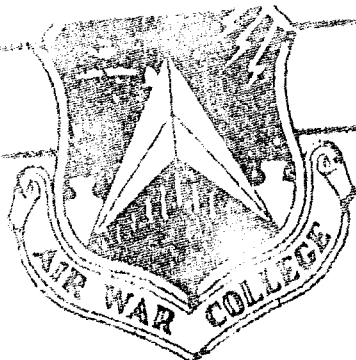


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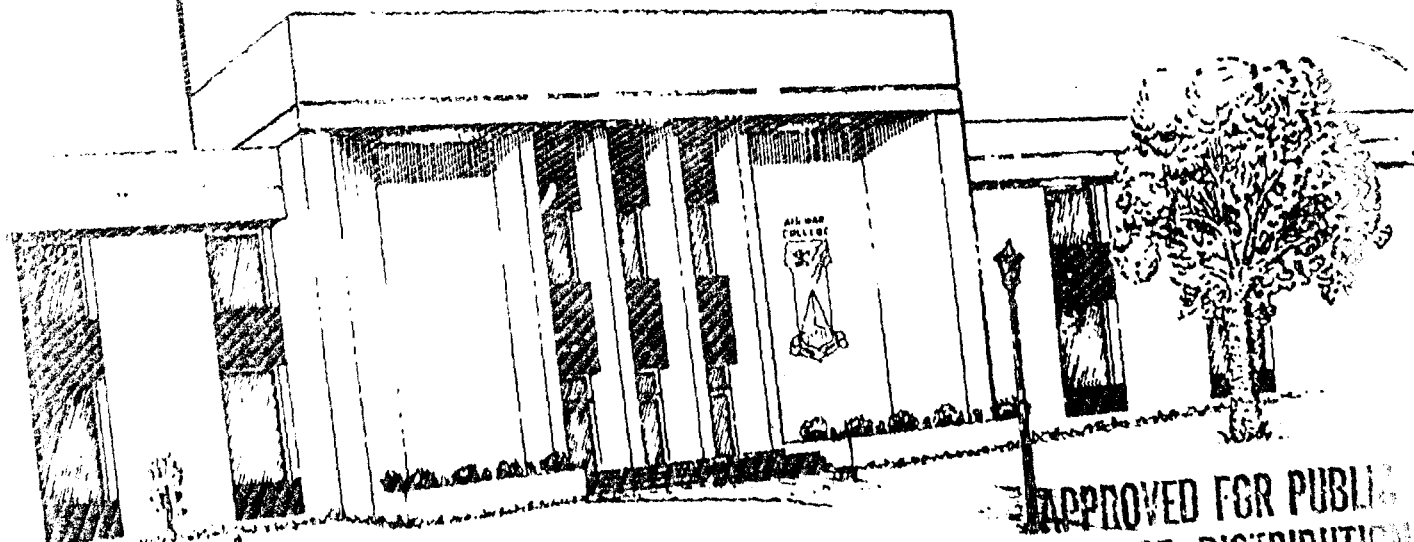
RESEARCH REPORT

COMMAND AND CONTROL OF STRATEGIC AIRCRAFT
IN INTEGRATED CONVENTIONAL OPERATIONS

LT COL ARVID P. PEDERSON

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COMMAND AND CONTROL OF STRATEGIC AIRCRAFT
IN INTEGRATED CONVENTIONAL OPERATIONS

by

Arvid Paul Pederson
Lieutenant Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY
IN
FULFILLMENT OF THE RESEARCH
REQUIREMENT

Research Advisor: Colonel William P. Moore

MAXWELL AIR FORCE BASE, ALABAMA

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AIR WAR COLLEGE RESEARCH REPORT ABSTRACT

TITLE: Command and Control of Strategic Aircraft in Integrated Conventional Operations

AUTHOR: Arvid Paul Pederson, Lieutenant Colonel, USAF

← This paper investigates command and control of strategic aircraft in integrated conventional operations presenting insights or options to planners for the use of strategic aircraft in ^{integrated conventional} these operations. US airpower doctrine evolved over time and crucially impacts force structure, deployment, and employment decisions. Likewise, command relationships and control systems for strategic and tactical air forces varied over time and are significant factors in the utility of strategic forces in conventional operations. Finally, technology has provided new capabilities affecting ^{military} doctrine, planning, control, and execution of military operations including integrated conventional operations.

US military planners have not always developed or modified airpower doctrine, command arrangements, control systems, or exploited new technologies to capitalize on the inherent flexibility of airpower. Flexibility in planning and exploiting new concepts of command and control may be crucial for integration of strategic aircraft into conventional operations.

This paper investigates historical airpower doctrine, command structures, control systems, and some technologies providing insights for planners into command and control of strategic aircraft in integrated conventional operations. (edc) ←

BIOGRAPHICAL SKETCH

Lieutenant Colonel A. Paul Pederson (M.S., University of Southern California, and M.S., Naval Postgraduate School) has been assigned as an action officer in the Strategic Command and Control Division in the Plans and Operations deputate at the Air Staff and as a strategic planner in the Planning, Programming, and Budgeting Division in the Command, Control, and Communications Systems Directorate in the Organization of the Joint Chiefs of Staff. He served as a Forward Air Controller (FAC) with various units in South Vietnam and was a B-52 squadron commander. Colonel Pederson was a Distinguished Graduate of the Air Command and Staff College Class of 1982 and holds the Distinguished Flying Cross, the Defense Meritorious Service Medal, and the Air Medal with Thirteen Oak Leaf Clusters. Colonel Pederson is a graduate of the Air War College, Class of 1988.

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CHAPTER I

INTRODUCTION

The concept of strategic bombardment forces being integrated into conventional operations along with general purpose forces is not new. Throughout airpower history, these forces have complemented one another in accomplishing airpower tasks in support of theater commanders' objectives. This paper investigates the historical airpower doctrine, command arrangements, and technological developments to provide current and future planners with some insights into the challenges and opportunities of the current emphasis on joint and integrated operations of strategic and tactical forces.

History has provided many examples of faulty airpower (current Air Force term is aerospace recognizing the space dimension of Air Force's capability and responsibility) doctrine and command structure arrangements. Generally, airpower leaders during war have adapted flexibly to the evolving warfare tasks and technological developments that have contributed to aerospace military capability in support of national objectives and the other military forces.

Potential military war-fighting requirements and the lethality of modern battlefields may preclude adaptation of faulty doctrine and command structure arrangements and the potency of the historical US industrial capacity to influence the outcomes of future wars. The US armed forces may be

required to already possess the proper doctrine, command structure arrangements, and technology to be successful in the next military confrontation. The doctrine, strategy, tactics, and readiness of forces in being may determine the war's outcome without the advantage of adaptations as was prevalent in previous conflicts.

The numbers of aircraft and other US military systems have declined drastically over the years as technology has increased the lethality and military effectiveness of these systems while the expense of acquiring them has increased markedly. These reductions of military systems have placed a premium on the doctrine, command arrangements, strategy, tactics, and employment of these expensive and scarce resources. These scarce resources cannot be squandered as in previous conflicts while doctrine, command arrangements, and employment practices are refined to arrive at the proper flexible operational employment concept. Military planners must derive the optimum doctrine, command arrangements, and employment procedures in peacetime in order to capitalize on the potent capabilities of modern military systems.

With the possibility of the intermediate range force (INF) nuclear systems being negotiated away, conventional as well as long range nuclear forces will attract added emphasis. With an agreement between the superpowers on strategic nuclear systems or a strategic nuclear warhead cap, the flexibility of aerospace forces, especially the manned

strategic bomber, will take on added importance. This, coupled with the importance of an increased conventional force capability to enhance deterrent capability and raise escalation thresholds, makes the strategic bombardment aircraft operating in an integrated conventional environment a crucial war-fighting capability.

In order to overcome doctrinal and command arrangement problems that have plagued integrated conventional and strategic aerospace forces' operations for years, a graduated and building block approach to the education and training of our military forces, both strategic and tactical, should be instituted. The initial steps are already underway. But efforts must be increased to educate, train, and indoctrinate aerospace, maritime, and ground forces on the synergistic effect of strategic forces' contribution to overall military capabilities in truly integrated conventional operations. Opportunities for "integrated" play; development of doctrine, strategy, tactics, and information; and development of planning and procedures should be stressed during joint exercises such as those at Red Flag/Green Flag at Nellis Air Force Base and the National Training Center at Fort Irwin, California. Large numbers of joint planners should participate and train in order to develop the planning and control capabilities needed for effective integrated operations.

Strategic Air Command's Rapid Shot deployment exercise series should be expanded and a "Checkered Flag-like"

program of "sister" deployment bases established in the overseas theaters that are likely to receive the bombers on conventional deployments. Proper command components, planning groups, and support packages must be exercised to ensure training and planning efforts. Entire support packages including command, control, logistics, administration, supply, intelligence, operations, and communications should be exercised with their wartime tasking packages to properly exercise, train, and evaluate their capabilities and limitations.

Command and control of strategic aircraft operating in integrated conventional operations may prove to be the decisive factor in the next conflict. Proper doctrine, command structures, control systems, and support must provide planners and operators with the wherewithal to properly execute the aerospace tasks necessary in support of military operations to win the conflict. The key for success is the foresight to prepare military forces with the doctrine, command arrangements, plans, and readiness to accomplish the military tasks against a determined foe. The challenge is ahead for military professionals, history has provided the lessons, and planners will determine the readiness of US military forces to conceptualize, organize, plan, and execute our strategic forces in integrated conventional and strategic forces' operations. The current planning efforts may prove crucial to the outcome of any future US military undertaking.

CHAPTER II

HISTORICAL DOCTRINE, COMMAND STRUCTURES, AND TECHNOLOGY AFFECTING US STRATEGIC FORCES

Developments Prior to World War II. The fundamental airpower doctrine that came out of World War I was that the airplane possessed such advantages of speed and altitude that it had the power to destroy surface objectives, onshore and afloat, while remaining relatively safe from any effective reprisal. Airpower disciples Italian Brigadier General Giulio Douhet and American Brigadier General William A. (Billy) Mitchell were early advocates of airpower that believed in decisiveness of aerial bombardment in the outcome of wars. A professional artillery officer by training, General Douhet advocated the "destruction of nations" by airpower as a military means of war. Mitchell believed that airpower was decisive in its own right and that it should be separate from the navy and army. (35:189-190) Douhet influenced major air forces including those of Great Britain, Germany, Italy, and the United States. Mitchell led US Army air forces' strategic thinking after World War I. (7:73-77)

Douhet believed that aircraft are instruments of the offense that cannot be defended effectively and that human morale would be shattered by bombardment of cities. Therefore, command of the air was an absolute military requirement. (Gropman:103) These beliefs resulted in the prime

military objectives being aerial attacks of population centers and industries far from contact with surface armies. As such, General Douhet advocated a "battle plane" that could conduct bombardment while simultaneously providing for its own self-defense. (35:191-192)

General Mitchell believed aircraft could obliterate every surface objective, be it naval vessel or of fixed surface construct. However, Mitchell did not subscribe to an all-purpose plane for all airpower tasks. He did advocate the independent application of airpower with a minimum of support from surface forces and was a firm believer in the potential of technical improvements and their importance to increases in military capability. (35:196-197)

The US airpower doctrine that evolved prior to World War II was heavily influenced by the ideas of Generals Giulio Douhet and Billy Mitchell. In the 1920s and 1930s, the US Air Corps Tactical School (ACTS) and its direct predecessors were the primary participants in developing airpower doctrine. The War Department Training Regulation (TR) 440-15, "Fundamental Principles for the Employment of the Air Service," dated 1 June 1926, limited airpower to Army cooperation. However, a 1926 tactical school text "Employment of Combined Air Force" went beyond instruction in air tactics, organization, and administration addressing doctrine that challenged the War Department employment concepts. In 1928, the ACTS' faculty developed a paper "The Doctrine of the Air

Force," to establish a common air doctrine for the US Army and forwarded it for consideration to the War Department. It declared that doctrinal confusion persisted and that, while bombardment operations could be decisive, occupation forces would be necessary to subdue a foe and that the Air Corps always supports the ground forces no matter how decisive or indirect the support may be. By 1931, the ACTS, now fully supported by the Office of the Chief of the Air Corps, had developed a fuller articulation of strategic bombardment doctrine that the enemy could be defeated by strategic air operations alone. (31:63-71)

By 1935, the ACTS had developed a doctrine of strategic bombardment that the destruction of the enemy's economical and industrial structures and his will to resist would be shattered under a properly conducted bombardment campaign. The associated war plan called for the destruction of the enemy's economic and industrial sector and demoralization of the enemy population's will to resist.

Indeed, technological progress contributed to this doctrinal boldness. Two-engine Boeing B-9 and Martin B-10 bombers in the inventory in 1931 -- with speeds in excess of 180 miles per hour and service ceilings in excess of 20,000 feet -- greatly outperformed existing single-engine biplane pursuit aircraft of wood and fabric construction. (31:73-77) Postulated fighter aircraft to defend against these bombers required three engines and greater performance in such areas

as speed, rate of climb, and service ceiling than these bombers in order to maneuver into the appropriate attacking positions. (14:103) In addition, prototype aircraft such as the XB-17 four-engine bomber were available in the mid-1930s to expand on the notion that a determined bomber formation in Douhet's conception "will always get through" against the inferior defensive assets. In an age oblivious to radar, Douhet believed aerial defensive forces to be at a distinct disadvantage against a determined, massed offensive force. (7:83-86)

Similar to the doctrinal development between the world wars, the command structure arrangement of airpower forces took on their own development. The US Army "Air Service" was separated from the Signal Corps on 20 May 1918. It became the US Army Air Corps by the Air Corps Act of 2 July 1926 and was a "separate and coordinate branch of the Army." (11:12) Major tasks included observation and liaison with units being attached directly to ground units. Army Regulation 95-10 of March of 1928 provided for an air arm divided into two sections -- one attached to subordinate ground units and another assigned to a general headquarters (GHQ) aviation section. The former would be observation units assigned to divisions, corps, and armies; the latter would comprise the remainder of the combat aviation forces. The "GHQ aviation" would be under command of a single air officer responsible to the commander-in-chief of the Army

field forces. Some missions of the "air force" would be unrelated to the direct support of ground troops. However, the Army General Staff refused to place this command arrangement in force during the resource-constrained peacetime. (31:142)

Prior to World War II, US command structures evolved around the doctrines of the Army and Navy -- and resulted in two different structures. In war, the services were expected to cooperate. This doctrine was termed mutual cooperation. If mutual cooperation doctrine proved ineffective, a single command could be organized under one commander -- true unity of command. (10:8-9) Within the Army, a 1935 revision to the War Department Training Regulation TR 440-15 established the General Headquarters (GHQ) Air Force under the command of a single air commander. This allowed the air commander to conduct deep bombardment strikes against the enemy's homeland if it did not conflict with the Air Corps' top priority -- Army ground forces cooperation. (13:7) US war-fighting doctrine stressed mutual cooperation between the Army and Navy and primacy of air forces strategic bombardment for the US Army Air Corps. Command arrangements endorsed traditional Navy and Army structures with the exception of a general headquarters section for the air forces to conduct strategic bombardment functions. These were the US armed forces' doctrine and command structures prior to US involvement in World War II.

Doctrine and Command Structure Development During World War

II. The United States entered World War II after the Japanese bombing of Pearl Harbor on 7 December 1941 with a decision to consider the Pacific theater as secondary to the European theater. (37:38) The pre-war plan for Europe, Air War Plans Division I (AWPD 1), was the basic blueprint for the development of US Army Air Forces and the conduct of the air war against Nazi Germany. It stated that the most efficient way to defeat Germany would be to destroy its economic and industrial capacity by aerial bombardment. (36:137-138)

The plan to carry out the strategy, AWPD-1, required 63,000 aircraft, 180,000 officers, and 1,920,000 enlisted personnel for a total of 2,200,000 men and women. The actual plan (AWPD-42) included minor target changes from AWPD-1 and derived from the Casablanca Directive approved by the Combined Chiefs and signed by Prime Minister Churchill and President Roosevelt at Casablanca on 19 January 1943. The plan called for a combined British and US bomber offensive against Germany, the capture of Sicily, and postponement of the invasion of Europe until 1944. (18:144-146)

The American doctrine and command structures for airpower operations in World War II were greatly influenced by the initial operations in the North African theater. There was no centralized control of either tactical or strategic air forces in North Africa. Airpower operated to the demands of the ground commander fighting the local battle. The US

Army Field Manual 1-5 provided the doctrine that air support command was attached to army formations and directed by the ground force commander. This resulted in no concentrated effort for air superiority or close air support for the theater with tactical and strategic air forces operating almost independently. Both air superiority and close air support suffered. (26:40) US Army Air Forces in Northern Africa were under command of Major General Jimmy Doolittle's newly created 12th Air Force which included eight bomb groups, flying B-17s, B-24s, B-25s, A-20s, and B-26s, and four fighter groups, flying P-40s, P-38s, and British Spitfires. Twelveth Air Force consisted of about 800 aircraft (300 fighters, 300 bombers, and support aircraft like C-47s) that were spread over 600 miles of desert and being attrited in uncoordinated actions in support of Allied ground forces. (11:96-97) The Luftwaffe constituted a major obstacle. The requirement for centralized theater air control was strongly voiced by British Air Chief Marshal Tedder and dramatically demonstrated during the battle for Kasserine Pass in Tunisia. Had Allied airpower been more centralized and concentrated during this engagement, Rommel could have been stopped sooner than he was. (26:40-42)

Eventually, Army Air Force General Carl "Tooey" Spaatz was successful in convincing Supreme Commander General Eisenhower that air forces needed to be commanded by air officers and centrally controlled to gain air superiority so

that all air tasks could be coordinated according to the theater commander's desires. This recognition resulted in a significant reorientation of airpower efforts. As a result of the ineffectiveness of airpower support to Allied armies and the high attrition rate of Allied air forces, General Spaatz established the Northwest African Air Forces (NAAF) integrating the Twelveth Air Force into his command. Spaatz then established the new Mediterranean Air Command and placed his NAAF in the command along with Tedder's Commonwealth Desert Air Force (consisting mainly of RAF and South African Air Force (SAAF) squadrons flying Hurricanes, Spitfires, and Kittyhawk fighters as well as some Beaufighters and Wellington bombers) and the new USAAF Ninth Air Force formed in Egypt under the command of General Lewis Brereton. Under this centralized command and control, the integrated Allied air forces were able to gain and maintain air superiority and to systematically defeat Axis air forces supporting Rommel's retreat into Italy. (11:97-102)

Indeed, the modified doctrine and Allied command structure arrangement that existed in Northern Africa after the Casablanca Conference in January of 1943 was significant in that the air component commander, General Spaatz, had centralized control of all air assets. His bomber forces were divided between tactical bombers under British Air Vice Marshal Sir Arthur Coningham and strategic bombers under Major General James H. Doolittle. General Spaatz directed

the forces under his centralized control according to theater commander General Eisenhower's guidance. (26:43-44)

Thus, the initial ineffectiveness of the Allied air forces' operations in gaining air superiority and supporting ground commanders in Northern Africa resulted in the significant doctrinal shift -- a bold statement that recognized the theater-wide benefit of centralization of air assets for control and decentralization of air assets for execution of aerial tasks. The inherent flexibility of airpower forces to achieve objective, surprise, mass, offensive, economy of force, movement, cooperation, and security was emphatically recognized.

... the quick initial victories of the Germans led to a redefinition of the role of military air. War Department Field Manual 31-35, 'The Employment of Air Power,' of 9 April 1942, subordinated air to the theater commander, and under special circumstances, allowed him to attach air units directly to ground units. This fit the airman's conception of centralized control and decentralized execution. It also gave air commanders more control over the execution of their strategic and tactical missions. (13:7-9)

During the invasions of Sicily and Italy, the air commander controlled naval and land-based aviation providing air defense, support of troops landing and moving inland, and targeting and controlling naval aviation involved in these operations. The unity of airpower was not only sound in theory, but the theory stood the test of battle and proved to be the most effective method for the command and control of airpower in a theater of operations. (26:44-45)

For the Italian campaign, the Twelveth Air Force,

under General John Cannon's command, transferred three P-38 groups to the new Fifteenth Air Force to complement its P-47 fighters and B-17 and B-24 bombers and provide a better integrated fighting force. Generals Eisenhower, Spaatz, and Doolittle had left Africa for England to prepare for the Operation Overlord invasion of Europe. General Ira Eaker became the new Allied air component commander in the Mediterranean Theater of Operations (MTO). He then controlled about 1200 fighter aircraft in Italy comprised of seven fighter groups in 12th AF, five fighter groups in 15th AF, and sixteen squadrons of RAF, SAAF, and Royal Australian Air Force (RAAF) fighters. He also controlled ten light and medium bomber groups in 12th AF and 21 heavy bombardment groups in 15th AF. These forces gained air superiority over German air forces in Italy and the 15th AF coordinated its strategic bombing of the German homeland with the 8th AF in England and used escort fighters for long-range integrated support. (11:104-107) These air forces coordinated effectively in integrating strategic and tactical operations as necessary to support overall objectives in Allied European operations.

Because of the early US experience in the Pacific and in the air-ground operations in North Africa, the Allied high commands recognized the requirement for unity of command for all joint and combined operations:

The necessity for an overall single ground component commander was recognized when the American command

doctrine of mutual cooperation proved inadequate for joint operations and on 27 November 1941 the unity of command was vested in the Commander in Chief of the Pacific Fleet and six months later recommended by the British Chiefs of Staff for the European theater. The combined chiefs approved the unity of command doctrine in 1942 with the assignment of General Eisenhower as the Supreme Commander. (10:9)

The command structures for the remainder of World War II reflected the above unity of command doctrines. Allied combined armies and navies were under a single commander. General Douglas MacArthur commanded Allied forces fighting in the Asian theaters and Admiral Chester Nimitz commanded Allied forces operating in the Pacific theater.

With the decision to give priority to the European theater, the Pacific air forces were placed in a defensive posture until sufficient forces would be available for the offensive campaign against Japan. (20:170) Regarding the airpower picture in the Pacific theater, the air war was waged on islands and at sea by the US Navy, the US Marines, the USAAF, and the Japanese in the carrier and island-hopping battles. The US Army Air Force's Seventh Air Force operated in support of Naval units in the Gilberts, Marshalls, Marianas, Carolines, and Palau. (11:92) The Eleventh Air Force operated in Alaska and the Aleutian Islands against Japanese Admiral Yamamoto's northern Pacific forces. (27:Notes) Lieutenant General George Kenney's Fifth Air Force and Southwest Pacific Air Forces (including Thirteenth Air Force) and long range forces of the Twentieth Air Force were employed against the Japanese throughout the Asian area. In addition, Tenth

Air Force was operating under command of General Lewis Brereton in India. (11:88-89)

Allied air forces' command structures in the Pacific reflected the military strategy to defeat Japan. The strategic air forces of the Twentieth Air Force -- with the unit designated to drop the atomic bombs -- reported through the executive agent, General Henry H. "Hap" Arnold, Commanding General of the Army Air Forces, to the Joint Chiefs of Staff. (20:169) The US Navy and Marines, including aviation units, operated under the command structure of Commander-in-Chief of the Pacific Fleet, Admiral Chester W. Nimitz. The Allied ground forces, including US Army Air Forces other than the 7th AF and 20th AF, were subordinate to General Douglas MacArthur. In the Southwest Pacific, the USAAF Thirteenth Air Force and US Navy, US Marines, and Royal Australian Air Force squadrons concentrated on the island of Rabaul, which was as important to the Japanese as Pearl Harbor was to the United States as a Pacific base. (11:92)

In Europe, the combined Allied armies under General Eisenhower had sections for land forces and air forces and evolved as additional forces were added. However, political considerations prevented full implementation of the unity concept because of British pressure to have all ground forces under General Bernard Montgomery and a single air component commander under a British commander. Americans would not agree with this concept and proposed a US Strategic Air Force

consisting of 8th AF in England and 15th AF in Italy under General Spaatz' command. These forces would be assigned to the strategic air offensive but, under emergency conditions, could support the theater commander. Therefore, these command arrangements resulted in the unfortunate situation of Allied air forces not having a single air component command in the European Theater of Operations (ETO). (26:46-51)

When General Eisenhower decided not to create the land component, the American air force saw no reason to have an air component command -- the Allied Expeditionary Air Forces. The argument was that there was no need to coordinate tactical bombers and fighters since the US Ninth Air Force was already working closely with the 12th US Army Group. Also, since the deputy to General Eisenhower already had the responsibility for coordinating the US Ninth and British Second Tactical Air Forces with the US Strategic Air Force and British Bomber Command, the air component command was really unnecessary. (10:9)

Technological Developments During World War II. In addition to the operational and command aspects of early World War II experience, technological developments during the war had a profound impact on doctrine and military strategy. Early navigation systems including the British Gee system (for the first letter in grid) promised accuracy of six miles within the maximum range of 400 miles of the home transmitters. This system promised bombing reliability that would prove the "bomber" concept. However, the inaccuracies experienced by British bomber crews, often missing their intended targets by distances of up to five miles and more, resulted in the requirement for the crews to "see" the target despite being able to navigate to the general target areas. (24:12)

On 28 March 1942, British Air Chief Marshal Sir Arthur Harris, leader of the Royal Air Force Bomber Command, ordered ten Gee-equipped Wellington pathfinder bombers to lead 234 of his bombers to demonstrate his bombing concept and to strike the Baltic port city of Lubeck with incendiary bombing of the highly-wooded medieval structures of this lightly defended city. The results were 200 acres leveled, 2,000 buildings destroyed and 15,000 people rendered homeless. A similar attack on Rostok, another heavily wooden Baltic port city, resulted in 70 per cent damage to the city, 6,000 civilian casualties, and major damage to a Heinkel aircraft plant. Harris -- always believing the bomber force must be massed and time-compressed to achieve best results -- later ordered a force of over 1,000 bombers led by Gee-equipped Wellingtons marking the target with incendiary bombs to strike Cologne in Operation Millennium. The results were devastating despite less than 500 killed and 5,000 injured. All told, 600 acres were destroyed, 12,000 fires started, 250 factories and 18,000 other structures destroyed or damaged, and a great psychological aspect for both his elated bomber crews and the harrassed German populace. (33:98-103) However, early RAF daylight bombing losses and available technology for nighttime operations had driven the RAF Bomber Command to adopt a strategy of bombing area targets -- mainly cities geared to war materiel production -- driven by limitations in their equipment and pre-war training. (24:13)

Like the Gee-navigation system advances, the British also developed a comprehensive radar (for radio detection and ranging) system to defend against attack. This system was especially effective against the Germans in the Battle of Britain air war in which Luftwaffe General Adolph Galland stated, "The British fighter was guided all the way from takeoff to his attack on the German formations ... this was a surprise and a very bitter one." (33:53)

Concerning United States Army Air Forces' experience in WW II, the Norden bomb sight and the development of the atomic device had profound implications. Despite the RAF Bomber Command conclusion that nighttime bombing was the better option, USAAF bomber strategists insisted on daylight strikes and the efficacy of "seeing" the target. This US bombing strategy fit very nicely into the "around the clock" bombing campaign and contributed to massive German assignment of personnel to the anti-aircraft defensive mission. The Norden Mark XV bombsight improved bombing accuracies -- providing the most accurate system yet invented -- and could hit specific targets if the target could be seen. (2:56)

The 509th Bombardment Group, equipped with the great technological advancements of the Norden bombsight and the pressurized four-engine Boeing B-29 bomber, coupled with the super-secret atomic bomb, was tasked to deliver the decisive blow to Japan. On 6 August 1945, three B-29 weather planes departed Tinian for Japan headed for Hiroshima, Kokura, and

Nagasaki, three cities that had escaped bombing up to this time. The weather crews reported Hiroshima clear of weather and at 8:15 a.m. the uranium bomb named "Little Boy" was dropped from the B-29 "Enola Gay." On 8 August 1945, "Fat Man," a plutonium bomb, was dropped on Nagasaki from another B-29 named "Bock's Car." As a result of these raids, the Japanese sued for peace and invasion of the Japanese homeland was unnecessary. (2:170) These technological advancements of atomic devices, accurate delivery, and long range delivery vehicles would fundamentally change war-fighting doctrine for years to come.

World War II had provided the first important testing grounds for the early airpower theorists -- disciples like Generals Douhet and Mitchell. Their ideas were put to the test of battle in major theaters but, in regard to doctrinal implications and strategic bombardment forces to match, only the United States and Great Britain developed major strategic bombardment forces. (22:153) Airpower was vindicated in WW II as characterized by General Billy Mitchell's "anything that flies" conception rather than by General Giulio Douhet's "battle plane" conception. Tactical employment was most spectacular and won air forces the unqualified respect and admiration of the older services. Some writers thought purely strategic successes, however far-reaching, were never overly convincing. Against Germany, strategic operations came too late to have a clearly decisive result and, against

Japan, the strategic operations were applied to an enemy already prostrated by other forms of war. (7:107) However, strategic bombing of Germany, while not providing a decisive victory without invasion and hard fighting, did make ground operations easier. (5:47) Indeed, Allied strategic bombers added to traditional tactical operations:

A considerable contribution to exercise 'Overlord' in June 1944 was the interdiction of German reinforcement routes in Normandy. Railways, marshaling yards, bridges, and highways were systematically destroyed by Allied heavy bombers so that German reserves had to make constant detours, were frequently delayed and consequently unable to mount counterattacks in sufficient force ... the interdiction campaign was centrally directed and coordinated with fighter activity which ensured almost complete air supremacy in the region. (3:9)

Many airpower successes in WW II demonstrated that integrated strategic and tactical operations conducted at the appropriate time and place were crucial to decisive outcomes. In North Africa, air commanders secured centralized command and control of air forces, organized for flexible operations, and executed airpower tasks in a coordinated and integrated manner within the theater commander's overall objectives.

In the Pacific theater, airpower forces were also task-organized in that 7th AF was integrated into Admiral Nimitz's forces. The 20th AF, whose forces dropped the atomic bombs, reported directly to the Joint Chiefs of Staff through General Arnold while other air forces were under the air component commander reporting to the theater commander. While a single air component commander was not established in the European theater, Allied air force commanders operated

under theater commander General Dwight Eisenhower's guidance. Allied bombers and fighters flexibly supported each other when required. Fighters escorted bombers and bombers provided support to Allied ground forces if needed.

Allied air forces' commanders modified doctrine and command structures during WW II to effectively accomplish their missions. Evolving technology provided significant war-fighting capabilities that would profoundly affect future airpower doctrine and weapon systems (radar, atomic devices, jet engines, rockets, navigation systems, etc.).

Doctrine and Command Structure Development After World War II.

The doctrine of the US armed forces after WW II was heavily influenced by US atomic superiority. The traditional US demobilization of the armed forces after war was linked to the concept that wars could be deterred by overwhelming atomic superiority. Demobilization returned the United States to its "Fortress America" status and, coupled with the Marshall Plan to revitalize European economies and the US atomic monopoly, the US armed forces embraced the "massive retaliation" strategy for any attack on the United States or its allies and postulated that the superior US atomic forces would deter any potential aggressor from these attacks.

US armed forces' reorganizations reflected this new aspect of atomic strategy, especially the units that could deliver atomic devices to potential adversaries. Strategic Air Command was formed on 21 March 1946 as one of the Army

Air Forces' three major combatant commands. The new USAAF command's mission statement was:

The Strategic Air Command will be prepared to conduct long range offensive operations in any part of the world either independently or in cooperation with land and Naval forces; to provide combat units capable of intense and sustained combat operations employing the latest and most advanced weapons; to train units and personnel for the maintenance of the Strategic Forces in all parts of the world; and to perform such special missions as the Commanding General, Army Air Forces may direct. (19:2)

US armed forces' command structures were modified by major legislative action in 1947. By the National Security Act of 1947, the United States Air Force became a separate service, a secretary of defense was established, the Joint Chiefs of Staff (JCS) were formally created, and a unified and specified (U&S) command structure was born. Thus, unity of command through U&S commanders was endorsed by national law. In a 1949 amendment to the act, a Secretary of Defense (SecDef) became executive of the Department of Defense with departments of Army, Navy, and Air Force subordinate to the SecDef. Unified commands had component commands of the services subordinate to them for war-fighting while specified commands were predominantly of personnel of a single service. (10:13) There was some thinking within the Air Force that strategic air forces (particularly when nuclear weapons became dominant in defense policies) should be employed separate from tactical air support to ground operations resulting in two subordinate air components. (26:50-56)

In line with the thinking that strategic forces

should be separate from tactical forces, the events of the late 1940s and the 1950s reinforced a theme that atomic forces should dominate US defense policy:

... yet despite such readings of the air power lessons of the war [WW II], the USAF ... set its sights squarely on 'the air-atomic mission'. Several reasons [existed] ... over few of which the airmen had any measure of control. Demobilisation to the point of disintegration of the military services was one, presidential budget decisions another, the emerging cold war with the Soviet Union yet another. Events in Czechoslovakia, Berlin, Russia (the atomic explosion of August 1949) and soon Korea -- married to disappointments at Yalta and Potsdam and mixed liberal doses of Stalinist-Leninist bombast -- served to unhinge many in high places. (23:13)

Many tactical airmen, including Lieutenant General Elwood R. Quesada and Major General Otto P. Weyland, believed that non-nuclear war was the most probable type of future conflict.... At a time when the Air Force was shrinking and funds were short, though, it wasn't easy to find money for conventional tactical weapon systems.... Strategic forces received most of the Air Force dollars, and only those tactical forces that had a nuclear capability could demand and get substantial funding. (26:2)

The US armed forces had evolved from World War II into a peacetime stance but with a fundamentally different outlook on the future of warfare. The United States faced the Korean conflict with a new national command structure and its new air-atomic war-fighting doctrine.

Doctrine and Command Structure Development During the Korean Conflict. The United States Air Force entered the Korean conflict as an independent air force with an atomic-air doctrine and performed in support of the United Nations command. General Douglas MacArthur was designated United Nations commander (CINCUNC) as well as commander of the US forces as Commander-in-Chief, Far East. Far East Command was

a unified command reporting directly to the JCS. (26:53)

General MacArthur used his General Headquarters, Far East Command for both the joint headquarters staff and his land component staff consisting mainly of Army personnel. Generally, the Far East Air Force worked in an independent fashion. In July 1950, General MacArthur established a separate land component command but physical separation of joint, land, and naval headquarters hindered effective coordination. (10:12-15)

Introduction of Strategic Air Command's B-29 equipped 22d and 92d medium bombardment groups and later the 98th and 307th medium bombardment groups to complement the Guam-based FEAF 19th Bombardment Group (comprising the Far East Air Forces Bomber Command) and tactical air support actions by the Fifth Air Force, coupled with the on-going US Navy and Marine aviation efforts, resulted in a need for central coordination of airpower missions. (15:Notes) Commander of Far East Air Forces, Lieutenant General George E. Stratemeyer, gained centralized "coordination control" of Korean air functions. A key point for the Far Eastern Air Forces' command structure development is that the JCS directed the Strategic Air Command to subordinate its strategic bomber forces to operational control of the Far East Air Forces. (21:54) The FEAF Commander found that in order to achieve maximum effectiveness of United Nations' available airpower resources, these UN air forces required centralized control

and decentralized and integrated execution of airpower tasks.

When both Navy Forces, Far East, and Far East Air Forces are assigned missions in Korea, coordination control, a commander in chief prerogative, is delegated to the Commanding General, Far East Air Forces. (16:50)

The term "coordination control" was never spelled out during the Korean conflict and hence much time was spent in "coordinating" combined air force actions. However, despite the disconnects between naval and air forces staffs in Korea, the unified approach worked reasonably well. Cooperation in controlling air assets was not always efficient but it was effective. (10:17) Airmen had again discovered centralized control and decentralized execution coupled with integrated strategic and tactical operations resulted in effective airpower application.

... old concepts that certain targets were 'tactical' and others were 'strategic' were abandoned, and so far as FEAF (Far East Air Forces) resources were concerned, airpower was undivided by artificial and unreal attempts to classify targets by type of aircraft. (16:504)

... in Korea, the B-29s not only attacked factories, ports, depots, and marshaling yards; but bridges, troop concentrations, and strong points. The carpet bombing near Teagu was another example of the extreme flexibility of air power. (32:9)

... centralized control of all the airpower assigned to the Far East theater of operation provided the flexibility that it did in the campaigns of World War II.

With the conclusion of the Korean War, airpower had again demonstrated the need for a command structure that didn't arbitrarily divide forces between mission areas. The command structure had to be capable of using airpower in a variety of tasks simultaneously or in sequence. The fundamental point, though, was that the theater air component commander had to control all the airpower in the theater so that he could support ground, naval, or air operations -- wherever the enemy was weak. (26:62)

Technological Developments During Korean Actions. During the Korean conflict, the jet engine proved to be the significant technological advance as US F-80s and F-84s ranged far and fast and F-86s dominated aerial duels with MiG 15s in the skies over Korea. However, strategic aircraft powered by jet engines did not enter the conflict. Radar technology again proved essential in Korean airpower operations as AN/MPQ-2 and AN/MSQ ground controlled radars were effectively utilized in accomplishing night and all-weather bombing in coordinated Korean interdiction missions. (15:Notes)

Doctrine and Command Structure Development During the Vietnam Conflict. The Korean conflict was viewed by American leaders as an aberration -- as a mistakenly conducted affair that would not be repeated -- and consequently had little impact on doctrine development. (23:20) Therefore, US armed forces' doctrine facing the Vietnamese situation remained little changed from that of the pre-Korean conflict doctrine.

As to command structures, the arrangements in the Vietnam conflict evolved out of initial US Military Advisory Group efforts which increased after the French defeat at Dien Bien Phu in 1954. The US military involvement was strictly organizing and training Vietnamese units. The US Military Assistance Command, Vietnam (MACV) was formed on February of 1962 as an operational headquarters with staff elements in place if direct military actions were required. MACV was a subunified command under US Pacific Command. (10:18)

By 1962, the US Southeast Asian command structure was under the unified US Pacific Command with three components. The Pacific Air Forces (PACAF) was the air component, the Pacific Fleet was the naval component, and MACV was the land component as well as the subunified command. Under PACAF, the Thirteenth Air Force had the advanced echelon of the Second Air Division at Tan Son Nhut Air Base near Saigon. The Pacific Fleet had the 7th Fleet, the Fleet Marine Force, and Task Force 77. Assigned to MACV were the III Marine Amphibious Force, the US Army Support Group, Vietnam, and Army combat units. When the conflict extended into Laos, Joint Task Force - 116 (with Army, Air Force, and Marine units) was sent to Thailand to show US resolve. This new arrangement caused command relation problems because of fragmented structures. Finally, JTF-116 was disestablished and replaced by Military Assistance Command, Thailand (MACTHAI) under COMUSMACV. Air Force units were assigned under the 2d Air Division commander as the air component commander of MACV and the forward commander for Thirteenth Air Force (Thailand). (10:19)

In 1965, a new deputy for air operations was created under COMUSMACV to exercise operational control over air force assets but specifically excluded Army helicopters and Marine aviation. After continuing command structure problems highlighted at the battle of Khe Sanh, the Deputy Secretary of Defense decided on 15 May 1968 to place Air Force and

Marine air assets under the control of the Air Deputy, MACV. This arrangement for air assets internal to South Vietnam continued to the end of the conflict. (10:21)

Meanwhile, other airpower operations throughout the Southeast Asia theater had a different character:

... the command and control arrangements that evolved over time, driven largely by institutional imperatives internal to the US military services, created a situation in which it appeared that five separate air wars were underway simultaneously: over the north (where the Air Force and Navy operated in separate theatres, called Route Packages), two others, mostly secret at the time, over Laos and over Cambodia, another in southern Laos along the Ho Chi Minh trail; and one in south Vietnam involving by far the greatest level of effort and degree of military success. The resultant command and control arrangements made a mockery of air power doctrine.... 'The piecemeal and divided nature of the bombing campaign over the North violated virtually every tenet of air power from unity of command to concentration of force'. (Schlight: 168-169) Over South Vietnam the situation was even worse, reflecting an air war pursued simultaneously by at least six air forces (not counting the Australians), each going about its own business ... at least until 1968 ... above all these flew the B-52s, theoretically under the control of a ground officer, often a Marine, in Saigon, but under the actual control of Headquarters, SAC, in Omaha, Nebraska, through another headquarters on Guam and a liaison office (Arc Light) in Saigon. (23:21-22)

Beginning in 1954, the SAC headquarters on Guam was the 3d Air Division and operated as such until 1 April 1970 when Headquarters, Eighth Air Force moved from Westover AFB, Massachusetts to once again become the strategic forces' combat headquarters. (19:163) The SAC Arc Light (B-52) missions in Southeast Asia were coordinated by a SAC ADVON (Advanced Operational Nucleus) at Tan Son Nhut Air Base near Saigon and continued under the command structure of Eighth Air Force

Headquarters to the end of the Vietnam conflict.

In regard to the overall command structure during the Vietnam conflict, General William C. Westmoreland, the MACV Commander from 1964 to 1968, who oversaw the large buildup in US armed forces and the resulting fragmentation of command structures stated:

In view of this [Vietnam] command arrangement, seeds of friction not unlike those that had plagued MacArthur ... during WW II were present Creating a unified command for all of Southeast Asia would have gone a long way toward mitigating the unprecedented centralization of authority in Washington Instead of five 'commanders' -- CINCPAC, COMUSMACV, and the American ambassadors to Thailand, Laos, and South Vietnam -- there would have been one man directly answerable to the President on everything Such an arrangement would have eliminated the problem of coordination between the air and ground wars that was inevitable with CINCPAC managing one, MACV the other. (10:22)

Technological Developments During the Vietnam Conflict. The AN/MSQ-77 (Combat Skyspot) radar was effective throughout Laos, Cambodia, and South Vietnam for ground-controlled all-weather and nighttime bombing of interdiction targets. In addition, LORAN (long-range air navigation) equipped fighters and bombers contributed to accurate bombing results often utilizing pathfinder techniques to lead formations of strategic aircraft into the target areas. The 1972 bombing campaign of North Vietnam using LORAN and onboard bombers' radars was especially effective because of the around-the-clock and bad weather capability of the B-52s. (26:177-179) In fact, the Linebacker II campaign was another example of effectiveness of integrated strategic and tactical operations

as over 700 B-52 sorties integrated with massive tactical support packages were flown against North Vietnamese target complexes consisting of railyards, air bases, shipyards, communications facilities, power plants, railway bridges, air defense radars, and missile sites. Fifteen B-52s were shot down by surface-to-air missiles (SAMs) and one B-52 crash landed for a lost rate of only about two percent for the entire campaign. Over 1,000 SAMs were fired by the North Vietnamese in these operations. The bombing results were so complete against these target complexes that the bombers were virtually unopposed the last few days of the campaign. For Linebacker II, over 20,000 tons of bombs were dropped on North Vietnam targets with over 15,000 tons delivered by the B-52s. (19:179-180)

To assist ground attack aircraft with no effective airborne radar, many flare-dropping and searchlight-carrying aircraft were developed for Southeast Asian operations such as the AC-47 "Puff the Magic Dragon," C-123 "Candlestick," AC-119 "Shadow," and the AC-130 "Spectre" to illuminate target areas. The AC-130 gunship aircraft incorporated low light television (LLTV) and infrared (IR) sensors and heavy firepower such as 20 and 40 millimeter cannons and a 105 millimeter gun for the Ho Chi Minh Trail interdiction mission. (26:211)

In addition to gunship developments, control aircraft systems were developed to include EC-121 "College Eye" and

the EC-130 Airborne Command and Control (ABCCC) to provide better control and coordination for intercepts and tactical air control. (26:151-155,202)

The air-to-air missile and terminally guided munitions found their testing grounds in the Vietnam conflict. Whereas in WW II and Korea, the 50 caliber machine gun provided the only aerial advanced weapon, in the Vietnam conflict the 20 millimeter Gatling cannon and air to air missiles were available for airmen. Visual identification requirements hindered US armed forces' effectiveness in Southeast Asia but US Air Force aerial kills were 57.5% radar controlled with Sparrows and the US Navy's kills mostly with heat-seeking Sidewinder missiles. The advent of the laser-guided and other precision-guided munitions in Southeast Asia provided capabilities that truly brought a new dimension to the employment of airpower. The circular error probable (CEP) of the new laser-designated weapons of approximately 30 feet compared to the prior dive-bombing CEP of 420 feet in the 1966-1968 era resulted in dramatically fewer strike aircraft required against designated point targets. (26:149, 156-157)

Post-Vietnam Strategic Force Capabilities Development. While technological developments during and after the Vietnam conflict promised new military capabilities, the complicated command structures experienced in Vietnam and the development of the Rapid Deployment Joint Task Force (RDJTF) in early

1980 urged the Strategic Air Command to package a comprehensive military force that could respond immediately with conventional weapons to crisis situations. SAC's contribution to the RDJTF comprised the Strategic Projection Force (SPF) formed mainly from B-52H and KC-135 aircraft of the 57th Air Division; with SR-71, U-2, and RC-135 reconnaissance aircraft; EC-135 and E-3A command and control aircraft; and associated support to provide a complete deployable "package" for immediate support of the RDJTF under a single command element. The concept was tested during the Busy_Prairie exercise in September of 1980 from several bases to validate the operational concept. Exercise_Bright_Star_82 vividly demonstrated the SPF's worldwide capability with deployment of eight B-52Hs and associated support on a 31-hour, 15,000 mile, non-stop bombing mission from bases in North Dakota striking a simulated runway target in the Republic of Egypt. (19:232,238,245)

While the SPF concept is no longer an advertised force package capability, the concept remains sound and any tailored force for integrated strategic and tactical conventional operations could indeed be a subset or extension of these capabilities. Command and control of integrated operations could prove impossible without such a force package capability.

CHAPTER III
CURRENT DOCTRINE, COMMAND STRUCTURES, AND
TECHNOLOGY AFFECTING STRATEGIC FORCES

The current Air Force basic doctrine in Air Force Manual 1-1, Basic Aerospace Doctrine of the United States Air Force, provides for use of Air Force airpower assets and does not specify a command or weapon system for any particular mission or role but instead identifies the requirement for flexibility and "smart" application of all available forces. It treats the relationship between strategic and tactical actions:

Strategic and tactical actions are not necessarily tied to specific geographical areas, operating environments, or types of vehicles. An air commander may employ any or all of his assigned forces to produce integrated strategic and tactical effects to support the overall objective.... Strategic and tactical actions are not mutually exclusive and to consider one in isolation of the other disregards their interdependence and their synergistic influence in warfare. (1:2-11)

This doctrine stresses freedom of action for aerospace forces to gain control of the aerospace environment and to conduct essential missions in support of land and naval forces. The guiding principle is to employ aerospace power as an indivisible entity based on objectives, threats, and opportunities. (1:2-10) The inherent flexibility of aerospace forces must be exploited by the air commander through consideration of all facets of the tactical situation and application of appropriate aerospace forces -- whether they

are tactical or strategic or the integrated application of both.

Current Air Force war-fighting doctrine is heavily influenced by the cooperation and integration required to support the US Army's AirLand Battle doctrine. This doctrine is promulgated in Army Field Manual (FM) 100-5, "Operations," of 20 August 1982 and describes the extended battlefield and concept of integrated warfare with synchronized air and ground operations, conventional and tactical nuclear support, and maneuver and fire support. The Air Force and Army Chiefs of Staff agreed in a memorandum of understanding on a process to support the development of forces and tactics to enhance joint employment of the AirLand Battle doctrine. Terms of reference (TOR) of this understanding served as a foundation of the joint force development effort and defined the battlefield by dividing it into three parts: the friendly rear battle area, the close battle area of the engaged forces', and the enemy's rear battle area. The close battle area and enemy's rear battle area were further subdivided into three zones. Zone 1 extended from the line of contact to 20 kilometers behind the enemy front. Zone 2 comprised the area from 20 kilometers to 150-250 kilometers behind the enemy front. Zone 3 encompassed the area beyond Zone 2 to a line 500-1000 kilometers beyond the enemy front. (13:32-37)

Friendly air and ground forces require the closest cooperation, integration, and synchronization in the close

battle area while in the deep enemy area synchronized joint or single service operations engage second and third echelons to destroy, delay, or disrupt these forces and their support. Integrated strategic and conventional forces' operations are envisioned to be in this deep enemy area primarily where close synchronization with ground forces is not required.

In applying current Air Force doctrine for integrated operations of strategic and tactical forces, the command structure for Strategic Air Command aircraft currently is vested in the major command headquarters. Headquarters, SAC at Omaha, Nebraska controls SAC aircraft and missile forces. The day-to-day operations of strategic forces are directed by the subordinate numbered air forces (NAFs) and their air divisions, including the overseas 7th Air Division at Ramstein AB, Federal Republic of Germany, in the US European Command area of responsibility for Eighth Air Force and the 3d Air Division at Andersen AFB, Guam in the US Pacific Command area of responsibility for Fifteenth Air Force. Eighth Air Force is located at Barksdale AFB, Shreveport, Louisiana and command controls CONUS SAC bases roughly east of Omaha. The Fifteenth Air Force is located at March AFB, Riverside, California and command controls CONUS SAC units roughly west of Omaha. In addition, SAC aircraft forces are assigned to the US Central Command area of responsibility and can be assigned by the NCA as required for the USCENTCOM. (12:Notes)

The Commander-in-Chief of SAC, General John T. Chain, Jr., has indicated that all B-52 units have been assigned conventional warfare tasking and are training for that mission. (4:20) General Chain has stated that B-52s would be assigned to the theater commander for conventional employment even though the aircraft will likely be deployed from their assigned CONUS bases. (29:55) This arrangement of "chopping" designated conventional SAC bombers with operational control by the theater commander would preserve unity of command doctrinal concepts for employment of airpower under a single air component commander, a doctrine which had been often violated in previous conflicts. Examples are:

SAC strategic-bombing forces may be employed within a theater in an interdiction campaign. In this role, SAC retains operational control of its forces, which are employed in support of the unified commander's objective. Targeting is accomplished within the unified command, with advice and assistance provided by the SAC ADVON [advanced operational nucleus], which is attached to the TACC [tactical air control center].... Coordination between the TACC and the SAC ADVON ensures that any required support by the TACC is identified and that appropriate air-operations orders are issued. Such support might include prestrike and poststrike reconnaissance, combat-air-patrol, and electronics-warfare support. (21:22)

Throughout three wars, World War II, Korea, and Vietnam, the command and control of airpower has been a major issue. Airpower has great flexibility to perform many tasks in war, and its ability to respond with varying levels of firepower to a variety of targets has led Army and Navy commanders to seek control of airpower as part of their forces.... Airmen know the centralized control of airpower in a theater of war can best serve armies and navies; to fragment airpower is to court defeat. In North Africa, Europe, Korea, and Vietnam this principle has been proven time and again. (26:107-108)

Technological Developments Affecting Strategic Aircraft Since the Vietnam Conflict. Technological improvements since the Vietnam conflict have provided increased capabilities for strategic aircraft. Many of the aircraft are B-52s over 25 years old but that have been modernized through modification with LLTV (low light television) and IR (infrared) sensors of the electro-optical viewing system (EVS), an offensive avionics system (OAS) that has dramatically increased bombing accuracy and maintenance reliability, a solid state forward-looking radar (strategic radar), a highly-capable reprogrammable electronic countermeasures suite (ALQ-172 (V)), and munitions upgrades providing increased capabilities. The short range attack missile (SRAM) and air-launched cruise missile (ALCM) as well as the US Navy developed Harpoon missile have proven to be highly capable on B-52s. Follow-on missiles to the SRAM, ALCM, and Harpoon as well as tactical forces' standoff missiles promise to provide increased capabilities and greater survivability for carrier aircraft. Strategic aircraft could be certified to employ these weapons in offensive, defensive, or defense suppression roles with proper modifications because of the inherent weapons carrying capability and onboard control systems of strategic aircraft (including the highly capable human factor given sensor systems of proper capability).

The B-1B will provide an enhanced capability over the B-52 with its ability to carry up to 84 conventional bombs

internally, its long range, and its ability to penetrate at low altitudes and speeds near the Mach. Additionally, the high load capacity and low observable (stealth) technology of the B-2A advanced technology bomber (ATB) combined with its inherent survivability and application of standoff weapons will ensure a precision strike capability across the entire spectrum of potential target systems. (25:222-223)

Advances in navigation systems such as the OAS and the NAVSTAR Global Positioning System (GPS) satellite system promise navigation and bombing accuracies that make strategic bombers viable conventional weapons delivery vehicles. New highly accurate standoff munitions further the capability of strategic aircraft to complement tactical aircraft in integrated operations. In addition, night vision goggles (NVG) and onboard bomber sensor systems contribute to bomber crews' ability to accomplish their missions at night and in bad weather. (9:99-104)

General Chain, CINCSAC, has stated that the toughest technological problem facing SAC planners is the hardening and increased mobility of potential Soviet targets which increases the difficulty of holding these targets at risk and hence maintaining credible deterrence. The requirement is for a system or systems to locate these targets and "cue" weapons systems such as manned bombers that can acquire and attack these targets. Such systems would greatly enhance integrated nuclear and conventional missions also. (34:78)

CHAPTER IV

COMMAND AND CONTROL SYSTEMS SUPPORT FOR STRATEGIC FORCES

Headquarters, Strategic Air Command. Headquarters, SAC has connectivity with the National Military Command Center (NMCC) and the National Command Authorities (NCA) through the Joint Chiefs of Staff by the JCS Alerting Network (JCSAN) secure voice communications system, landline telephone, the Ground Wave Emergency Network (GWEN), high frequency (HF), line-of-sight satellite ultra high frequency (UHF), and other systems as well as connectivity with the other U&S commanders.

SAC Headquarters is connected to two hundred SAC operating locations around the world by the Primary Alerting System (PAS). This system is tied directly to SAC strategic aircraft units as well as Eighth and Fifteenth Air Force headquarters which are also connected directly to all SAC aircraft wings. (38:26-27)

Strategic Air Command Aircraft Wings. SAC bombardment wings are in direct contact with Headquarters, SAC through the Primary Alerting System (PAS) and can be connected directly with the NMCC. SAC aircraft crews are netted to the "Giant Talk" HF network of fourteen worldwide ground stations as well as the UHF "Green Pine" stations across North America from Adak, Alaska to Keflavik, Iceland. In addition, the UHF Air Force Satellite Communications System (AFSATCOM) named GIANT STAR, which is integrated with US Navy Fleet Satellite

Communications System (FLTSATCOM), provides for worldwide integrated communications to SAC ground and airborne command posts as well as bombers and other aircraft. (38:26-27)

SAC is developing intelligence, mission planning, automated data processing, and communications systems for deployed operations that will enhance the command and control of strategic aircraft as well as assist planners and aircrews in adaptive and responsive planning for integrated operations. SAC Bomber System Capabilities. All SAC bombers can receive instructions on HF, UHF (including AFSATCOM), and by messages at home base and deployed locations. SAC's command control for its strategic bombers is legendary and virtually assured in peacetime operations. These command control operations are exercised on nearly all training missions for SAC bomber aircrews and are extremely effective. Procedures are established for redundant sources for message receipt including options for worldwide UHF AFSATCOM reception. SAC bomber aircraft can receive employment message traffic on HF, UHF (including AFSATCOM), and VHF (some capability), as well as relay from other systems and aircraft.

SAC bomber aircraft also possess Have Quick UHF radios that have some anti-jam capability through frequency hopping techniques. These radios are completely compatible with tactical forces' Have Quick equipment on the E-3A AWACS, fighters, and other tactical aircraft. Also, SAC bombers are being modified with miniature receive terminals (MRTs) that

will allow receipt of messages in the LF/VLF frequency bands with long range reception capability, nuclear-hardening, and excellent anti-jamming capability. (8:51)

In addition to command, control, and communications capabilities, SAC bombers also have a very sophisticated onboard electronic warfare capability and other self defense systems including flare dispensers, chaff dispensers, and some bombers have defensive gunnery systems. This defensive suite provides a very potent capability against all but the most capable groundbased and airborne defensive systems.

Target/Retarget Capabilities. Target information for bombers can be programmed by planners on mission tapes for insertion on aircraft offensive avionics systems or inserted by crewmembers on the ground or in flight. New target information can be inserted manually by crewmembers up to the last moment after receipt over HF, UHF (including worldwide AFSATCOM), or local relay from other sources. Targetting mobile/moveable target systems has been stated as an urgent requirement of strategic bombers. (34:78-79)

Strategic Projection Force Capabilities. The capabilities (especially command and control) formerly available in the disestablished Strategic Projection Force comprise a potent crisis or contingency "force" capable of responding quickly to situations around the globe. Since 3 February 1961, the SAC EC-135 airborne command post (Looking Glass) has provided continuous duty ensuring an alternate and enduring command

control capability to SAC Headquarters' "underground" command center. (19:100,101,278) SAC's EC-135s are capable of netting with other aircraft of the worldwide airborne command and control system and of providing an airborne enduring command and control capability. Therefore, SAC's EC-135s can fill in or complement theater CINC's command and control capabilities if so employed. SAC's EC-135 provides radio frequency spectrum coverage from very low frequency (VLF) to super high frequency (SHF) through numerous and redundant systems and carries a battle staff fully capable of employing SAC's bomber and missile forces. (38:30)

In addition, Strategic Projection Forces'-like capabilities could prove crucial to any strategic bombardment involvement in crisis or conventional situations around the world. Air refueling operations make long-range bombardment option a viable, time-critical option anywhere on earth. Also, time-sensitive reconnaissance and intelligence may be critical to bombardment operations and are organic to day-to-day SAC operations. Finally, the command and control capabilities inherent in the SAC EC-135s and Tactical Air Command's E-3A airborne warning and control system (AWACS) aircraft can greatly enhance control of strategic bomber aircraft in conventional or crisis operations.

Political and international concerns during a crisis or conflict could result in an environment where landing and overflight rights are denied to US military forces. In this

case, the intercontinental unrefueled range of SAC's bombers or the global single command nature of SAC's bombers and tankers team provide a flexible response capability from US bases that is unrivaled. The National Command Authorities possess the option of employing a crisis or contingency team from continental US bases that does not require international coordination for landing, refueling, or overflight rights. This capability could be packaged under a singular command element by the proper doctrine, command arrangement, and planning efforts.

It is well recognized by military planners that the first 48 to 72 hours of a conflict are potentially crucial. With a minimum or no warning time the LRCA [Long Range Combat Aircraft] ... B-52, B-1, etc. ... is the only conventional military force we can project to stem the tide of battle in those crucial hours. (6:2)

... Our current force of B-52 bombers provides theater commanders with highly responsive platforms able to rapidly deliver large, varied payloads in support of a broad range of missions on land or at sea. Its capability to project tremendous conventional power anywhere in the world is unrivaled by any other weapon system. (25:222)

CHAPTER V

STRATEGIC AND TACTICAL FORCES INTEGRATED OPERATIONS

Historical Perspective. Integrated operations of strategic and tactical assets have historically been plagued by doctrinal, organizational, and command arrangements since inception of airpower operations. Early concepts of the airplane being an extension of the eyes of the ground commander to determine disposition of enemy forces and to adjust artillery firing evolved into the concept of a separate airborne force capable of striking deep into the enemy heartland and affecting the morale and well-being of the enemy at home.

Doctrinal and command arrangement problems continued from the interwar years into World War II when Allied forces were initially ineffective against German forces in North Africa because airpower forces were tied to the ground forces they were supporting. Therefore, Allied air forces were unable to achieve the control and concentration necessary for the air superiority that allowed accomplishment of other airpower functions. Eventually, Allied air forces gained centralized control of air operations under General Spaatz and conducted integrated conventional operations through the Northwest African Air Forces and Air Marshal Tedder's Commonwealth Desert Air Forces. The US 12th AF (with about 300 strategic and 300 tactical aircraft) were integrated into the

Allied air forces that proved effective in repulsing Rommel across North Africa from Egypt. After air superiority was attained over the Germans in North Africa, the Allied air forces were able to systematically attack logistical lines of communications and directly support ground forces in driving Rommel and his Desert Corps out of North Africa finally forcing him to surrender his 270,000 German and Italian troops while escaping himself to Italy. (11:101)

In World War II ... both strategic and tactical bombing forces had been established under the full command of the air officer commanding in Northwest Africa. (21:53)

After the North African campaign, Allied airpower planners pursued the Casablanca Conference strategy with the all-out strategic bombing campaign of Germany and began plans for the cross-channel Operation Overlord invasion. However, pre-war notions that the bomber "will always get through" were laid to rest despite the 8th AF commander General Ira Eaker's conviction that "... 300 heavy bombers can attack any target in Germany with less than 4% losses." He unhappily discovered losses in the spring of 1943 sometimes approached 50% in certain raids. In July 1943, losses were 6.8%; in August, losses were 6.5%; and in October, 9.9% of the bombers were shot down or crashed. (14:105-106) After these losses, the strategic bombers no longer conducted strategic bombing deep into Germany without escort fighters.

The integrated conventional missions that resulted

from subsequent fighter escorted strategic bomber missions were effective. The P-47 Thunderbolt initially provided the escort for 8th AF bombers until the famous P-51 Mustang with the British Rolls-Royce engine took over the task. After the P-51 appeared in March and April of 1943, no part of Germany was exempt from the far-ranging Mustangs. (14:110) The 9th AF commander, Lieutenant General Elwood Quesada, stated that the P-51 was so effective in the role of defending the heavy bombers and making the Germans fight that he did not resist assigning them to the strategic effort despite the fact that he needed them for tactical missions. He accepted that the strategic role may have been the more profitable employment mode. (28:13) In the Mediterranean theater, P-47s and P-38s effectively escorted 15th AF heavy bombers to their targets in Rumania, Austria, and Germany. (11:106)

After D-Day for Operation Overlord, the Allied invasion of Europe (France), most US tactical and strategic aircraft were diverted from the offensive mission against the German homeland to providing close support to Allied ground forces. The 8th AF and 9th AF together had about 2900 heavy bombers, 3000 fighters, and 400 medium bombers. (11:111) As Allied ground forces swept across France in pursuit of the retreating Germans, Allied air forces attacked enemy air and ground forces, supplies, and lines of communications. Luftwaffe Commander-in-Chief General Von Rundstedt stated after the war that the superiority of Allied air forces, the lack

of German oil and gas supplies, and the disruption of German lines of communication were the keys to Allied success. (11:116) The strategic bombing mission did not replace the traditional conventional missions but had in fact complemented them just as fighters in the escort role complemented the strategic bombing mission. Integrated conventional airpower had again proved crucial in the Allied victory.

... there is an area of integrated application between the historic functions of these systems [strategic and tactical] in which either aircraft type can perform--either strategic or tactical actions. This 'gray area' represents the ... naval air strategic effort against Japan, the B-17 and B-24 carpet bombing campaign in support of the Normandy invasion, and the combined bomber/escort fighter air superiority struggle over Germany This perspective acknowledges both the necessity of bombers and fighters ... for flexibility ... (28:55-56)

During the Korean conflict, integrated conventional operations were conducted routinely as strategic forces were subordinated to the Far Eastern Air Forces commander and used to attack strategic and tactical targets as the tactical situation required.

... about Korea ... old concepts that certain targets were 'tactical' and others were 'strategic' were abandoned, and so far as FEAF (Far East Air Forces) resources were concerned, airpower was undivided by artificial and unreal attempts to classify targets by types of aircraft. (16:504)

Typically, airpower forces have adjusted to practical reality by exercising the inherent flexibility of this mode of warfare. Flexibility and long range have always characterized airpower. (28:26-27) Development of command structures to support flexible employment of airpower has evolved

erratically but generally has supported theater commanders' objectives. Attention to this aspect of war-fighting has proven to be crucial historically and could again be significant.

The theoretical case for giving operational control to the theater commander is simply stated. Unified direction of the entire air effort through the air component commander can be thereby obtained. Integration of the strategic-force effort with the total air campaign can be more readily achieved. (21:54)

AWACS Control Capability. The E-3A Sentry AWACS possesses unique control capability because of radar and communications aspects. Capabilities enable AWACS airborne controllers to control multiple airborne intercepts as well as to coordinate ongoing tactical operations including integrated conventional operations in a restricted area. Coordination may be limited to communications check-in, initial flight following, and deconfliction with friendly forces, advisories for aircraft ingressing and egressing enemy territory but could serve the essential services needed for strategic aircraft depending on the threat. In high threat scenarios, the AWACS may be the coordinating agency for control of the entire strike package including fighter escorts, fighter-bombers, electromagnetic combat aircraft, strike-reconnaissance aircraft, tankers, and bombers.

RED FLAG/GREEN FLAG Exercises. SAC bombardment units have been participating in the RED FLAG/GREEN FLAG (RF/GF) conventional and electromagnetic combat exercises at the Nellis AFB ranges for many years. In early 1987, the 7th Bombardment

Wing became the first bombardment unit to fly daily sustained conventional missions at RF/GF over a two-week period to develop tactics for conventional operations. These operations are vital for bombardment units but planners must participate and derive maximum benefit if true integrated conventional operations are expected. A shortage of strategic planners for the unified commands exists and additional planners must be trained if true integrated operations of strategic and tactical forces in conventional operations are anticipated. In addition, strategic planners must coordinate and crosstalk with conventional planners for progress to be made in the integrated mode of operations.

Continued participation of strategic bombardment units in joint/combined operations and exercises must be insured to derive maximum benefit. In addition, operational planners from unit level must participate and an active cross-talk and lessons learned program developed. Procedures and tactics should be coordinated at the major command level to capitalize on exercise experiences.

Target ranges available and target times should be expanded to allow bombardment units to achieve surprise and practice tactics that are more realistic for large, long-range aircraft (e.g. early morning, late afternoon, or night penetrations; multiple ingress/egress routing; concentration; massing of forces; full threat array activation; utilization of multiple axes; etc.).

Joint Planning Groups. In order to prosecute effective integrated strategic and tactical conventional operations, proper planning must be conducted. Planning staffs or groups must be established to coordinate and plan these operations. Current SAC conventional planning is coordinated in the unified commanders' theaters by SAC ADVON groups. This capability resides in small numbers of planners and should be greatly expanded in order to capitalize on synergism of integrated planning with tactical groups. The 1988 Aerospace Power Symposium at Air War College addressed strategic aircraft in integrated conventional operations and concluded that the unified commanders with operational control of the strategic aircraft should be responsible for integrated operations planning. In order to do this, large groups of operational planners must be trained in truly integrated conventional operations.

CHAPTER VI

CONCLUSIONS

The concept of integrating strategic and tactical aircraft in conventional operations is not new. Indeed, airpower history is ripe with examples -- some effective and others not so effective. Often doctrine or command structure problems precluded effective integration of strategic and tactical forces. Available technology often impacted doctrine, force structure, and operational employment.

Doctrine prior to World War II divided air forces between support to ground forces and strategic bombardment forces designed to operate independently. Command arrangements reflected this doctrine. Airpower leaders adapted their doctrine, command structures, and employment operations during WW II to capitalize on the inherent flexibility of airpower. The guiding tenet of airpower came out of operations during this war -- centralized control of air forces under a single air component commander and decentralized execution of these forces. Integrated conventional operations of strategic and tactical air forces were effectively demonstrated with fighter escorted bomber operations and strategic bombers providing support to ground forces at appropriate times and places.

After World War II, new command arrangements resulted from the establishment of the Strategic Air Command and later

the independent United States Air Force. The Key West conference and the National Security Act of 1947 (with its amendments) formalized the roles and missions of the Services and the command structures of the US armed forces. Doctrine was heavily influenced by the US nuclear superiority. Technology including the atomic devices, improved weapons delivery accuracy, and long range aircraft profoundly affected US doctrine and command arrangements.

The Korean and Southeast Asian conflicts were characterized by faulty doctrine and evolving command structures that sometimes impeded effective military operations. At other times leaders were able to adapt with integrated strategic and tactical operations such as the B-29 bombing support to Allied forces in Korea and the Khe Sanh and Linebacker II airpower campaigns in Southeast Asia. Technology again provided flexibility in airpower operations with radar, improved weapons with better accuracy, jet engines, and missiles. Innovative employment operations often overcame faulty doctrine and employment restrictions.

Developments since the Vietnam conflict have included doctrinal, command structure, and technological change. Most dramatic is technological change with great increases in military capabilities and the lethality of weapons. Some military analysts predict the effectiveness of modern precision munitions to approach that of nuclear weapons. These technological developments will impact doctrine and command

structures as their military functional utility is realized.

Current Air Force basic doctrine supports the integrated and coordinated application of strategic and tactical forces in all aerospace tasks, including conventional operations. AirLand Battle doctrine emphasizes the integrated and synchronized air and ground forces' employment to prevail over the determined enemy. Command structures are evolving to support joint, combined, and coalition aspects of Allied strategy for war-fighting. The LINCSPAC's decision to provide dedicated strategic aircraft for conventional employment under theater commanders' operational control and dual qualification of all SAC bomber aircrews for nuclear and conventional roles underwrite the new command arrangements.

Numbers of available air force systems has declined as the Soviet threat has increased so previous wartime attrition rates cannot be tolerated. Doctrine, command arrangements, tactics, and training must reflect this reality. The impending intermediate nuclear forces (INF) agreement between the superpowers and forecast limitations on strategic nuclear systems combine to promise increased importance of strategic bomber aircraft to US national security. The requirement for increased conventional capability for deterrence and escalation control make the strategic bomber contribution to integrated strategic and conventional operations a crucial war-fighting capability.

To preclude the doctrinal and command arrangement

problems that have plagued the integrated conventional operations of strategic and tactical forces previously, an aggressive and graduated building block approach to the education and training of our military forces, both strategic and tactical, should be instituted. Initial steps have already been undertaken with recent SAC commanders' commitment and determination to support unified commanders in conventional operations. The institution of the "Warrior Spirit" in all SAC personnel programs is a necessary and welcome aspect of the new commitment.

Strategic forces must take every opportunity to participate in joint exercises such as Red Flag/Green Flag and the National Military Training Center as well as the unified commanders' exercises. The great shortage of trained planners and operators, the key to integrated strategic and tactical operations, must be overcome. Planners must participate, train, and educate our military forces as to the capabilities and limitations of our strategic aircraft in order to effectively employ these forces in integrated conventional operations.

The SAC Rapid Shot deployment exercises should be expanded to develop planning, operations, and support with actual exercise of wartime tasking packages in accordance with Air Force 28-series regulations mobility requirements and SAC 3-1 and 55-7 regulations as well as unified commanders' operations plans that are assigned. Maximum

participation of joint planners would derive much benefit.

In addition, a "Checkered Flag-like" program of "winter" deployment bases with actual training deployments of complete packages should be developed. SAC ADVON or other control and planning groups from the unified command should aggressively participate. Actual wartime command arrangements with the proper authorities should exercise, train, and refine command and control procedures. Standardized procedures should be developed and disseminated at the major command level to insure effective integrated operations. These planning and training efforts should strive for a unity of effort and be flexible in order to accommodate technological advances (e.g. new standoff and precision guided munitions), changing mission requirements, and new concepts of operations. Entire support packages including command, control, logistics, administration, supply, intelligence, operations, and communications should be exercised with their wartime tasking to educate, train, and evaluate their capabilities and limitations. Command and control assets both on the ground and airborne must be exercised in realistic scenarios to develop operating tactics and procedures.

Command and control of strategic aircraft operating in integrated conventional operations may be a decisive factor in the next conflict as the threat continues to overtax our conventional capabilities. However, proper doctrine, command arrangements, control systems, and support

must be available to planners and operators to properly employ these expensive and scarce strategic resources. SAC has indicated that a SAC general officer will be available to advise the theater air component commander on the strategic forces' capabilities and limitations in providing maritime, interdiction, and ground forces' support. The command structure is the normal theater structure with control provided by normal channels and procedures. A specific package for SAC command and control and intelligence functions may have to be developed and exercised. Peacetime command and control systems are very reliable and effective but may not be available when a conflict starts. Planners must have flexible options to command and control the force in war conditions. Doctrine and command structures are appropriate for integrated conventional operations. However, much planning, educating, and training will be required to develop and refine tactics and procedures for truly integrated operations. The key for success is foresight and hard work in preparing our military forces with the doctrine, command arrangements, control systems, plans, and readiness to execute airpower tasks in integrated conventional operations.

The challenge is ahead for military planners; history has provided the lessons. Planners will determine the readiness of strategic and tactical forces to effectively operate in integrated conventional operations. The expansion of operations into conventional operations in all theaters

around the globe brings with it new challenges and opportunities.

Aerospace power, because of its increasingly global nature will require a command and control philosophy and structure that enhances its changing nature. Both central [strategic] and theater planners must develop a global perspective toward aerospace operations. (28160)

In order for effective command and control of strategic aircraft in integrated conventional operations, planners must conceptualize, organize, plan, and then execute these plans by training and refining doctrine, command structures, and operational procedures in order to capitalize on evolving technology and military requirements. The first steps have been taken but a lot of hard work and hard thought remains before the crucial command and control capability for integrated conventional operations is attained. But US military planners must provide this capability if integrated conventional operations against our determined adversary are to be successful.

LIST OF REFERENCES

1. Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine of the United States Air Force. (Washington, DC: Government Printing Office, 16 March 1984). pp. 1-1-4-10.
2. "America in the Air War." From the Time-Life The Epic of Flight Series. Edited by Edward Jablonski and editors of Time-Life Books. (Alexandria, Virginia: Time-Life Books, 1982). pp. 53-79, 163-172.
3. Armitage, M.J. and R.A. Mason. Air Power in the Nuclear Age. (Urbana, Chicago, and London: University of Illinois Press, 1983). pp. 8-25.
4. "B-52s for Europe?" Air Force Magazine, Vol. 70, No. 12, December, 1987, p. 20.
5. Beaumont, Roger. "The Bomber as a Second Front." Journal of Contemporary History, Vol. 22, 1987, pp. 3-19. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 2, pp. 41-47.
6. Bodenheimer, Clyde E., Colonel, USAF. The Impact of New Technology Weapons on SAC Conventional Air Operations. (Maxwell Air Force Base, Alabama: Airpower Research Institute, 1983). pp 1-10.
7. Brodie, Bernard. Strategy in the Missile Age. (Princeton, New Jersey: Princeton University Press, 1959). pp. 71-107.
8. Canan, James W. "Electronics for the High Ground." Air Force Magazine, Vol. 69, No. 7, July 1986, pp. 45-51.
9. Canan, James W. "Storm Flags on the Budget Front." Air Force Magazine, Vol. 71, No. 1, January 1988, pp. 98-104.
10. Cardwell, Thomas A., III, Colonel, USAF. Command Structure for Theater Warfare: The Quest for Unity of Command. (Maxwell Air Force Base, Alabama: Air University Press, 1984). pp. 1-85.
11. Christy, Joe. American Air Power: The First 75 Years. (Blue Ridge Summit, Pennsylvania: Tab Books, Inc., 1982). pp. 1-192.

12. Crist, George B., General, USMC. (Notes from a presentation to Air War College Class of 1988 on 28 February 1988).
13. Davis, Richard G. The 31 Initiatives: A Study in Air Force-Army Cooperation. (Washington, DC: Office of Air Force History, 1987). pp. 1-145.
14. Emerson, William R. "Operation Pointblank: A Tale of Bombers and Fighters." The Harmon Memorial Lectures in Military History, No. 4, pp. 1-45. Reprinted in Air War College Resident and Associate Programs, Air War College, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 2, pp. 98-111.
15. Futrell, Dr. Robert F. "Integrating Strategic and Tactical Air Power in Conventional Warfare in Korea, 1950-1953." (Notes from a paper presented to the Twelveth Aerospace Power Symposium, Air War College, Air University, Maxwell Air Force Base, Alabama, 2-4 March 1988).
16. Futrell, Dr. Robert F. The United States Air Force in Korea, 1950-1953. (Washington, DC: Office of Air Force History, 1983). pp. 490-504.
17. Gropman, Alan L. "The Battle of Britain and the Principles of War." Aerospace Historian. Fall/September 1971. pp. 138-144. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 1, pp. 102-108.
18. Hansell, Haywood S., Jr., Maj Gen, USAF (ret.). "The Air Plan That Defeated Hitler," Air Force Magazine, July 1980, pp. 106-113. Reprinted in the Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 2, pp. 141-148.
19. Hopkins, J.C. and Sheldon A. Goldberg. The Development of Strategic Air Command 1946-1986. (The Fortieth Anniversary History) (Offutt Air Force Base, Nebraska: Office of the Historian, Headquarters Strategic Air Command, 1986). pp. 1-280.
20. Huston, John W., Maj Gen, USAF (ret.). "The Wartime Leadership of 'Hap' Arnold." Air Power and Warfare. (Washington, DC: Office of Air Force History, 1979). pp. 168-185.

21. Lane, John J., Jr., Lt Col, USAF. Command and Control and Communications Structures in Southeast Asia. (Maxwell Air Force Base, Alabama: Airpower Research Institute, 1981), pp. 1-78.
22. Lemay, Curtis E., General, USAF (ret.). "Strategic Air Power: Destroying the Enemy's War Resources." Aerospace Historian, No. 27, Spring 1980, pp. 9-15. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 2, pp. 149-154.
23. MacIsaac, David. "The Evolution of Air Power Since 1945: The American Experience." War in the Third Dimension, Air Vice Marshal R.A. Mason, Ed. (London: Brassey's Defence Publishers, 1986). pp. 11-31.
24. MacIsaac, David. Strategic Bombing in World-War Two. The Story of the United States Strategic Bombing Survey. (New York and London: Garland Publishing, Inc., 1976) pp. 1-168.
25. McCarthy, James P., Lt Gen, USAF. "SAC Looks to the Future." Air University Review, Vol. 38, No. 2, January - March 1987, pp. 14-23. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Strategic Force Employment," Department of Aerospace Doctrine and Strategy, pp. 220-223.
26. Momyer, William W., General, USAF (ret.). Air Power in Three Wars. (Washington, DC: Government Printing Office, 1978). pp. 1-339.
27. Mowbray, Dr. James A. "The Fabric of Air Warfare: Doctrine, Operational Experience, and the Integration of Strategic and Tactical Air Power from World War I Through World War II." (Notes from a paper presented to the Twelfth Aerospace Power Symposium, Air War College, Air University, Maxwell Air Force Base, Alabama, 2-4 March 1988).
28. Myers, Grover E., Major, USAF. Aerospace Power. The Case for Indivisible Application. (Maxwell Air Force Base, Alabama: Air University Press, 1986). pp. 1-64.
29. Rhodes, Jeffrey P. "Up to the Test - Chain on the Mission." Air Force Magazine, Vol. 71, No. 2, February 1988, pp. 52-55.

30. Schligh, John. "The Impact of the Orient on Air Power." in Joe C. Dixon's (Ed.), The American Military and the Far East: Proceedings of the Ninth Military History Symposium. (Washington, DC: Government Printing Office, 1980). pp. 160-171.
31. Shiner, John F. Foulois and the U.S. Army Air Corps, 1931-1935. (Washington, DC: Office of Air Force History, 1983). pp. 63-78, 140-144.
32. Smith, Dale O., Colonel, USAF, and Maj Gen John Def. Barker, USAF. "Air Power Indivisible," Air University Quarterly Review 4, No. 2, (Fall 1950). p. 7.
33. "The RAF at War." From the Time-Life Epic of Flight Series. Edited by Ralph Barker and the editors of Time-Life Books. (Alexandria, Virginia: Time-Life Books, 1981). pp. 47-171.
34. Ulsamer, Edgar. "Strategic Connections in Space." Air Force Magazine, Vol. 70, No. 8, August 1987, pp. 78-84.
35. Warner, Edward. "Douhet, Mitchell, Seversky: Theories of Air Warfare." Makers of Modern Strategy from Machiavelli to Hitler. Edward Mead Earle, Ed. (Princeton, New Jersey: Princeton University Press, 1971). pp. 485-501. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 1, pp. 189-198.
36. Watts, Barry D., Lt Col, USAF. "The First U.S. Strategic Air War Plan." The Foundations of U.S. Air Doctrine, (Maxwell Air Force Base, Alabama: Air University Press, 1984). pp. 17-23. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 2, pp. 137-140.
37. Weigley, Russell F., "The Strategic Tradition of U.S. Grants: Strategists and the European War." The American Way of War. (Bloomington, Indiana: Indiana University Press, 1973). pp. 312-317. Reprinted in Air War College Resident and Associate Programs, Air University, Maxwell Air Force Base, Alabama, Resident Studies Readings AY 1988, "Military Strategy Analysis," Department of Aerospace Doctrine and Strategy, Book 2, pp. 37-40.
38. Yenne, Bill. SAC, A Primer of Modern Strategic Airpower. (Novato, California: Presidio Press, 1985) pp. 1-138.