Combat Support

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Fifty Years of Air Force Logistics, 1947–1997

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By its very nature, the Air Force is more heavily weighted on the tail end of the tooth-to-tail equation. The inescapable fact is that, for the most part, a limited number of aircrews, special operations personnel and other miscellaneous groups carry out the Air Force's combat engagement mission with the support of a larger logistics tail. Over the past fifty years, the logistics menagerie has evolved along with the service's weapon and support systems, technology, roles, missions and combat experience. Rapid technological advances have allowed logisticians to dramatically improve both the quality and the timeliness of logistics support, and there is no reason to believe this trend will not continue into the future.[1]

When the United States Air Force (USAF) gained its independence from the Army in 1947, the United States faced no immediate military threat. Vanquished World War II enemies struggled to rebuild their countries while victorious European allies grappled with restoring their battered nations. America rapidly demobilized after the war, leaving mountains of air war materiel strewn about the globe and tens of thousands of aircraft stored around the United States. At the same time that the Air Force was dismantling its World War II–era piston-engine armada, it was embarking on the development of an atomic/jet air and space force. This task gained added urgency in the late 1940s when the country and its allies found themselves engaged in a marathon Cold War with the Soviet Union, China and their client states, and fighting a hot war in Korea. At the close of 1947, the Air Force numbered 339,000 military personnel and employed an additional 111,000 civilians, down from 2.3 million and 410,000, respectively, three years earlier. Aircraft on hand had fallen from a wartime high of 78,000 to 23,000 in 1947, and most of these were in storage.[2]

From a logistics viewpoint, the USAF faced two primary tasks in 1947: culling the vast store of materiel left over from World War II, and reequipping itself with modern aircraft and support equipment. The mass exodus of skilled support personnel from the Army Air Forces (AAF) following the war and a

precipitous drop in defense spending hampered these efforts.

During the closing months of World War II, the Air Service Command began an aircraft storage and distribution program. By 1947, responsibility for the program had passed to the Air Materiel Command (AMC). Briefly, the program involved finding suitable storage sites for the aircraft, selecting aircraft for operational reserve or scrap, preparing the aircraft for storage and, when necessary, removing the aircraft from storage and returning them to operational units in serviceable condition. In 1946, AMC storage facilities held 16,000 aircraft. At first the AAF stored aircraft at dozens of locations. However, as AMC trimmed the inventory, a few climate-friendly sites came to serve as the primary storage facilities: Davis-Monthan Field, Arizona; Peyote Field, Texas; Hill Air Field, Utah; and Tinker Field, Oklahoma. Beginning in 1947, the Air Force began transferring excess aircraft to the Air Force Reserve, the Air National Guard and numerous foreign air forces.[3]

Dealing with surplus nonaircraft materiel and property proved more taxing. In the spring of 1947, AMC still did not know the content of its worldwide inventory. Immediately after World War II, the AAF began developing a World-Wide Stock Control and Reporting System as a tool to manage its inventory, but it was not fully implemented until after the Korean War. The bulk of the materiel in Europe, mostly in the United Kingdom, had been declared surplus and sold for token sums. The situation in the Pacific theater was more complicated. There, the materiel lay scattered across the Pacific at locations such as Guam, the Philippines, Australia, New Guinea, Japan and Okinawa. Immediately following the war, under Operation Packout, the AAF (and later the USAF) dispatched caretaker personnel to catalog, pack and assist in disposal of the supplies and equipment. However, as late as 1950 vast stores of materiel remained in place at the Pacific outposts. In the continental United States (CONUS), the USAF rapidly reduced its depot structure, but the service found disposal efforts very slow going. Working with the Reconstruction Finance Corporation, the Central Surplus Property Agency and later the General Services Administration, AMC chipped away at the mountains of USAF property and supplies that ranged from aircraft factories to spark plugs. Despite an accelerated disposal program begun in 1949, five years after the end of World War II, Air Force warehouses still bulged with war surplus.[4]

Between 1947 and 1948, the President's Air Policy Commission (Finletter Commission) and the Congressional Aviation Policy Board (Brewster Committee) examined the status of America's military air power and the country's aviation industry. Both committees concluded that the Air Force required a minimum of seventy combat groups (or wings), equipped with new aircraft, in order to meet the nation's security needs. Reaching this ambitious goal required a significant expansion of aircraft production with an accompanying increase in flight crews, support personnel and materiel support. To achieve this end, the Air Force established the Five-Year Aircraft

Procurement Program, to be executed from 1948 through 1952. However, President Harry S Truman worried that such a rapid Air Force buildup might be construed domestically and internationally as a threatening rearmament, and neither he nor Congress wanted to spend the money required. By 1950, a lack of funds compelled the Air Force to revise its procurement program to provide for only a forty-eight-group program. With the limited dollars available and development-to-production lead times growing, an all-jet combat fleet appeared to be many years away. On the eve of the Korean War, the Air Force had inched its way into the jet age, but the bulk of its aircraft still consisted of World War II designs. As noted, many of these aircraft remained in storage.[5]

During the peacetime interlude, the Air Force fine-tuned its maintenance procedures and organization. At the command level, AMC adopted a two-zone support system, dividing the CONUS into self-sufficient maintenance and materiel support zones along the Mississippi River, east and west. Air Materiel Areas (AMAs)—AMC's primary maintenance, repair and support facilities—and specialized depots provided support to the operational units within their zones. In 1947, in the area of aircraft maintenance, the Air Force replaced the four-echelon maintenance system developed by the AAF during World War II with a three-division system—organization, field and depot. Under the new system, the organization (unit ground crews) performed flight-line inspections and preventive maintenance. Field maintenance included repairs requiring fixed shops, skilled mechanics and heavy precision tooling and was performed at the air base level. Depot maintenance included aircraft and component overhaul and major modifications performed at a CONUS AMA or at one of the overseas depots located at RAF Burtonwood, England, or Tachikawa Air Base (AB), Japan. The same year, 1947, at the direction of HQ USAF, all wing/base organizations adopted a standard organizational structure that included maintenance and supply groups and airdrome groups (later renamed air base groups). The new organizational changes functioned well, but the mass exodus of skilled personnel following demobilization and a corresponding reduction-in-force among civilian workers left the flying units and depots short-handed and facing a skills imbalance. Retraining mechanics for jet aircraft support added further complications. By 1950, a concerted recruitment effort alleviated the military personnel problem, returning balance to the Air Force's skill and rank structure. Unfortunately, Washington did not provide the funds to rebuild the civilian depot work force, and the system was strained to the limit at the outbreak of the Korean War.[6]

North Korea's invasion of South Korea in June 1950 caught the United States by surprise, but not totally unprepared for the ensuing air war. To be sure, at first the Air Force scrambled to throw the right types of aircraft and trained personnel into the fight and hustled to provide the required support. However, even at the height of the Korean War, the Air Force committed no more than one-fourth of its resources to the Far East Air Forces (FEAF), which

consisted of the Fifth, Thirteenth and Twentieth Air Forces. Throughout the war a sizable portion of FEAF remained committed to regional air defense. Despite the deliberately limited nature of the conflict, the impact of the war reached well beyond the Korean peninsula. More than demonstrating that the United States and its allies would use military force to contain communist aggression, the war spurred the expansion of the USAF and allied armed forces, particularly those of the North Atlantic Treaty Organization, the latter with considerable materiel assistance rendered through the Mutual Defense Assistance Program ([MDAP], later renamed the Military Assistance Program [MAP]).[7]

Within days of the first offensive air operations, the United Nations Command enjoyed air superiority over the North Koreans. Providing FEAF with additional aircraft, building air bases in Korea capable of supporting jet aircraft and heavy transports, establishing a supply line, creating in-theater base-level and depot-level maintenance capabilities, and expanding CONUS logistics support capabilities—all these tasks took longer.[8]

When the Korean War began, FEAF possessed a mix of approximately 1,200 aircraft, less than half in operational units, stationed on Guam (including 19th Bombardment Wing conventionally armed B–29s) and Okinawa and in the Philippines and Japan. Organized and equipped as a defensive force, the bulk of FEAF's air fleet consisted of F–80C fighters. Primarily configured for air-to-air combat, these F–80s were not particularly suited for the task at hand because they could not operate from the austere air fields in Korea, the battlefield lay at the limit of their range from the air bases in Japan, and they were not equipped to carry both bombs and external fuel tanks. None was equipped with pylon bomb racks. Nevertheless, FEAF easily made quick work of the North Korean Air Force, but immediately found itself in pressing need of more transports and ground attack aircraft both to augment the forces on hand and to provide attrition replacements. To fill FEAF's requirements, the Air Force transferred operational units from the CONUS and Alaska to FEAF, withdrew and reconditioned aircraft from storage, and took aircraft from Air Force Reserve and Air National Guard units, replacing their planes with ones withdrawn from storage. In this way the Air Force rapidly placed hundreds of additional F–51s, F–82s, newer model F–80s, B–26s, B–29s, transports, helicopters and reconnaissance planes under FEAF's operational control. As the war ground on and aircraft acquisitions accelerated, the Air Force introduced newer planes such as the F–84, F–86 and F–94.[9]

Few paved runways existed in Korea before the war, and none was suitable for sustained combat jet aircraft operations. Additionally, nearly every airfield of any consequence in both North and South Korea was damaged to some extent during the seesaw attacks and counterattacks of the first six months. Consequently, for the first months of the war, all USAF jet operations originated from bases in Japan. F–51s, C–46s, C–47s and C–54s could oper-

ate from the crude Korean air strips. These World War II aircraft proved invaluable, therefore, in the early fighting. The creation of a network of jet-capable air bases became absolutely necessary once the Chinese and North Koreans introduced MiG–15s into the war. This task fell to the combat engineers. When the United Nations forces broke out of the Pusan Perimeter and pushed north, engineer aviation units followed. These hybrid USAF–U.S. Army units (Special Category Army Personnel with Air Force), augmented by local contract labor, constructed the pierced-steel plank runways that first brought short-range F–80 jet fighters and RF–80 reconnaissance jets closer to the enemy. As the battlefront stabilized, the engineer aviation units constructed permanent air bases with concrete or asphalt runways that could better withstand the wear and tear of jet fighter and C–124 heavy transport traffic. After tenant USAF units moved into an air base (either temporary or permanent), USAF installations squadrons assumed responsibility for air base maintenance and improvement. As with the engineer aviation units, the installations squadrons relied heavily on local labor and materials.[10]

The Far East AMC, later redesignated the Far East Air Logistics Force (FEALOGFOR), managed the supply and maintenance of USAF forces in the theater. At first, FEAF relied on remaining World War II supplies and on the limited peacetime operating stocks available in the region. The high tempo of action, however, quickly depleted these sources. As the war escalated, FEAF materiel requirements mushroomed, increasing over fivefold by 1952 and straining the logistics pipeline stretching across the Pacific. Air Force issues of fuel alone increased from 591 million gallons in fiscal year 1950 to 2.1 billion gallons in fiscal year 1953.[11] The Sacramento AMA directed the flow of materiel to the growing supply and maintenance depots in Japan, Korea and the Philippines. In August 1950, to ease supply and maintenance efforts, HQ AMC established direct teletype communications with HQ FEAF. At first, AMC applied the "push" supply principle, which meant that the Air Force rushed to the theater all of the available supplies that AMC logisticians believed FEAF might need. In addition, AMC scrambled to ship the flood of specific high-priority supplies and spares requested by FEAF. The depot at Tachikawa was large enough to absorb most of the incoming materiel, but the limited port facilities in Korea quickly became saturated. All through the war AMC and FEALOGFOR made a determined effort to keep theater inventory levels at sufficient levels to meet consumption, but because consumption forecasting was not yet reliable, supply requirements and availability did not always match. Fortunately, given the distance between the sources of supply in the United States and the fighting forces in the Far East, Japan served well for theater procurement, quickly becoming a reliable source for raw materials and manufactured items that ranged from munitions to radios and aircraft external fuel tanks.[12]

With the Pacific Ocean standing between FEAF and its sources of sup-

ply in the United States, transportation loomed critical. Moving supplies to Korea did not become too difficult, but moving supplies within Korea and tracking individual shipments as they wound their way through the supply line did indeed prove troublesome. The Military Sea Transportation Service provided sea lift. The Military Air Transport Service airlifted high-priority supplies from the CONUS to either Japan or Korea. The 315th Air Division (Combat Cargo) conducted in-theater air transport, while the U.S. Army carried the burden of ground transportation in Korea.

Aircraft operating from Japan and Okinawa did not experience major maintenance difficulties. Flying units operating from airfields behind the ground troops in Korea encountered considerable maintenance and supply problems, and these difficulties remained unresolved until the battle line stabilized and the aircrews, support personnel and aircraft settled into permanent air bases. As noted, the Air Force aircraft maintenance system operated on a three-tier system that required field maintenance (utilizing fixed shops and precision equipment) be performed at the air base/wing level. As Air Force units moved north, then retreated, and again moved north, valuable truck-transported equipment was captured, destroyed and lost in the shuffle. In many cases, maintenance personnel simply did not have enough time to set up the necessary shops. Even when the battleline stabilized, crude forward base conditions and the high tempo of operations caused the quality of field-level maintenance to slip. The mechanical condition of aircraft deteriorated. To alleviate this situation, FEAF established Rear Echelon Maintenance Combined Operation (REMCO) shops. Located at secure rear-area bases, REMCO shops acted as in-theater maintenance centers, performing field maintenance and some depot-level functions such as battle damage repair, basic airframe overhaul, modifications and engine repair. Forward operating base mechanics performed only flight-line inspection and maintenance and simple field-level repair. Aircraft were flown back to REMCO shops for more complicated maintenance.[13]

The Korean War was the final event that nudged the United States into large-scale rearmament and an accompanying expansion of AMC depot activities. Until 1950, the Air Force had been cutting back on maintenance and supply personnel and facilities. The war reversed this trend. Activity at AMC's eight AMAs and eighteen supply depots expanded rapidly as the command, with contractor support, overhauled and modified increasing numbers of aircraft, engines and subsystems for the USAF and MDAP countries. The number of personnel (overwhelmingly civilian) within the command climbed from 101,000 in 1950 to 191,000 in 1953. In 1951, AMC overhauled 1,949 aircraft and 27,919 engines. In 1954, the Command reconditioned 4,512 aircraft and overhauled 27,500 engines. Acquisition, supply and maintenance activities remained at this high tempo until the aircraft buildup peaked in 1957.[14]

China's entry into the Korean War put an end to bureaucratic wrangling

over the Five-Year Aircraft Procurement Program, radically changing the scope and pace of aircraft acquisition. The Air Force entered the war with a 48-wing fleet, but within six months both Congress and the President supported expanding the Air Force to 95 wings by June 1952. However, Washington did not want to disrupt the civilian economy. The Air Force therefore initiated a relatively gradual general rearmament program, as did the other services. Because the Air Force maintained an ongoing research and development program, private industry already had an array of new model aircraft in low-rate production, such as the F–86, F–89, B–47 and C–124, ready for immediate increased production. Aircraft set to move from research and development to production within a few years included the Century-series fighters, the B–52, the C–130 and the KC–135. Congress quickly provided money for new aircraft, increasing funding for aircraft acquisition from $1.5 billion at the beginning of 1951 to $10 billion by the end of the year. Unfortunately, Air Force industrial mobilization planning had not anticipated rearmament under a peacetime economy. As a result, the rearmament program proceeded without federal economic controls. The expansion program immediately encountered numerous difficulties such as manufacturers promising more than they could deliver, labor shortages, strikes and material shortages. Despite these problems, production steadily increased. To reach production goals for aircraft, engines and spares, the Air Force reactivated fourteen standby production plants for use by contractors. Additionally, private industry constructed new factories, reversing a retrenchment dating from 1945. At first, production focused on aircraft then in production, such as F–84s, F–86s, C–119s and B–47s. Between 1953 and 1957, production shifted to newer aircraft. In 1950 the Air Force acquired 1,652 new aircraft. By 1954 annual production climbed to 5,662 and then began to decline. As of December 1956, the Air Force had grown to 134 combat and troop carrier wings employing 25,000 aircraft.[15]

Congress, on October 6, 1949, enacted the Mutual Defense Assistance Act as a companion to the North Atlantic Treaty. The program was intended to rapidly rearm NATO, rejuvenate the Western European armaments industry, and boost the revival of Western Europe's economy. Subsequent funding legislation provided $1.5 billion in fiscal year 1950 for military assistance in the form of surplus military hardware, spares and cash grants for the purchase of new American-manufactured equipment, offshore (non-U.S.) procurement and in-country armament production. Congress appropriated tens of billions of dollars more over the following years. AMC, in coordination with other government entities, acted as the administrative agent for aircraft materiel assistance. Political and bureaucratic difficulties prevented the Air Force from obligating any funds until early summer 1950. As a result, the program got underway just as the Korean War broke out. The Air Force and its contractors thus faced the logistical task of simultaneously refurbishing surplus equipment and acquiring new equipment and spares for the forces engaged in the war, for the Air Force

buildup and for MDAP. The Air Force depots and the American aircraft industry were immediately inundated with orders for aircraft, engines and spares. As noted, both the depots and private industry expanded to meet this demand. By September 1952, the USAF had supplied recipient countries with 4,000 aircraft, mostly refurbished World War II surplus. Military Assistance Advisory Groups (MAAGs) provided initial flight, maintenance and supply training. Five years later, MAP beneficiary air forces fielded approximately 8,000 aircraft provided or financed by the United States, primarily F–84s, F–86s, Hawker Hunters, T–6s and T–33s. Since then, the Air Force has continued providing aircraft, equipment and spares to friendly nations through Air Force Materiel Command's Air Force Security Assistance Center.[16]

When the fighting ceased in Korea, the USAF was in the midst of a significant transformation driven by technological advances and by an omnipresent struggle with the Soviet Union and China. American commitment to the global containment of communism led, in turn, to the worldwide deployment of Air Force units and to the creation of a hair-trigger strategic striking force. The creation of weapons of mass destruction, refinement of jet engines and airframes and the steady improvement in electronics and missile technology produced a whole new family of aircraft, armament and support equipment. Air Force logisticians responded to these changes, using rapidly advancing technology to improve support capabilities.

The AAF modified the first B–29s for atomic warfare in 1944 (under Project Silverplate), and by war's end forty-six aircraft had been so modified. By 1948, the number of operational atomic weapons–capable B–29s fell to thirty-two. That year, as part of an effort to mold Strategic Air Command (SAC) into a truly credible strategic striking force, AMC undertook an extensive program to modify over three hundred B–29s, B–36s and B–50s for atomic warfare under Projects Saddletree and Gem. These modifications included adding in-flight refueling capability, winterizing the aircraft for arctic operations and adding global navigation electronics. A companion program converted several hundred B–29s to tankers. In 1951 under Project Back Breaker, AMC began modifying F–84s and B–45s for tactical atomic warfare. These early atomic warfare modification programs did not run smoothly for several reasons. Foremost, the secrecy and compartmentalization of all atomic weapons programs continually led to "the right hand not knowing what the left hand was doing." Scheduling aircraft for depot modification, producing modification kits and preparing field modification teams in advance could not be reliably planned. In addition, beginning in June 1950, Gem and Saddletree had to compete with Korean War B–29 requirements and with USAF's commitment to provide B–29s to Great Britain under MDAP. These concurrent obligations saturated the Air Force's B–29 and B–50 depot facilities, resulting in a heavy reliance on contractors who were also quickly overburdened. Fortunately, as atomic carrier-designed B–47s and B–52s entered service,

modification demands subsided. At the combat command level, the unique operational requirements of SAC led to the establishment of unique maintenance and support procedures and organizations. Experience gained with SAC was soon applied to other Air Force organizations.[17]

The policy of Massive Retaliation placed an arduous burden first on the Air Force's strategic bomber fleet and later on its missile forces. Until the mid-1960s, SAC bomber aircraft served as the primary delivery vehicles for weapons of mass destruction. Therefore, entire SAC wings could be called on short notice to deploy from the United States to forward operating bases scattered from Guam to Morocco, and by the mid-1950s SAC units routinely deployed during such exercises. Ever vigilant, the command kept large numbers of aircraft on alert at all times, and when intermediate-range ballistic missiles (IRBMs) and intercontinental ballistic missiles (ICBMs) entered service under the command's operational control, they too remained on alert at all times. Although constant readiness and rapid deployment planning first focused on SAC's bomber and fighter units, the Air Force soon organized, trained and equipped tactical units for rapid mobility as well.

In 1949, SAC reviewed its capabilities versus its target commitments identified in the command's emergency war plan and found that, because of poor bomber in-commission rates, these commitments could not be met. To correct this situation, over the next few years SAC overhauled its supply and maintenance organization and procedures, centralizing administrative responsibilities and putting maintenance on more of a production-line basis. Simultaneous with the increase in the number of aircraft, the complexity of SAC's aircraft and subsystems (radar, electronics, engines) increased. This combination of developments forced base-level maintenance to inspect and repair growing numbers of complex systems, which required the skills and specialized equipment of increasing numbers of technicians. To best employ manpower and equipment, the command pooled these resources at wing/base-level shops and adhered to a strict maintenance regimen. Depot maintenance was streamlined by establishing a strict and controlled flow of aircraft from SAC to the AMAs and contractor facilities. The sheer number of personnel needed to support a SAC wing mushroomed as the complexity of its aircraft increased. For instance, a B–47 wing with forty-five operational bombers required 2,653 personnel whereas a B–52 wing with forty-five operational bombers employed 4,756 personnel. Fighter wings experienced a similar transformation.[18]

War planners in the early 1950s assumed that a general war would be decided within the first 180 days. The Air Force planned accordingly. First, SAC squadrons, then other combat flying units, began to organize and equip to rush combat forces to overseas locations on short notice. During this period, SAC established a series of forward operating bases stocked with fuel, oil, munitions, water, basic food supplies and shelter. The development of large

capacity, long-range cargo aircraft gave the Air Force the capability to airlift initial sustainment spares and equipment with deploying squadrons. Each squadron assembled equipment, spares and basic supplies in prepackaged air-transportable flyaway kits. These kits were configured to support particular aircraft types for thirty days and remained on hand at all times. In addition, the Air Force developed air-transportable station sets to provide ninety-day support for combat units deployed to austere forward operating bases. Station sets contained support equipment such as electronic, hydraulic and engine repair equipment. The Air Force also assembled prepackaged, air-transportable housekeeping sets designed to provide deployed units with administrative, sleeping and messing facilities. Though limited amounts of munitions could be airlifted, the Air Force remained dependent upon pre-positioning and sealift for the bulk of conventional munitions support.[19]

Weapons of mass destruction could not be handled the same as conventional weapons. Until the mid-1950s, the Atomic Energy Commission (AEC) and Armed Forces Special Weapons Project (AFSWP) retained strict control over all aspects of atomic weapons from production to the flightline. In 1950, the Air Force established the Special Weapons Command at Kirtland Air Force Base, New Mexico, marking a shift in special weapons support responsibility away from AEC and AFSWP to the Air Force. However, AEC retained tight control over atomic weapons production and testing, and AFSWP kept physical control over the special weapons stockpile. AMC designated San Antonio AMA the lead AMA for special weapons equipment support and acquisition, and established a special weapons depot at Kelly AFB. The Air Force supported the AEC testing program through the Special Weapons Command. As the atomic weapons stockpile grew in number and as the warheads were mated to missiles, Air Research and Development Command (ARDC) and AMC assumed increasingly important roles in the development and acquisition of delivery systems and support equipment. Beginning in 1952, AMC established new units named Aviation Depot Groups (later redesignated Aviation Depot Squadrons). Collocated with SAC wings, these units provided special weapons storage and maintenance support. Although very stringent controls and safeguards remained in place for all weapons of mass destruction, logistics support became more routine as the 1950s progressed.[20]

Beginning in the 1940s, all three services engaged in guided-missile research. This research began to pay dividends in the 1950s with the steady introduction into service of numerous missiles, ranging from the radar-guided Falcon air-to-air missile to the Thor intermediate-range ballistic missile. Air-to-air missiles required a relatively small amount of logistics support; they were vacuum-packed and stored until used, modified or periodically overhauled. Development and deployment of liquid-fuel IRBMs and ICBMs presented a whole new set of logistics support needs. Keeping these weapons on alert required that they be mounted on above-ground launchers or in under-

ground silos, ready to be fueled and launched at a moment's notice. Their first flight was their last, so their rocket motors, guidance system or warhead had to perform faultlessly. Technicians did routine maintenance and made minor modifications on-site. For major repair, modification or overhaul, the missiles were loaded aboard transports and flown back to the depot or to a contractor facility.[21] Only a limited number of the very expensive liquid-fuel missiles (such as Atlas, Titan, Jupiter and Thor) were produced, and all were marked for rapid obsolescence. As a result, the cost of spares was very high, and few such spares were procured. Likewise, the Air Force saw no point in developing an extensive organic depot support capability for the weapons, and it therefore relied heavily on contractor support. The Air Force did establish the Heath Maintenance Annex in Heath, Ohio, as a central repair, modification, overhaul and calibration facility for intricate missile and aircraft guidance systems and precision instruments. The launch complexes themselves (including control-room equipment, launch equipment and liquid-fuel storage facilities) required meticulous maintenance. Introduction of the Minuteman solid-fuel ICBM in the early 1960s eased logistics support difficulties, but ICBMs and their launch facilities remained complicated systems requiring constant maintenance and upgrading. The Minuteman, however, has proved its durability, and the much improved Minuteman III remains in service to the present.[22]

Previous war experience taught the Air Force the importance of being able to apply counter air and tactical air power as early as possible in a conflict. Accordingly, the Air Force made great strides towards creating mobile tactical air units during the 1950s. Fighters and tactical bombers received air-to-air refueling capability, enabling them to fly from the United States to potential war zones in either the Far East or Europe. Development of long-range heavy transports like the C–124 and C–133 provided airlift for both prepackaged spares and maintenance equipment and for the technicians and mechanics who kept the planes flying. However, in the many areas where the West faced massive communist armed forces across heavily fortified borders, only permanently stationed forward-based air power offered a credible deterrent. In the case of a no-warning war, CONUS-based units could only serve as reinforcements. Accordingly, the Air Force expanded its global presence, ringing Europe and Asia with dozens of USAF air bases and stockpiled munitions, spares, supplies and equipment as war reserve materiel at forward locations. To help keep the aircraft flying, the Air Force expanded its overseas maintenance and supply capabilities. Large Air Force depots operated at Burtonwood, England; Chateauroux, France; Erding, Germany; Nouasseur, French Morocco; Tachikawa AB, Japan; Iwakuni AB, Japan; and Clark AB, Philippines. The four Overseas Logistics Control Agencies, located at Newark (New Jersey), Sacramento (California), Ogden (Utah), and New Orleans (Louisiana), served as clearinghouses for overseas and Alaskan supplies, receiving daily supply requisitions via radio transmission or, in the case of

stock replenishment items, by air mail. Air materiel forces in the Far East and Europe managed offshore procurement for both American forces and MAP recipients.[23]

By the end of the 1950s, advances in computers, communications and transportation allowed the Air Force to reduce the size of its depot system both in the United States and abroad. However, owing to the increasing complexity of weapon systems and support equipment, the number of individual spares and supply items grew. Calculating spares and supplies requirements and managing the supply system became an enormous task. By 1955, the Air Force inventory included 1.2 million separately defined items. Managing this huge inventory required the production and analysis of over 350 recurring reports. By the mid-1950s, digital computers provided the technology to streamline the job. In 1954, HQ AMC received its first digital computer, a Remington Rand UNIVAC. Soon after, the AMAs began acquiring digital computers. Eventually, the use of computers eliminated tens of thousands of man-hours per depot per year formerly devoted to inventory management. In addition to improving inventory management, AMC made a determined effort to eliminate excess items through programs such as High Value, which identified expensive excess spares purchases. The Air Force significantly reduced information transfer time when, in 1955, it began operating a transceiver system that used leased telephone lines to transmit coded computer punch-card impressions from a punch-card reading machine to a punch-card reproduction machine. This system proved to be a great advantage over teletype communication because it minimized human error. Cutting transportation time offered the Air Force a means with which to shorten the spares pipeline and thus reduce inventory requirements and improve service to the flying units. With these goals in mind, and with an eye toward cutting growing commercial air delivery costs, AMC in 1954 initiated the contract freight air service, Mercury Service, later renamed LOGAIR, that connected CONUS AMAs with daily flights. AMC eventually extended this service to operational command air bases, thus dramatically reducing high-priority shipping times.[24]

By the close of the 1950s, the USAF possessed the personnel, facilities and materiel with which to wage all-out, or general, war against the Warsaw Pact and China. For the Air Force, general war meant not only the use of strategic nuclear weapons, but also the immediate use of tactical nuclear weapons to counter the enemy's numerical superiority in troops and equipment. Tactical fighter and bomber units were trained and equipped for general war, and preparations for limited conventional war consequently suffered. Air Force war planners assumed that limited war deployments could be supported with the same air-mobile and pre-positioned assets developed for a general war. Large-scale USAF deployments during the Lebanon and Taiwan crises of 1958 exposed weaknesses with logistics support. Deployed units experienced serious difficulties with spares support and in gaining access to

pre-positioned support equipment. War reserve materiel (WRM) proved inadequate and was not always properly distributed. These problems forced the service to rethink its conventional limited war planning. From 1958 through 1960, the Air Force carefully studied limited war requirements and began developing plans to reflect the growing importance of conflicts below the level of general war. Newly elected President John F. Kennedy and his Secretary of Defense Robert S. McNamara articulated a revised national security policy known as Flexible Response. It led to an immediate acceleration in conventional warfare preparation that, for the Air Force, meant that combat units could be called on to generate higher sortie rates over longer periods of time than would be necessary if tactical nuclear weapons were used. This change in turn required the Air Force to recalculate war materiel requirements.[25]

During the first half of the 1960s, the Air Force began accumulating, prepackaging and pre-positioning materiel for limited conventional war. The USAF Wartime Guidance Document, Annex X, provided specific wartime materiel support data. Air Force Logistics Command's (AFLC's) War Consumable Distribution Objective defined Air Force war consumable objectives and served as the basis for the pre-positioning of WRM. WRM consisted of six categories of supply: war consumables (drop fuel tanks; petroleum, oil, and lubricants [POL]; air munitions; chaff and other nonreusable supplies); spares (war readiness spares kits [WRSK] and spares for aerospace ground equipment); station sets (direct mission support equipment, such as aerospace ground equipment, required to be in place prior to the arrival of combat units); housekeeping sets (tents, messing, typewriters and other personnel support items); Gray Eagle packages (combination station sets and housekeeping sets for bare-base operations); and field rations. CONUS-based units kept air transportable WRM, such as WRSK, on hand and ready for deployment with each squadron. Other WRM, such as POL and munitions, were pre-positioned overseas in areas of potential conflict. The Air Force managed the WRM inventory through the use of electronic data processing (computers) and the Automatic Digital Information Network (AUTODIN), a secure worldwide communications system. The major commands monitored the status of their WRM and provided monthly reports to HQ USAF and to AFLC, who then identified and corrected deficiencies. Regional war could erupt at one or more of numerous hot spots, but prudence dictated that USAF's primary focus remain directed toward the continuing standoff with the Warsaw Pact in Europe. Should the United States go to war elsewhere, war planners reasoned, it would be in response to the invasion of an allied country. No one envisioned the United States slowly becoming involved in a sustained conventional war, but that is exactly what happened in Southeast Asia.[26]

The first USAF units that deployed to South Vietnam in 1961 and 1962 under Operations Farm Gate, Mule Train and Ranch Hand found rudimentary airfields and only limited maintenance and supply facilities that had been con-

structed with MAP assistance. Port facilities were no better than those found in South Korea ten years earlier. This mattered little, at first, for the USAF's initial deployment in support of South Vietnam's war against the Viet Cong rebels consisted of only a handful of propeller-driven aircraft. The thirty-day deployment kits (resupplied through Clark AB, Philippines) and mobile maintenance vans sufficed to provide supply and maintenance support. As the number of aircraft increased and as RF–101 reconnaissance jets joined the USAF units, supply and maintenance requirements increased. Following the August 1964 Gulf of Tonkin Resolution and the November 1964 U.S. presidential election, the USAF commitment to Southeast Asia rapidly escalated.[27]

The U.S. buildup began in earnest in 1965. The Air Force decided to base its theater presence on a combination of simple forward operating bases and large, well-equipped main operating bases (MOBs). The Air Force eventually established nineteen MOBs in South Vietnam, Thailand, the Philippines and Okinawa, including eleven newly constructed bases and eight others expanded for this purpose. AFLC undertook Project Bitterwine to assemble and ship the necessary equipment and supplies required for this large-scale base buildup. Coincidentally, the Air Force was in the process of phasing out four of its nine CONUS AMAs and closing numerous excess air bases. The Air Force therefore had excess maintenance materiel and supplies available for shipment to the MOBs. The first units to arrive at a base utilized prepackaged Gray Eagle tent and housekeeping kits. Prime BEEF (Base Engineering Emergency Force) teams and RED HORSE (Rapid Engineer Deployable, Heavy Operations Repair Squadrons, Engineer) squadrons assembled the temporary shelters and then began building permanent housing, runways, water and sewage lines, drainage systems, roads, revetments, fuel storage and dispensing systems, and the myriad of other required structures. As in Korea, local labor and supply, and Army and Navy civil engineer units, provided a great deal of support. Base Civil Engineer units, with the assistance of contractors, maintained, repaired and expanded the operational bases and provided numerous base support functions such as fire fighting, electrical power generation and air conditioning maintenance.[28]

The rush of materiel into Southeast Asia quickly overwhelmed the personnel and supply system at the receiving end. Relocation of air units from one base to another, long cargo delays at the congested ports, and inexperience on the part of base supply personnel all contributed to the confusion. To assist overburdened Pacific Air Forces (PACAF) supply personnel, AFLC constituted and deployed specialized, primarily civilian volunteer, temporary duty logistics teams. Rapid Area Transportation Support (RATS) teams assisted with cargo packaging, shipping and receiving, and trained the South Vietnamese in these skills. Rapid Area Supply Support (RASS) teams helped PACAF personnel institute viable accounting, inventory, storage and issue procedures and practices. Installation and checkout teams aided with maintenance equipment,

mobile precision measurement laboratories and computers. The Air Force eventually installed UNIVAC 1050–II computers at seventeen MOBs, vastly enhancing supply management, requisition processing and requirements forecasting. The Air Force assembled three additional air-mobile computer vans to serve as emergency backups. With the help of the specialized teams, modern data processing and AUTODIN communications, PACAF logisticians were able to establish normal "pull" supply practices and procedures after the initial buildup.[29]

Because of the sheer bulk involved, air munitions supply presented a unique problem. At first, the Military Sea Transport System (MSTS) shipped air munitions to Subic Bay in the Philippines, where they were unloaded and shipped by truck to the munitions depot at Clark AB. When the munitions were trucked back to Subic Bay, loaded on ships and forwarded to Southeast Asia. As munitions expenditures climbed, the system proved wholly unsatisfactory. Shipping the munitions directly to South Vietnam and Thailand appeared preferable but infeasible because of the lack of adequate port facilities and munitions depots in Southeast Asia. Therefore, AFLC and MSTS initiated Project Special Express whereby commercial ships under contract to MSTS loaded munitions on the U.S. West Coast, sailed to the Philippines to take on fresh water and supplies, then traveled on to South Vietnam where they anchored offshore to act as floating warehouses. Munitions were offloaded onto Navy landing craft for transport ashore. When empty, the ships returned to the United States for additional cargo. At its peak in 1967, Special Express operated nineteen munitions ships. By late 1967, South Vietnam's port facilities and munitions depots had been expanded enough to allow for normal port-to-port shipments. Air transport played a small, but important, role in CONUS-to-theater munitions support. Between 1966 and 1969, under Project SEAIR, Military Airlift Command (MAC) flew emergency munitions, fuses and bomb wires directly from Hill AFB (Utah) to Southeast Asia aboard regularly scheduled C–141 flights.[30]

The Military Sea Transportation Service, heavily dependent on commercially contracted ships, provided the primary link between the supply sources in the United States and the forces in Southeast Asia. As in Korea, the 315th Air Division provided Pacific theater airlift, utilizing C–123s, C–124s and C–130s. As the war progressed, a very large fleet of C–7s, C–123s and C–130s grew to provide in-country cargo and personnel movement. In addition, the Army operated a vast armada of helicopters. Contract air carriers augmented in-country transport. Military Air Transport Service, redesignated Military Airlift Command in 1966, provided CONUS-to-theater airlift. When jet-powered C–141s (1966) and C–5s (1970) entered service in Southeast Asia, MAC gained the ability to provide fast global transportation. Capable of intercontinental flight while carrying substantial cargo or personnel loads, these aircraft revolutionized air transport. The development of the rugged reusable 463L

pallet and tie-down net system allowed the Air Force to rapidly load and unload aircraft. The 463L was essential for efficient C–123, C–130, C–141 and C–5 cargo handling. Unfortunately, these lightweight pallets also served well as tent floors, bunker walls and bunker roofs. Once palletized cargo left a main aerial port for a forward base, there was a good chance the pallet would not return. As would happen again during Desert Storm, the one-way flow of 463L pallets came close to creating a cargo transport emergency. Frantic worldwide stock searches and emergency manufacturer production averted the crisis.[31]

The Air Force utilized a three-level maintenance system throughout the Southeast Asia war, but as noted, PACAF did not attempt to establish base-level support shops at forward operating bases in South Vietnam. Instead, aircrews flew the aircraft to one of the MOBs for base-level maintenance and some depot-type repair and modification. Because of the great distance between the theater and the CONUS AMAs, the Air Force established depot-level repair and overhaul capabilities at five air bases in Japan, Okinawa and the Philippines. To provide unique aircraft battle damage expertise, AFLC dispatched Rapid Area Maintenance (RAM) teams to Southeast Asia. These primarily civilian units repaired battle damage, prepared heavily damaged aircraft for one-time flights or shipment back to a depot, and processed aircraft for salvage. Their work often took them into crash sites in the field. Over the course of the war, RAM teams handled over 1,000 aircraft, including 845 that were repaired on-site. The RAM, RASS and other civilian volunteer special teams provided valuable support, but because they operated in combat zones, the Air Force much preferred that military personnel perform the work. Accordingly, in late 1967, AFLC began assembling all-military Combat Logistics Support Squadrons (CLSSs) to perform the functions of the specialized civilian logistics teams. The CLSSs, however, were not organized, trained and equipped in time for effective service in Southeast Asia.[32]

The Southeast Asia war temporarily reversed the overall military reduction underway since the late 1950s. The introduction of IRBMs and ICBMs allowed the Air Force to withdraw from service thousands of B–47s, B–52s, SAC fighters and support aircraft. Improvements in communications, transportation, data-processing and material-handling equipment further reduced manpower requirements. Once the United States began disengaging from South Vietnam, military retrenchment resumed and budgets declined. Inexorably, advancements in technology marched on, and the Air Force again required new weapon systems, new support equipment and infrastructure upgrades.

The Department of Defense (DOD) and the Air Force began reducing and reorganizing CONUS and European logistics support infrastructure in the early 1960s and continued the process through 1997. In 1961, the Air Force established the Air Force Logistics Command and the Air Force Systems Command

(AFSC), replacing AMC and ARDC. AFSC assumed responsibility for research and development, weapon system acquisition and weapon system test and evaluation. AFLC concentrated on supply, maintenance, modifications and mission support. That same year, DOD announced the establishment of the Defense Supply Agency (DSA), later redesignated as the Defense Logistics Agency (DLA). This new organization henceforth contracted and managed common-use services and supplies for all military branches. As the number of aircraft in the inventory fell, beginning in the late 1950s, excess depot capacity grew. To alleviate this imbalance, the Air Force began closing installations. By 1960, all overseas AMAs had been discontinued, and between 1966 and 1969 the Air Force closed five of the nine CONUS AMAs. In addition, the Air Force shut down numerous supply depots and turned others over to the DSA.[33]

Technology advanced, but not fast enough for the Air Force's logisticians. AFLC attempted to use 1970s computer technology to create a single closed-loop, real-time, all-encompassing system for logistics operations, designated the Advanced Logistics System (ALS). The ALS proved to be far too ambitious for the computer technology available, and the effort was canceled by Congress in 1975. Seven years later, the Air Force undertook the creation of the Logistics Management System (LMS), which was divided into incrementally developed interconnected component programs. The leap in computer capability represented by the refinement in microprocessor technology gave logisticians the tools to make this new system work. Between the early 1980s and early 1990s, AFLC brought into operation nine component systems such as the Weapon System Management Information System, which assessed the Air Force's warfighting capabilities and requirements, and the Local Area Network–Intersite Gateway system that provided computer communications links between all LMS components and locations.[34]

In 1971, AFLC embarked on the most concerted construction effort at the depots since World War II. A 1969 study revealed that sixty-eight percent of AFLC's depot facilities had been acquired between 1937 and 1945, and forty-five percent of all Air Force facilities were acquired between 1937 and 1953. By 1979, AFLC had three programs underway involving warehouse construction, plant equipment modernization and depot facility and technology modernization. Unfortunately, by the mid-1980s, AFLC still possessed only half of the adequate warehouse space required and again undertook a warehouse expansion and modernization program.[35]

Between 1974 and 1976, AFLC streamlined its repair workload distribution system by redistributing the repair work previously done at the Command's fifty-two work centers to twenty-three technology repair centers located at the five Air Logistics Centers ([ALCs], formerly AMAs). Items were divided into eighteen commodity groups, based on technological similarities. The repair workload was then distributed among the ALCs by commodity group, allowing each center to become expert in the repair of particu-

lar items and eliminating duplicate maintenance facilities.[36]

Space logistics responsibilities grew slowly and initially involved supporting the rockets that hurtled Air Force satellites into orbit. As the number of Air Force space systems and ground support systems grew, space logistics transitioned from the world of the esoteric to the realm of normal logistics. In particular, development of the Space Shuttle provided the means with which to retrieve expensive satellites from orbit, overhaul and modify them, then return the upgraded systems to space. In 1988, after several years of study, AFLC began providing support for thirty-five space systems. Very soon thereafter AFLC assumed program management responsibility for the Defense Meteorological Satellite Program, marking the first time a space system was managed just as other operational systems.[37]

The Air Force budget, in constant fiscal 1998 dollars, rose to $391.5 billion in 1968, declined to $314.3 billion in 1972, and fell further to $261.9 billion by 1976.[38] Funds for maintenance, spares and training decreased accordingly. At the same time that budgets fell, the Air Force began a long-term acquisition effort that eventually brought into the inventory the aircraft that performed so well during the 1991 Persian Gulf War. With new aircraft under development, the Air Force acquired relatively few fighters during the 1970s. As the operational air fleet aged, the need for maintenance, modification and spares support increased. However, lacking funds, the Air Force could not afford to meet spares and maintenance requirements, which contributed directly to the creation of the post-Vietnam "Hollow Force." Between 1972 and 1975, the not operationally ready–supply rate for Tactical Air Command aircraft climbed from 4.9 percent to 10 percent.[39]

By the late 1970s, new aircraft such as the A–10, F–15 and F–16 began entering service. In 1979, the Soviet Union militarily intervened in Afghanistan, sparking a rise in U.S. defense spending that peaked in 1986 under Ronald Reagan's presidency. The 1986 fiscal year defense budget totaled $414 billion in fiscal 1998 dollars.[40] With funding available, the Air Force replaced its aging fighters and bought new B–1B bombers and KC–10 tankers. Contractors and the ALCs upgraded and modified proven systems such as the F–111, KC–135 and B–52. Moving air warfare technology to a new plateau, the Air Force acquired fifty-nine stealthy F–117 fighter-bombers. Filled with state-of-the-art avionics and armed with costly precision guided munitions, the new weapon systems cost much more than their predecessors. For example, in 1973 an F–4E cost $2.48 million,[41] whereas in 1990 an F–15E cost $42.8 million.[42] Logistics support costs likewise increased. Fortunately, Congress provided generous funding that enabled the Air Force to purchase adequate spares and upgrade logistics support capabilities. High-technology weapons required equally "high-tech" support equipment.[43] The investment in supplies, spares and support equipment paid off. By fiscal year 1988, the fleetwide Not Mission Capable Supply rate stood at four percent and the total mission capa-

ble rate hovered around eighty-one percent.[44]

Mikhail Gorbachev's rise to power in the Soviet Union during the latter 1980s and the ensuing collapse of both the Soviet empire and the Warsaw Pact fundamentally altered U.S. defense requirements. Additionally, the need to bring U.S. government spending in line with revenues forced the DOD to operate with declining budgets after 1986. This combination of factors led to basic changes in the acquisition and logistics processes and to a sweeping overall reorganization of the Air Force that saw the inactivation of AFSC and AFLC, which were replaced in 1992 by a single new command, Air Force Materiel Command (AFMC). In the midst of this transformation, the Air Force supported a modest military intervention in Panama and engaged in a major regional war against Iraq.

Rapidly deteriorating relations between the United States and the Panamanian government led by Gen. Manuel Antonio Noriega precipitated an American invasion of Panama (codenamed Operation Just Cause) in December 1989. Organized Panamanian resistance collapsed in the first hours of the assault, and General Noriega surrendered several days later. The rapid conclusion of hostilities and the sparse use of nonairlift aircraft limited the need for air logistics support. Deficiencies surfaced in operations planning and communications that, while not critical to the operation, merited review and correction. Limited in scope from an air logistics planning perspective, Operation Just Cause nonetheless highlighted the role logistics operations could expect to play in future air operations, and experience gained in Panama was put to use soon thereafter during Operations Desert Shield and Desert Storm.[45]

Iraq's invasion of Kuwait in August 1990 sparked an unprecedented international response, culminating in the liberation of the tiny emirate by force of arms. In January 1991, after a massive U.S.-led military buildup in the Persian Gulf (Operation Desert Shield), the coalition of forces assembled against Iraq launched a crushing military assault (Operation Desert Storm) that drove Iraq's occupying forces from Kuwait.[46] The Air Force's logistical successes during the war were the result of long-term planning and preparation. Though Europe remained the focus of U.S. military thinking through 1990, presciently the Air Force and U.S. Central Command (CENTCOM) also trained and prepared for a war in the Middle East. With the Air Force geared for a "standing start" war against the potent Warsaw Pact and fleshed out by the defense buildup begun in 1979, Air Force logisticians made what the AFLC commander, Gen. Charles C. McDonald, described as "an almost transparent transition to wartime operations."[47]

Given little advance notice, the Air Force rapidly moved substantial combat forces, support personnel and war materiel to Saudi Arabia. Key to that effort, each squadron kept on hand necessary munitions, spares and equipment in air transportable configurations, including WRSK; standard air munitions packages (STAMPs); and standard tank, rack, adapter and pylon pack-

ages (STRAPPs). Each of the F–15 squadrons rushed to Saudi Arabia during the first days of the crisis deployed with the equivalent of twenty C–141 cargo loads of materiel and with five hundred personnel. Hundreds of additional aircraft followed during the ensuing weeks. Building the logistics base necessary to sustain the forces eventually employed during Desert Storm required a massive effort.[48]

Infrastructure conditions in the host Gulf nations differed markedly from those encountered in Korea and South Vietnam during the initial stages of the earlier wars. The first USAF aircraft to fly into Saudi Arabia found state-of-the-art facilities, such as King Khalid Military City and Dhahran Airport, at their disposal. As the buildup continued, Coalition air forces set up operations at modern military and commercial airfields in all of the Gulf Cooperation Council (GCC) countries.[49] In addition to the considerable existing runway and ramp space made available to the Coalition air forces, the Saudi Arabian cities of Jabail and Dhahran provided large port facilities. With modern air and sea terminals available immediately, MAC (strengthened by the Civil Reserve Air Fleet) and Military Sea Lift Command ([MSC] augmented by the Ready Reserve Fleet and commercial freighters and tankers) moved hundreds of thousands of troops and billions of pounds of materiel into the theater with unprecedented dispatch. The Air Force relied heavily on the sea and surface transportation network established by U.S. Transportation Command and CENTCOM for the intertheater and intratheater movement of such bulky items as fuel, munitions and vehicles. U.S. Air Force Component, CENTCOM (CENTAF) C–130s provided in-theater airlift.[50]

The host nations, Saudi Arabia in particular, provided more than just dock space and runways. The Saudis also supplied water, housing and transportation equipment, utilizing every available resource in support of the Coalition forces. Saudi oil refineries produced aviation fuel. Construction material and labor came from local building contractors and vendors. Local caterers fed the arriving troops, and local cleaning services washed their uniforms. Grateful for the Coalition's support, the Saudi government eventually paid for all services rendered. Coalition forces gathered in other GCC countries received similar support, though on a smaller scale.[51]

Pre-positioned assets represented the second major source of materiel support available in-theater. Large quantities of war supplies and equipment lay dispersed in warehouses and on ships throughout the region. USAF items pre-positioned ashore included bare-base assets such as prefabricated aircraft hangars, vehicles, air flight support equipment and munitions. The afloat pre-positioned items included aircraft ammunition, general-purpose bombs, cluster bomb units, rockets, chaff, flares and miscellaneous asset hardware. The Air Force also maintained fuel and POL tankers in the area. Pre-positioned materiel saved 1,800 airlift missions and provided supplies and infrastructure materiel for twenty-one of the principal airfields.[52]

The bulk of the assets pre-positioned in the Persian Gulf, as well as those procured for use in Southwest Asia but held in storage in the U.S., comprised bare-base assets. These proved invaluable when overcrowding at the main GCC air bases forced USAF units to operate from barren airfields. The Air Force developed three types of bare-base systems: Harvest Bare, a collection of prefabricated hardwall shelters; Harvest Eagle, sets of tents designed for housekeeping support; and Harvest Falcon, a comprehensive segmented system designed specifically for Southwest Asia that included shelters, tents, kitchens, water systems and electrical and air conditioning systems. In addition to the bare-base systems, the Air Force also deployed fifteen air transportable hospitals, each a fifty-bed unit.[53]

The engineering and support units and teams formed as a result of Korean and Vietnam War experience proved their value in Southwest Asia. Prime BEEF teams assembled prepackaged assets and RED HORSE units performed heavy construction tasks such as constructing runways, drilling wells and building revetments. Readiness in Base Services (Prime RIBS) teams followed to provide kitchen, billeting, laundry and mortuary services. CLSS Aircraft Battle Damage Repair (ABDR) teams provided ABDR and maintenance support. Rapid Area Distribution Support teams assisted with supply, storage, transportation, shipping and receiving.[54]

Pre-positioned stocks and STAMP provided only enough munitions for limited duration combat and contained very limited amounts of preferred guided air-to-ground bombs and missiles. During the early months of Desert Shield, munitions activities centered on distributing the pre-positioned stocks and on improving munitions storage facilities. However, as the tempo and volume of munitions shipments and distribution activity increased, the lack of a central munitions depot began to hinder munitions logistics. CENTAF therefore constituted the 4401st Munitions Maintenance Squadron and established a provisional munitions depot at Al Kharj, Saudi Arabia. Given the cushion of time and the elimination of the Soviet threat, the Air Force was free to draw on CONUS-, U.S. Air Forces, Europe (USAFE)-, and PACAF-preferred munitions stocks. Upon arrival in Saudi Arabia, munitions were shipped to Al Kharj and redistributed to operating locations by tactical airlift or by truck.[55]

As noted, the aircraft that deployed to the Persian Gulf brought along WRSK and STRAPP to provide an immediate thirty-day combat support capability. CENTAF logisticians decided to keep the WRSK intact and use them as tools for spares inventory control. The supply specialists decided to follow this course because the Air Force did not deploy the Tactical Shelter Systems (which included full-up supply computers), but each unit did deploy their Combat Supply System computers, which were designed to maintain the accountability and inventory accuracy of the WRSK. Initially, deployed units received stock replenishment and Mission Incapable Parts (MICAP) support from their home stations.[56] Having each unit resupplied through its home sta-

tion proved too slow and cumbersome. CENTAF therefore established and began operating the CENTAF Supply Support Activity (CSSA) in October 1990. The CSSA normalized in-theater supply accounts by channeling requirements from all theater supply accounts through a single theater location to the CSSA at Langley AFB, Virginia, via secure satellite link and ground lines. The CSSA then forwarded the supply requirements to the appropriate ALC or DLA supply center.[57]

Keeping track of the items in the supply pipeline vexed early supply efforts. Both MAC and MSC tracked items from the time they took possession until the item was offloaded from their ship or aircraft. Because AFLC, MAC and MSC tracking systems were not linked, finding a particular item in the logistics pipeline proved very difficult and time-consuming. Computer specialists at AFLC solved this problem by developing the Air Force Logistics Information File (AFLIF), a computerized information system that tapped into MAC and MSC databases, allowing AFLC to track the movement of every item from the time it left an AFLC facility until it was offloaded in the theater.[58]

Establishing intermediate-level maintenance (ILM) capability in-theater proved to be a key to the achievement of the high sortie rates sustained by USAF aircraft. The tactical air units deployed with a mix of aviation packages (including maintenance, avionics ILM for F–15s, electronic countermeasures test stations, and low-altitude navigation and targeting infrared for night [LANTIRN] test stations), ILM packages, WRSK and follow-on spares kits. Thirty days into the operation, CENTAF deployed additional ILM packages to provide sustained jet engine intermediate maintenance, avionics intermediate maintenance, and heavy fabrication intermediate maintenance. To avoid shipping engines all the way back to the United States for overhaul and repair, CENTAF arranged to have engines shipped to USAFE jet engine intermediate maintenance facilities in Europe. Adding to in-theater C–130 support capabilities, MAC established a propeller shop in Saudi Arabia. In addition, one avionics intermediate station deployed to each Persian Gulf air base, and CENTAF established a single precision measurement equipment laboratory at Riyadh to service the entire theater.[59]

Due in great part to excellent logistics support, USAF aircrews, ground crews, aircraft, subsystems and weapons performed admirably. Through six weeks of unrelenting combat operations, support personnel kept the complex aircraft mission-capable rates higher than normal peacetime rates. Mission-capable rates varied between 81 percent for the B–52G to 95.9 percent for the F–15E.[60] Investment in supply, maintenance, transportation and training reaped welcome dividends. The success of the Coalition's air war clearly demonstrated the combat prowess of modern air power and highlighted the notable superiority that the USAF enjoyed over all other air forces. Victory in the Persian Gulf, however, did not stop the military retrenchment underway in

the United States and the corresponding drawdowns affecting almost every major military power.

The Air Force–wide reforms and reorganizations begun in the 1980s continued unabated during the Persian Gulf War. In 1986, the President's Blue Ribbon Commission on Defense Management (the Packard Commission) issued its final report, which called for centralizing control of DOD acquisition in the new office of the Under Secretary of Defense for Acquisition and for shifting acquisition authority away from AFSC's system program offices to newly created service acquisition executives and program executive officers.[61] In 1989, President George Bush initiated the Defense Management Report, which spawned a series of Defense Management Review Decisions (DMRDs) including DMRD 943, which led directly to the disestablishment of AFSC and AFLC and the establishment of AFMC;[62] DMRD 902, which transferred the Air Force's wholesale supply responsibilities from AFLC to DLA; DMRD 926, which directed the gradual transfer of the military's consumable supplies to the DLA; and DMRD 908, which called for the Air Force to divest itself of unnecessary depot capacity.[63] As a result of a 1993 Commission on Base Realignment and Closure (BRAC) decision, the Air Force, in 1996, closed the Aerospace Guidance and Metrology Center (AGMC) at Newark AFB, Ohio, and turned the entire operation over to a contractor through a process called privatization-in-place.[64] In June 1995, the Commission on BRAC recommended, and Congress and the President agreed, that the Air Force would close the Sacramento and San Antonio ALCs by 2001, leaving the Air Force with only three air logistics centers. As of 1997, DOD was working to privatize-in-place the workload of the two ALCs selected for closure.[65] In a related initiative, designed to reduce depot maintenance costs, the Air Force, in 1990, began competing non–core depot maintenance workloads between the ALCs, other DOD depots and private industry.[66]

By 1997, the combined Air Force active military and civilian population approximated that of 1947, and continued to decline. During the same period the population of the United States grew by over 100 million. Defense spending as a percent of the gross domestic product slipped to 3.3 percent, the lowest since the immediate pre–World War II years. The USAF total active aircraft inventory as of late 1996 stood at 4,495. DOD modernization plans called for the acquisition of a new generation of aircraft, but not in sufficient numbers to replace every old airframe with a new one. A one-for-one replacement was not necessary because a smaller air fleet did not necessarily translate directly into reduced combat capability. The newest weapon systems were more capable and designed to require less maintenance. Though expensive, the latest USAF aircraft far outclassed all contemporary challengers. As of 1997, no other air force owned a combat aircraft as sophisticated as the USAF's thirteen-year-old stealthy F–117. As the United States prepared for the twenty-first century, the Air Force continued acquiring other peerless aircraft such as the B–2 bomber,

C–17 transport and F–22 fighter. Because no other country possessed both the expertise and money to produce such an array of weapon systems, the United States appeared to hold an unprecedented technological lead over all potential adversaries.

As had always been the case, the Air Force worked to drive down the logistics support cost of its new weapon systems. Beginning in the 1970s, the Air Force embraced the Integrated Logistics Support concept that required that logistics supportability of a weapon system be considered during the earliest design stages. In this way, the Air Force achieved total system planning by integrating support requirements into design, development and engineering. As a result, the newer aircraft and major subsystems were more reliable and required less maintenance.[67] The logistics support advancements allowed the Air Force to initiate a major change in maintenance procedures. Beginning in 1992, the Air Force began transitioning to two-level maintenance in which component repair formerly performed at intermediate-level shops was instead accomplished at AFMC's air logistics centers. Maintenance crews at the operational bases performed only flight-line maintenance and component removal and replacement. Elimination of base-level repair shops and technicians greatly reduced the number of personnel and the amount of support equipment that deployed with each squadron, resulting in money saved, reduced airlift requirements and simplified deployments.[68] Of course, two-level maintenance could only work if deployed units received rapid and reliable spares support. The combination of advanced computerized integrated logistics management systems and fast transportation provided this capability. Also, by cutting the time spares spent in transit, the Air Force was able to reduce the overall number of spares in the logistics pipeline. Given the very high cost of many line replaceable units (i.e., black boxes) and mechanical components, the Air Force saved a substantial amount of money simply by acquiring fewer spares.[69]

Since 1947, the Air Force has fought three "hot wars" and stood vigil until almost the entire communist world collapsed upon itself. Though still armed with weapons of mass destruction, Russia no longer represents a mortal threat to the free world. Now, after nearly a decade of downsizing, the USAF still has no equal. Because of its success, the Air Force of 1997 faces similar challenges to those confronted fifty years earlier. Davis-Monthan AFB is packed with mothballed aircraft, the Air Force has more depot capacity than it can use, and DOD warehouses are filled with billions of dollars worth of excess spares and supplies. The Air Force currently is flying primarily the technologically advanced, but aging, aircraft that faced down the Warsaw Pact and triumphed in Desert Storm. That conflict, however, is several years past, and all of the services need new weapon and support systems to deter future threats. But, as was the case in the late 1940s, securing funds for modernization will be difficult. One can hope that Congress and the President will ensure that the Air Force maintains its qualitative edge and retains the logistics base

necessary to keep its fighting machine ready for any challenge.

Notes

1. Few comprehensive studies cover the history of USAF logistics. For an account concentrating on operational logistics, see *The Logistics of Waging War: American Logistics, 1774–1985, Emphasizing the Development of Airpower*, ed. Lt. Col. David C. Rutenberg (USAF), and Jane S. Allen, Air Force Logistics Management Center, Gunter Air Force Station, Ala., 1985. For an account concentrating on depot maintenance and supply (including systems acquisition and modification), see Bernard J. Termena, Layne B. Peiffer, and H.P. Carlin, *Logistics: An Illustrated History of AFLC and Its Antecedents, 1921–1981*, Office of History, HQ Air Force Logistics Command (AFLC), Wright-Patterson Air Force Base (W-PAFB), Ohio, 1981.

2. *United States Air Force Statistical Digest, 1947*, Director of Statistical Services, Comptroller, HQ USAF, Washington, D.C., 1948, 15–16, 72, 132, 134. Unless otherwise noted, all documents cited are held in HQ Air Force Materiel Command (AFMC), Office of History Archives, W-PAFB, Ohio. All numbered Air Force–produced studies are available at the Air Force Historical Research Agency, Maxwell AFB, Ala.

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Eight Decades of American Military Airlift

Daniel L. Haulman

Do fighters and bombers fly into your head when you think of the Air Force? Perhaps transports should appear instead. An air-to-air kill or a precision strike on a key target may be more spectacular, but airlift is much more frequently used as an instrument of national policy. Airlift missions go on year after year, whether we are at war or not, and they have claimed increasing percentages of Air Force operations. But airlift is not new. In the following remarks I would like to highlight some of the events that illustrate the role and contributions of U.S. Air Force airlift since the early days of American military aviation.

World War I cultivated the airplane as a weapon and established the essential missions of air power, which included airlift. Two of the four Air Service members to earn the Medal of Honor in World War I lost their lives while attempting aerial resupply of a lost battalion along the front in October 1918.[1]

Between the world wars airlifts continued in humanitarian operations. As early as 1919 airplanes from Kelly Field, Texas, dropped food to Rio Grande flood victims.[2] Ten years later military airplanes from Maxwell Field air-dropped more than twenty-seven tons of food, clothing, blankets, medical supplies, and outboard motors to the victims of a flood in south Alabama.[3] In 1932 bombers dropped supplies to Navajo Indians who had become snowbound by severe blizzards in Arizona.[4] In 1936 and 1937 the Air Corps flew food to flood victims in Pennsylvania and Illinois.[5] Other nations also benefited from humanitarian airlift before World War II, as for example in February 1939 when the Army delivered medical supplies by air to the victims of an earthquake in Chile.[6]

World War II stimulated the growth of airlift as nothing before or since. Until then, surface transportation moved virtually all troops and war materiel. The German Luftwaffe demonstrated the utility of airborne operations, using

gliders during the conquest of the Low Countries and dropping paratroops to conquer Crete.[7] The Allies soon adopted the same techniques. Gen. George F. Kenney's Fifth Air Force transported General MacArthur's forces from Australia to New Guinea in 1942.[8] Allied transports sustained more than 150,000 surrounded British troops in eastern India for three months in 1944.[9] In Europe, American troop-carrying aircraft led the Allied airborne invasions of Sicily, Italy, Normandy, the Netherlands, and Germany.

One of the most important operations in World War II was Air Transport Command's flying of the Hump to airlift fuel and war materiel from British India over the Himalayas to China after Japanese forces had cut off all land and sea routes. American cargo airplanes fought turbulence and icing as they flew over the world's highest mountain range. Under the leadership of Gen. William H. Tunner, the Hump airlift delivered 550,000 tons of cargo in its last year of operation.[10]

During World War II the Air Transport Command (ATC) also ferried thousands of airplanes to England and Russia, flying hazardous routes across the North Atlantic and across western Canada and Alaska. In the month of July 1945, the ATC had 3,700 airplanes flying 275,000 passengers and 100,000 tons of cargo and mail over a worldwide network of air routes.[11]

Not long after the birth of the United States Air Force as an independent service in 1947, President Truman authorized the creation of the Military Air Transport Service (MATS), which combined the strategic airlift resources of the ATC and the Navy.[12] Other commands managed tactical airlift resources.

In 1948 the Soviet Union blocked all land routes between West Berlin and the free world. To sustain two million people, the United States and the United Kingdom launched the largest airlift operation that had ever been flown, and General Tunner was called upon to direct it. The United States Air Forces in Europe began the larger American phase of the operation, which was called Operation Vittles, but the C–47s in the theater were not adequate for the large quantities of cargo needed. MATS therefore sent four-engine C–54s from all over the world for use in Europe. By 1949 Tunner had a C–54 landing in Berlin every ninety seconds. Between June 1948 and September 1949, American and British transports airlifted 2.3 million tons to the besieged city. Frustrated, the Soviet Union abandoned the blockade, allowing the Allies to achieve their strategic objectives without having to engage in warfare. In terms of tonnage and sorties, Operation Vittles remains the largest humanitarian airlift operation in history.[13]

Shortly thereafter another war required major airlift support. In 1950 communist North Korea invaded South Korea in a brutal attempt to substitute force for free elections. MATS airlifted priority cargo and personnel from the United States to the Far East. Between June 1950 and July 1953, MATS airlifted 214,000 passengers and 80,000 tons of cargo to Japan. It also transported tens of thousands of combat casualties and patients from the Far East to the

United States.[14]

While MATS handled strategic airlift between the United States and Asia, Combat Cargo Command airlifted troops and their equipment from Japan to Korea and within Korea. General Tunner, hero of the Hump and Berlin, commanded the intratheater airlift, using mostly C–47s and C–119 Flying Boxcars.[15] In November and December 1950, as communist Chinese forces swarmed into Korea and threatened to entrap American troops in the Chosin Reservoir area, Tunner's transports evacuated thousands of American ground troops.[16] During the war, theater cargo aircraft airdropped 15,000 tons of supplies and equipment.[17] When the Korean War ended in 1953, North Korea released thousands of Americans it had been holding as prisoners. Most returned to the United States by ship, but several hundred, too sick or wounded to endure a long voyage, went by air.[18]

During the 1950s President Dwight D. Eisenhower attempted to avoid conflicts like the Korean War with a policy of massive retaliation, but he was forced to use airlift extensively as a diplomatic instrument. In 1956, after a failed Hungarian uprising against Soviet domination, MATS carried more than 10,000 refugees from Europe to the United States.[19] Airlift also reinforced American foreign policy in the Middle East. During the same year American aircraft airlifted 1,300 United Nations peacekeeping troops from Colombia and India to patrol a cease-fire between Egypt and Israel after the Suez War.[20] In 1958, subversion threatened the peace of Lebanon, and the United States airlifted more than 5,000 American troops from Europe to Beirut. They and a large force of U.S. Marine Corps personnel, who landed by sea, restored stability that was to last for two decades.[21]

President Eisenhower also used airlift in Latin America, often to provide humanitarian relief after natural disasters. In 1960, after severe earthquakes struck Chile, the Air Force airlifted 1,000 tons of food, clothing, medical supplies, and other humanitarian cargo 4,500 miles to Chile in an operation called Amigos. The cargo included helicopters and two complete Army field hospitals.[22]

On the heels of the humanitarian airlift to Chile in 1960, another crisis in Africa demanded Eisenhower's attention and his airlift resources. The Congo had just become independent from Belgium, and competing factions struggled for power. To restore order, the United Nations authorized an international airlift of troops. Twenty thousand United Nations troops from sixteen nations eventually participated, and the United States airlifted ninety percent of them. The operation, called New Tape, was the largest airlift since Berlin, and it lasted for more than two years. The Air Force committed as many as sixty cargo aircraft at a time.

Powerful congressmen such as L. Mendel Rivers of South Carolina, aware of the importance of such worldwide airlift operations to American foreign policy, recommended modernization of the airlift fleet. His recommenda-

tions fit well into the new administration's national security policies. President John F. Kennedy, who took office in 1961, promised a flexible response to international crises anywhere in the world. He therefore supported the acquisition of four-engine jet transport aircraft such as the C–135 and the C–141 Starlifter.[23] Like Eisenhower before him, Kennedy used airlift as an instrument of a global foreign policy. When China invaded India in 1962, Kennedy launched Operation Long Skip, deploying C–130 Hercules aircraft to airlift Indian troops to where they were most needed.[24] In October 1963, just a month before he was assassinated, Kennedy demonstrated the ability of the United States to project its forces rapidly to wherever they were required. In an operation called Big Lift, he tapped the Air Force to transport 15,000 American troops and a million pounds of battle equipment 5,600 miles from the United States to Europe in only three days.[25]

President Lyndon B. Johnson took Kennedy's energetic foreign policy to new heights in Asia, Africa, and Latin America. In November 1964 he sent American C–130s to help rescue American and European hostages being held by rebels in Stanleyville in the Congo. In an operation called Dragon Rouge, fifteen of the planes dropped Belgian paratroopers, refueled at Leopoldville, and returned to retrieve them and the surviving liberated hostages.[26] To quell political disturbances in the Dominican Republic in 1965, which threatened to turn the country into another Cuba, Johnson sent in American troops. Air Force cargo aircraft airlifted the majority of nearly 24,000 soldiers, including 1,800 paratroopers, to the island nation, stabilizing the government and preventing a dictatorship.[27]

In Vietnam President Johnson used his airlift resources to the fullest extent. The new C–141 Starlifter carried American troops rapidly from the United States to Southeast Asia to reinforce the President's policy of escalation. In January 1966, the same month that MATS became the Military Airlift Command (MAC), the Air Force airlifted a brigade of 3,000 men and their equipment from Hawaii to South Vietnam. In a larger operation at the end of 1967, MAC transported a division of more than 10,000 men from Kentucky to Vietnam.[28]

While C–141s were carrying strategic airlift loads to Vietnam, as many as 26 squadrons of smaller cargo aircraft such as the C–130 Hercules, C–123 Provider, and C–7 Caribou performed tactical airlift missions in Southeast Asia. They hauled about 7 million tons in the theater between 1962 and 1972. By moving troops and cargo rapidly from place to place, they counteracted the enemy's advantages of initiative and surprise. In Operation Junction City in 1967, 23 tactical transports dropped 780 American paratroops and their equipment in an area northwest of Saigon. It was the largest American paratroop operation of the Vietnam War. In April of that year, 16 Hercules aircraft moved a brigade of 3,500 troops and 4,000 tons of equipment from Chu Lai to Tay Ninh.[29] One of the most heroic episodes of the Vietnam airlift was the 1968

evacuation of Kham Duc, an American camp surrounded by enemy forces armed with antiaircraft artillery. Close-in air strikes allowed C–130s and C–123s to land and evacuate the defenders. Lt. Col. Joe M. Jackson, a Provider pilot, earned the Medal of Honor by evacuating three American combat controllers after the enemy had gained control of the camp. His plane was constantly under fire during landing, retrieval, and takeoff.[30]

Besides dropping paratroopers and moving troops from place to place, the tactical airlifters in Vietnam supplied ground forces. During the successful defense of the U.S. Marine base at Khe Sanh between January and April of 1968, as many as eighteen C–130s landed per day, flying half-hour missions from Da Nang. Because of enemy shelling, no more than two were permitted on the ground at a time. Defenders took cover during landings because the aircraft attracted mortar fire. When enemy shelling prevented the supply planes from landing, the C–130s air-dropped cargoes, using container delivery, low-altitude parachute extraction, and ground proximity extraction systems.[31]

President Richard Nixon reversed Johnson's policy of escalation in Vietnam and began the withdrawal of American troops, but the war continued into the 1970s. By then Nixon had a new airlift tool to use in Southeast Asia: the C–5A Galaxy. It was the largest aircraft in the world, capable of carrying bulkier and heavier cargo than any airplane in history. Nonetheless, because of its cost the Galaxy aroused considerable criticism. Senator William Proxmire, for example, ridiculed the Galaxy as a fiscal disaster.[32]

In 1972, near the end of the war, when North Vietnam launched a large-scale invasion of South Vietnam, Nixon responded with air power, and airlift again contributed generously. MAC helped move the 49th Tactical Fighter Wing from New Mexico to Thailand in only nine days.[33] The wing's four fighter squadrons helped stall the invasion. When the war finally ended for America the following year, 590 Americans who had been held as prisoners of war returned to the United States on MAC transports. Operation Homecoming was one of the most popular of all airlifts.[34]

Later the same year American airlift contributed to quelling hostilities in the Middle East. Egypt and Syria suddenly attacked Israeli forces in the Sinai and Golan Heights in October. In an operation called Nickel Grass, the Air Force transported more than 22,000 tons of tanks, artillery, and other military cargo from the United States to Israel.[35] The operation countered a massive Soviet airlift of equipment and supplies to the Arabs. The war was over before the first sea-delivered supplies arrived.[36]

In 1973 and 1974, no longer faced with the drain of military resources in Vietnam, the United States was able to employ airlift in two of the largest humanitarian operations in history. Operations Authentic Assistance and King Grain provided more than 18,600 tons of food and other relief supplies to the African nations of Mali, Chad, and Mauritania, which were dealing with one of their worst famines.[37]

Operations such as these proved the awkwardness of relying upon two or more major commands for airlift resources. During the mid-1970s, the Air Force consolidated airlift under MAC. In 1974 and 1975 MAC acquired the C–130s of the Tactical Air Command, the United States Air Forces in Europe, and the Pacific Air Forces, which it used in concert with its strategic airlift C–5s and C–141s.[38]

The fall of Southeast Asia to communist forces in 1975 put the new airlift structure to the test. In what became the largest refugee airlift in history, the Air Force evacuated tens of thousands of refugees from Vietnam and Cambodia to the United States. Air Force aircraft moved about 50,000 people, and civilian airliners under MAC contract transported thousands more.[39]

Despite declining defense spending in the wake of Vietnam, the Air Force was able to secure funding to improve its military transports. In the late 1970s, the service stretched each of its C–141 Starlifters about 23 feet to extend their cargo capacities and to allow them to refuel in flight.[40] After the election of Ronald Reagan in 1980, funding for strategic mobility doubled, and Congress authorized the purchase of 50 new C–5Bs and 44 KC–10 tankers that could also serve as cargo airplanes. The Air Force also proposed a fleet of new C–17 Globemaster IIIs, which would combine a wide body like the C–5's with the ability to use short forward airfields like those available to the C–130. Planners expected the C–17 to replace the aging C–141s.[41] Legislation in the mid-1980s also allowed the Air Force to transport privately donated humanitarian cargo on routine training flights, at no cost to the donors or recipients, and permitted the airlift of surplus nonlethal Defense Department property to developing nations in need.[42]

Both Presidents Reagan and his successor George Bush used the Air Force's airlift resources to resolve crises in Latin America. Reagan invaded the small island of Grenada in 1983 in order to evacuate American citizens, eliminate a Cuban military presence, and establish a stable democratic government. While the marines went ashore, MAC transports delivered Army troops to the island. Some of the airplanes evacuated more than 700 American citizens on return flights to the United States.[43] President Bush invaded Panama in December 1989 to capture Gen. Manuel Noriega, who had established a drug-dealing dictatorship. In the initial invasion, 84 MAC cargo airplanes, flying at 500 feet, dropped close to 5,000 troops across Panama. It was the largest night-time airborne operation since World War II.[44]

The new joint Transportation Command, created in 1987, faced a bigger test in 1990 when Iraqi forces suddenly invaded and occupied tiny Kuwait. President Bush responded with Desert Shield and Desert Storm, which eventually liberated Kuwait. Gen. Norman Schwarzkopf, the theater commander, relied heavily on air power, not only to attack Iraqi strategic and tactical targets, but also for mobility. Although the vast majority of Desert Shield and Desert Storm cargo arrived in Saudi Arabia by sea, airplanes carried more than

500,000 troops and 544,000 tons of cargo to the Persian Gulf area.[45] At the height of the airlift, 127 transports landed daily in the theater.[46] For the first time, the Defense Department activated the Civil Reserve Air Fleet.[47]

Tactical airlift was no less important. General Schwarzkopf relied on about 150 intratheater C–130s, which were supplied by regular, Air Force Reserve, and Air National Guard units. Hercules aircraft moved 14,000 troops and over 9,000 tons of equipment to the west for Schwarzkopf's famous "left hook" maneuver, contributing to the liberation of Kuwait.[48]

The end of the Cold War in the late 1980s and early 1990s reduced the need for American armaments. The fall of communist governments in Eastern Europe, the end of the Warsaw Pact, the unification of Germany under a democratic regime as a member of the North Atlantic Treaty Organization, the dissolution of the Soviet Union, and a move toward democracy in Russia all increased the security of the United States. Like the other military services, the Air Force began to shrink. Between 1991 and 1995 the Air Force closed more than 30 major installations, trimmed over 1,400 airplanes, and released more than 110,000 personnel.[49] With reductions came reorganization. In 1992 the Air Mobility Command (AMC) replaced MAC and acquired tankers from the inactivated Strategic Air Command. AMC combined them with jet transports to create a more efficient strategic airlift instrument.[50] At the same time the command gained tankers, it began to lose its tactical airlifters. In 1992 the United States Air Forces in Europe and the Pacific Air Forces each gained a C–130 wing, and intratheater airlift transferred from AMC to theater control.[51] The next year AMC transferred its remaining C–130 tactical airlift assets to the new Air Combat Command.[52] This transfer, however, proved to be temporary since in 1997 Air Combat Command returned its C–130 units to AMC in the interest of what was called "seamless mobility."[53]

Although the Air Force grew smaller, demands for airlift actually increased. With the demise of the Soviet Union, the United States was the only country left in the world with the capacity to airlift large numbers of troops and materiel promptly to any part of the world.[54] The collapse of socialist economies in Eastern Europe generated the need for relief at the same time the region opened to American military transports. The whole world became eligible for American relief. Whereas in its first forty years the Air Force participated in an average of twelve humanitarian airlifts per year, in 1991 and 1992 the annual average was twenty.

During those two years, President Bush launched a series of five Provide operations to help people in need or to secure peace around the world. Provide Comfort aided the Kurds in northern Iraq; Provide Hope delivered food, medicine, and other relief supplies to citizens of the former Soviet republics; Provide Relief carried humanitarian cargo to refugees of the Somali civil war in eastern Africa; Provide Transition separated troops of recently warring factions in Angola; and Provide Promise airlifted food, medicine, and other relief

cargo to Bosnia, a remnant of the former Yugoslavia, where Serbs, Muslims, and Croats contended for domination. Lasting from 1992 to early 1996, Provide Promise became the longest sustained humanitarian airlift operation in history.[55]

As Air Force cargo aircraft flew all over the world on the Provide missions, they also responded to emergencies at home. The most significant of these was Hurricane Andrew, which devastated southern Florida in 1992. In one month the Air Force airlifted 21,400 tons and 13,500 passengers, using the resources of Air Mobility Command, the Air Force Reserve, and the Air National Guard. In quantity of personnel and cargo, it was the largest domestic airlift in history.[56]

President Clinton also used the airlift resources at his disposal to secure a more stable and democratic world. He continued President Bush's Operation Restore Hope, which airlifted American forces to Somalia to provide security for relief workers and cargo in Somalia threatened by feuding factions.[57] In 1994 he authorized the airlift of almost 15,000 tons of humanitarian aid to Rwandan refugees in central Africa who had fled ethnic violence between the Hutu and Tutsi tribes.[58] That same year American troops flew to Haiti to help that nation's transition to democracy and to end a mass exodus of refugees to the United States.[59] The President followed up Provide Promise in Bosnia with Operation Joint Endeavor to secure the peace agreement negotiated at Dayton, Ohio, in 1995.[60]

In today's military, airlift increasingly reflects the Total Force concept, combining resources of Regular Air Force, Air Force Reserve, and Air National Guard units. By May of 1993 more than half the airlift wings and groups were Reserve or Guard organizations.[61] The Civil Reserve Air Fleet has shown its ability to carry more troops than military aircraft on strategic airlift deployments, and up to thirty percent of the cargo.[62] Technological improvements have also modernized Air Mobility Command. In 1993 the first operational C–17 finally entered the Air Force inventory.[63] A total of 120 C–17 Globemaster IIIs are on order and will eventually replace the Starlifter fleet. New C–130J models are now being built, with improved propellers and electronic systems.

With modern airplanes, highly trained and motivated crews, efficient command structures, and adequate basing, the nation's airlifters will continue to serve as effective instruments of national policy, both in peace and war, just as they have since World War I. Mobility may not be the most spectacular use of air power, but it is the most common. So, the next time you conjure up an image of the Air Force, you might picture a Hercules, a Galaxy, or a Globemaster III.

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U.S. Air Force Peacetime Airborne Reconnaissance During the Cold War, 1946–1990

Vance O. Mitchell

During most of its first two hundred years as an independent nation, the United States had no national intelligence establishment and little means of collecting information on other nations, but neither was really needed. Geographically separated from the other world powers on the east and west by two vast oceans, and bordered on the north and south by friendly, or at least weak, neighbors, the nation enjoyed a "cushion of time" that allowed it to mobilize its assets, including intelligence, to meet external threats. In times of peace, intelligence, espionage, and spying, like large standing militaries, were accorded indifference and suspicion rather than support. For most of this period, only the State Department routinely gathered information from abroad, but its efforts were sporadic, poorly coordinated, and bore little resemblance to the vast collection systems we take for granted today.[1]

Military intelligence fared no better, flourishing in wartime only to wither away with the return of peace. As late as 1936, the combined personnel strength of the Army General Staff G–2 and the Office of Naval Intelligence was only eighty-six. A small number of attachés accredited to American embassies overseas constituted the only military collection effort. Few competent officers pursued careers in intelligence because it was a dead-end field marked by low status and poor promotion opportunities. Indeed, other career fields routinely used intelligence as a dumping ground for malcontents, prima donnas, and oddballs whose personality quirks limited their utility elsewhere.[2]

World War II changed all that. The lingering effects of the intelligence failure at Pearl Harbor and the emergence of the United States from isolationism into a world suddenly made smaller by long-range aviation, and more dangerous by nuclear weapons, mandated greater support for peacetime intelligence. No longer could intelligence be what Maj. Gen. George C. McDonald,

Director of Intelligence, USAF, during the immediate postwar period, called "an undernourished wretch, misunderstood, and not encouraged."[3] The National Security Act of 1947, one of the most important pieces of legislation of the twentieth century, laid the foundation for a permanent American intelligence establishment. The director of the newly created Central Intelligence Agency (CIA) had a degree of authority over the intelligence community, which at the time consisted only of the CIA, the State Department, and the three military services, for purposes of oversight and coordination. The CIA director also provided pertinent intelligence to the members of the newly created National Security Council, who, in turn, advised the President upon whose shoulders rested the heavy burden of national security.[4]

Although the intelligence community's responsibilities spanned the globe to include every country and political entity, only one foreign power, the Soviet Union, had the technology, industrial base, population density, and, more importantly, the ideological hostility and expansionist impulses to threaten American interests. That reality, soon to harden into the Cold War, gave the intelligence community the focus it would maintain for more than four decades.

Maj. Gen. William Donovan, the head of the Office of Strategic Services, the CIA's predecessor during World War II, once remarked that intelligence was difficult, but no great mystery. It required only three steps—collecting information, arranging that information into patterns, and extracting the desired intelligence. Yet even the first step in General Donovan's simplistic trilogy proved a daunting process when applied to the Soviet Union, owing to that county's sheer size and security measures that sometimes seemed to border on paranoia. How did you compile information on a country where telephone books were controlled items, security forces closely monitored embassy personnel, and even casual contact between its citizens and foreigners was severely restricted?[5]

A partial answer to the problem was to conduct airborne reconnaissance around the Soviet periphery and, later, around the entire Sino-Soviet bloc. Although all the military services and the CIA flew reconnaissance missions during the Cold War, the Air Force was the major player by virtue of having the aircraft with the lifting power to carry the necessary sensors aloft and the range to reach the more remote areas of interest. This paper, which details only the Air Force contribution, focuses on routes, basing, and aircraft rather than on collection objectives and which aircraft carried which sensors, a choice mandated by both the available evidence and security considerations. Moreover, although the United States flew reconnaissance missions against many nations during the Cold War, the following remarks emphasize those operations against the Sino-Soviet bloc.

Reconnaissance against the Soviet Union was a tall order. That country's eleven thousand miles of shorelines and borders encircled an area of over eight

million square miles, making it larger than the entire North American continent. Add in the People's Republic of China and the satellite nations of Eastern Europe, and the territory encompassed grew to over thirteen million square miles and the periphery increased to some twelve thousand miles. Thus, the distance around the Sino-Soviet bloc was equivalent to halfway around the world.[6]

Protracted reconnaissance operations against a land mass that size required three things: judicious management, diplomatic initiatives, and advanced aviation technology. Management meant employing a limited number of aircraft to maximum effect, and since all locales did not yield information of equal value, they need not be treated in an equal manner. More sensitive areas, such as the Baltic Sea and the East German–West German border, might merit twice-weekly coverage. Conversely, more remote or less active areas, such as the Laptev Sea along the Soviet Arctic littoral, might receive only monthly or quarterly visits.

The diplomatic initiatives came from the State Department, which for forty years negotiated basing rights for reconnaissance aircraft with a number of foreign nations. Those negotiations allowed aircraft to launch and recover from bases as close to the target areas as geography and international politics would permit. In general, the State Department did its job well, but the shifting political sands sometimes created problems. At least three nations had rescinded basing rights for reconnaissance aircraft by the end of the Cold War.[7]

Enormous technological advances made during World War II resulted in aircraft that could bridge the gap between geographic and diplomatic obstacles and the target areas. The first twenty-five years of the Cold War were marked by the quest for ever-better reconnaissance aircraft, beginning with obsolescent aircraft being phased out of the inventory (such as the RB–17s and RB–29s in the late 1940s and early 1950s), and progressing to more capable vehicles. Not until the 1970s, when its strategic reconnaissance fleet consisted of RC–135s, RC–130s, U–2s, and SR–71s, did the Air Force have the aircraft it needed to conduct the mission satisfactorily.[8]

The Air Force began airborne reconnaissance operations against the Soviet Union in 1946 when RB–29s of the 46th/72d Strategic Reconnaissance Squadron (SRS) began operating from Ladd Air Force Base, Alaska. Some aircraft photomapped the northern extremes of Alaska and the Canadian Arctic Archipelago, searched the Arctic Ocean for hitherto unknown islands, and in general, looked for evidence of clandestine Soviet activity (Project Polaris and Project Five). Other RB–29s collected radar and photographic intelligence along the periphery of the Chukotski Peninsula, the Soviet landmass directly across the Bering Straits from Alaska and a potential launch point for an aerial assault against the United States. In 1947, the 46th/72d SRS and its RB–29 also began monitoring electronic emissions from the Chukotski area (Project Twenty-Three).[9]

Reconnaissance activity intensified over the next few years as relations with the Soviet Union deteriorated and the United States accelerated planning for nuclear war. In 1948, the Strategic Air Command (SAC) modified ten additional B–29s for electronic reconnaissance. Half of the new aircraft stayed at stateside bases from which they periodically deployed to England to fly missions in the Baltic Sea and along the East German and Czechoslovakian borders (Project Biograph). The other five aircraft were stationed permanently with the 91st SRS in Japan where they provided Pacific Air Forces with a theater reconnaissance capability. The 91st SRS's RB–29s would in time conduct systematic operations against the People's Republic of China, North Korea, Sakhalin Island, the Kurile Islands, and the Soviet Pacific littoral as far north as the Khamchatka Peninsula. Further north, the 46th/72d's RB-29s operating out of Alaska and the Aleutian Islands began monitoring the entire Siberian coastline from Wrangel Island in the Arctic Ocean to the southern tip of the Khamchatka Peninsula (Project Rickrack). When combined, the Japan and Alaska-based missions provided complete coverage of the Soviet Union's entire Pacific littoral.[10]

In the late 1940s, the United States Air Forces in Europe, the major American air command on the continent, also acquired a reconnaissance capability. The operative unit was the 7499th Support Group stationed at Wiesbaden Air Base, Germany. Initially, the 7499th had only a few RB–17s jury-rigged with rudimentary electronic intercept equipment, but over the next decade the unit received RC–54s, RC–97s, and variants of the RB–57. These aircraft, like SAC's England-based RB–29s, patrolled the Baltic Sea and the East German–West German and Czech–West German borders. Other 7499th missions flew the length of the Adriatic Sea to sample electronic signals from Yugoslavia and Albania. By the end of the 1950s, the unit used Athens, Greece, as a deployment base for missions in the Mediterranean Sea and Incirlik Air Base, Turkey, for operations in the Black Sea. Most of the aircraft were outfitted with electronic intercept suites, but one of the RC–97s carried aloft the largest optical sensor used in American airborne reconnaissance, the 240-inch focal length Pie Face oblique camera. Pie Face could peer across international borders and gain useful information to a distance of about seventy miles in good weather.[11]

In the early 1950s, SAC modified a number of B–50s into RB–50s with the addition of electronic intercept equipment. With a much greater range than the RB–29 and equipped for inflight refueling, these aircraft pushed reconnaissance coverage still further afield. The 91st SRS's RB–50s patrolled the entire length of the Soviet Far East coastline and recovered in Alaska after fifteen hours in the air. Half a world away, SAC's RB–50s based in England ventured around Norway's North Cape and into the Barents Sea to sample the electronic environment of the Kola Peninsula and the great Soviet naval complex at Murmansk, and further still into the Arctic on missions that lasted as

long as thirty hours. Far to the south, SAC RB–29s and RB–50s, temporarily deployed to Dhahran, Saudi Arabia, flew over the Black Sea monitoring the Crimean Peninsula and Soviet Armenia.[12]

In about 1953, RB–47s, ultimately numbering approximately thirty-three aircraft, began joining the inventory, and Air Force reconnaissance truly entered the jet age. The RB–47s were initially divided between SAC's 26th Strategic Reconnaissance Wing (SRW) at Lockbourne Air Force Base, Ohio, and SAC's 55th SRW at Forbes Air Force Base, Kansas. After the 26th SRW deactivated in 1958, the 55th SRW inherited the entire fleet. Powered by six jet engines and equipped for inflight refueling, the RB–47s routinely flew sixteen hour missions that spanned distances in excess of seven thousand miles. From bases in England and Japan, the new aircraft supplemented the Asian and European coverage of the older RB–50s. From bases in Alaska and Greenland, they brought routine coverage to the Kara Sea and the Laptev Sea, the most inaccessible portions of the Soviet Arctic coastline. Thus, by the middle to late 1950s, if not sooner, Air Force reconnaissance aircraft patrolled most of the Sino-Soviet bloc's periphery. Only that portion from eastern Iran to the South China Sea, areas off-limits for political reasons, escaped coverage.[13]

Yet both the RB–50 and the RB–47 had deficiencies that limited their reconnaissance role. The RB–50 was slow, making it vulnerable to hostile fighters and limiting its range despite inflight refueling. The RB–47 had only three intercept positions, and its cramped, almost claustrophobic, interior offered few creature comforts, aggravating crew fatigue in long missions. The search in the late 1950s for a more suitable aircraft quickly focused on the new KC–135 jet tanker, but the SAC commander, Gen. Thomas Power, balked at the idea. Although a strong supporter of reconnaissance and intelligence, he refused to release any of the aircraft from their tanker roles, but he promised to do so as soon as he could. Power's decision led to a renewed search and the selection of the turboprop C–130 transport. RC–130s began entering the inventory in 1958; by 1961 they had replaced the RB–50s in both the Far East and Europe. The RC–130 did not, however, replace the RB–47, owing to deficiencies in altitude, range, and speed. Table 1 shows the basing and operating areas for Air Force reconnaissance aircraft patrolling the Sino-Soviet bloc periphery during the late 1950s.[14]

TABLE 1
Air Force Peripheral Reconnaissance Missions, Late 1950s*

Base	Mission Aircraft	Area of Operation
RAF Brize Norton, England	RB–47	Barents Sea, Baltic Sea, West Germany

Yokota AB, Japan	RB–50, RB–47, RB–57	Yellow Sea, South China Sea, East China Sea, Sea of Japan, Sea of Okhotsk, North Pacific Ocean
Athens, Greece	RC–97, RB–50	Mediterranean Sea
Incirlik AB, Turkey	RC–97, RB–47	Black Sea
Thule AB, Greenland	RB–47	Kara Sea, Laptev Sea
Eielson AFB, Alaska	RB–47	East Siberian Sea, Bering Sea, North Pacific Ocean
Wiesbaden and Rhein Main ABs, Germany	RC–130, RC–97, RC–54, RB–57	Baltic Sea, West Germany, Adriatic Sea
Clark AB, Philippines	RB–47	Unknown

*Compiled from multiple sources.

General Power kept his word, and the first RC–135s entered the inventory in 1961. Afterward, however, problems encountered in sensor development delayed the subsequent delivery until 1965; not until the early 1970s did the Air Force have a full complement of this aircraft. All were assigned to SAC's 55th SRW, now stationed at Offutt Air Force Base, Nebraska. Like the RB–47s, the RC–135s flew peripheral missions from bases in Alaska, England, the Far East, and the Mediterranean. Its spacious interior accommodated relief crews and rest facilities, thereby easing the crew fatigue problem; its 500 mph speed made it less vulnerable to hostile fighters; and an inflight refueling capability allowed missions longer than twenty hours. Sufficient RC–135s were in the inventory to completely phase the RB–47s out in 1967 and the RC–130s out of their peripheral reconnaissance roles in 1974. By then, however, some RC–130s had secured a role in a covert reconnaissance mission that would extend their operational lives until the end of the Cold War.[15]

In addition to patrolling various coastlines and borders, the RC–135s inherited from RB–47s the responsibility for monitoring the Soviet long-range missile program, in particular intercontinental ballistic missile development. Special versions of the RB–47, the ERB–47 Tell Two, collected valuable information on Soviet missile testing during the late 1950s by monitoring electronic emissions from launch complexes located in what is now Kazakhstan. These aircraft operated from Incirlik Air Base, Turkey, and flew routes in Turkish and Iranian air space until Ankara canceled basing rights in 1966. In the early 1960s, two of the ERB–47s moved to Shemya, a tiny, barren island near the western extremity of the Aleutian chain, to record data generated by the reentry of missile warheads into the atmosphere. Unfortunately, the Shemya-based

ERB–47s did not prove to be particularly adept at this mission.[16]

The few RC–135s outfitted for missile monitoring also called Shemya home, but the mission was almost nomadic. Depending on the type of missile being tested and the launch site, the warhead could splash down anywhere in the broad ocean area (BOA) along an arc extending from the North Pacific near the Khamchatka Peninsula to the equator southwest of Hawaii. Fortunately, the Soviets always published the planned splashdown point, along with a warning for ships and planes to avoid the area, several weeks before the launch. This allowed the RC–135s plenty of time to deploy, if necessary, to one of several alternate bases—Hawaii, Guam, Wake Island, or Johnson Island—to await the launch.[17]

When other sources detected an imminent launch, the RC–135s got airborne in time to establish an orbit near the splashdown point. As the warhead neared reentry into the atmosphere, the aircraft began collecting data, using a variety of sensors. The collection continued until splashdown. In any given year, these aircraft successfully collected data regarding more than half of the Soviet missiles fired into the Pacific BOA. Some tests were not monitored because the tasking to do so was not ordered or launch notifications came too late.[18]

The aircraft discussed thus far had large or relatively large crews, ranging from as few as six in the RB–47 to as many as thirty in the RC–135. However, "mini-manned" aircraft outfitted with automatic collection systems allowed them to get by with only a pilot, or at most a pilot and a systems operator. These included the RB–57, the U–2, and the SR–71, the latter two of particular note. In fact, the U–2, whose Air Force service spans the period from 1957 to the present day, is arguably the most successful reconnaissance aircraft in the nation's history.[19]

At one time or another, Air Force U–2s used their 70,000-foot altitude and 10-hour endurance to perform a variety of missions. They ferreted out the Soviet attempt to install offensive missiles in Cuba (1962), confirmed the existence of Soviet military installations in Somalia (1976), assisted another African nation in its war against insurgents, patrolled the tense border between Yemen and Saudi Arabia (1980), monitored North Korea (1976–1990), flew a wide variety of missions during the American military involvement in Southeast Asia (1965–1975), and operated over Western Europe (1976–1990). Since 1974, U–2s have flown photoreconnaissance missions over the Sinai Peninsula and the Golan Heights to police the cease-fire that ended the 1973 Middle East war. The policing required the complete cooperation of the former belligerents—Israel, Egypt, and Syria—all of whom received copies of the imagery. Still other U–2s outfitted with special filters flew the globe through 360 degrees of longitude, virtually pole to pole, collecting radioactive debris hurled aloft by foreign nuclear tests.[20]

The SR-71 Blackbird, the other mini-manned aircraft of note, was the

most glamorous aircraft of the time, indeed, probably of all times. Designed to replace the U–2 as a manned penetrator of heavily defended airspace, it relied on its 2,200 mph speed and 80,000-foot operational altitude to escape detection. It was also the first American aircraft designed and built from the ground up specifically to conduct reconnaissance, rather than being an adaptation of an existing airframe. SAC's 9th SRW at Beale Air Force Base, California, began receiving SR–71s in 1965; building up the inventory and crew training occupied the wing for the next two years. Deployed to Kadena Air Base, Okinawa, in 1968, the SR–71 began overflying North Vietnam, a mission that continued regularly until the 1973 American military withdrawal, and less often afterward. During the 1973 Middle East War, SR–71s operating from the continental United States overflew the war zone on photographic missions that exceeded ten hours in length and required six inflight refuelings per sortie. In 1974, SR–71s assumed part of the Cuban reconnaissance mission and continued in this effort until surveillance of the island ended in the late 1980s. In 1987, a single SR–71 surveyed the entire length of the Persian Gulf to gauge the threat that Iran posed to oil tankers plying those waters. The aircraft also conducted operations against North Korea and Central America in the 1980s, but specific information on those missions is lacking.[21]

The overwhelming majority of Air Force reconnaissance missions during the Cold War skirted the Sino-Soviet bloc periphery. But long-range oblique cameras could peer in only a limited distance, and under ideal conditions, the coverage against line-of-sight electronic transmissions was perhaps three hundred miles. Therefore, most territory lay beyond the range of peripheral missions, a severe limitation in the days before reconnaissance satellites. As a result of the intensification of the Cold War following the December 1950 Chinese intervention in Korea, the United States took the extraordinary step of flying a number of reconnaissance missions *over* the Soviet Union, years before the U–2 entered that airspace.

Before discussing those missions, a word of caution. Even though the popular literature in recent years has carried a number of articles about Air Force overflights of the Soviet Union in the early 1950s, they rely mostly on the recollections of those who flew or were associated with the missions. Some accounts ring true, but some do not. With that in mind, the following is the author's best estimate of what took place, based on familiarity with the individuals relating the incidents, the competence of the writers involved, and the few pieces of hard evidence found in various archives and repositories. The paucity of hard evidence, testament to the small circle of people privy to these missions, has led some critics to charge that the overflights were rogue operations authorized by Gen. Curtis LeMay, the SAC commander at the time, possibly in an attempt to trigger World War III. In fact, these missions were ordered by higher authority, and LeMay was merely carrying out orders.[22]

Planning for the first overflight of the Soviet Union, targeting the

Chukotski Peninsula, began in early 1951, but the mission never transpired. The aircraft, a B–47 modified to carry cameras in its bomb bay, burned on the ramp at Eielson Air Force Base, Alaska, in September 1951, the day preceding the mission. The first successful overflight, also targeting the Chukotski Peninsula and piloted by Col. Don Hillman, occurred almost exactly one year later. In April 1954, a second mission, flown by an RB–47 piloted by Capt. Harold Austin, overflew the Kola Peninsula and the extreme northwest portion of the Soviet Union. Both missions flew in the daytime and photographed air bases to determine if they could support a bomber offensive against the United States.[23]

At about the same time, RB–45s based in England penetrated the western portions of the Soviet Union almost to Moscow, collecting radar intelligence against potential targets (Project Ball Park). The collected radar images were used to improve the target folders of SAC bomber crews who, until then, had only sketchy ideas of how their targets would appear on radar. These missions flew at night to minimize the threat posed by Soviet air defense, which at the time had neither radar-equipped interceptors nor surface-to-air missiles.[24]

Other overflights used specially equipped fighter aircraft for shallow penetrations of Soviet air space. One such mission used F–86s based in Japan to penetrate the Soviet maritime provinces. Another used F–100s against the Caucasus region from a base in Turkey (Project Slick Chick). Both missions, flown in the daytime to collect photographic intelligence, relied on surprise, speed, and the minimal amount of time in hostile airspace to escape destruction. Still other missions used RB–47s based at Thule, Greenland, to photomap Novaya Zemlya, a large Soviet island in the Arctic Ocean; the Yenisey River valley; and other areas of the northern Soviet Union in the spring of 1956 (Project Home Run). A final mission took RB–57s over Vladivostok in the Soviet Far East in December 1956, after which all Air Force overflights ceased.[25]

Thereafter, the overflight mission fell entirely to the CIA's U–2 program and continued until May 1960 when a missile downed Francis Gary Powers' aircraft deep inside the Soviet Union. The shootdown and President Dwight Eisenhower's promise that no further overflights would occur ended the penetration of Soviet air space by manned reconnaissance aircraft. The loss of intelligence was short-lived, however. Earth-orbiting reconnaissance satellites became operational in August 1960, obviating the need for a manned penetrator by performing the overflight mission without risking the life of a human pilot and without diplomatic repercussions.[26]

By the 1980s, the Air Force strategic peripheral reconnaissance mission involved three types of aircraft, two main operating bases (MOBs), and a number of operating locations (OLs). The MOBs were Beale, home of the 9th SRW (U–2s and SR–71s), and Offutt, home of the 55th SRW (RC–135s). The OLs

were located wherever necessary to provide the optimum coverage of the target nations. With the exception of a small number of missions against Cuba and Central America, conducted from Beale, and a few RC–135 missions in the same area, conducted from Offutt, all operational flying took place from the OLs.[27] Table 2 shows the basing and operating areas in the 1980s.

TABLE 2
Air Force Peripheral Reconnaissance Missions, 1980s

Base	Mission Aircraft	Area of Operation
Primary Location:		
Offutt AFB, Nebr.	RC–135	Caribbean Sea
Beale AFB, Calif.	U–2, SR–71	Caribbean Sea, Central America
Secondary Location:		
RAF Mildenhall, England	RC–135, U–2, SR–71	Baltic Sea, Barents Sea, West Germany
Athens, Greece	RC–135	Mediterranean Sea
Cyprus	U–2	Golan Heights, Sinai Peninsula
Kadena AB, Okinawa	RC–135, SR–71	South China Sea, Yellow Sea, Sea of Japan, Sea of Okhotsk, North Pacific
Osan AB, Korea	U–2	South Korea, Yellow Sea, Sea of Japan
Eielson AFB, Alaska	RC–135	East Siberian Sea, Laptev Sea, Kara Sea, North Pacific Ocean
Shemya Island	RC–135	Pacific BOA
Hickham AFB, Hawaii	RC–135	Pacific BOA
Wake Island	RC–135	Pacific BOA
Andersen AB, Guam	RC–135	Pacific BOA
Johnson Island	RC–135	Pacific BOA
Diego Garcia	SR–71, U–2	Persian Gulf, Arabian Sea
Patrick AFB, Florida	U–2	Caribbean Sea, Central America

All the missions and aircraft discussed heretofore, be they peripheral or overflight, used aircraft that operated overtly with little, if any, attempt to hide the camera ports, antennas, and dielectric domes associated with the various on-board sensors. There was, however, one reconnaissance unit that, while technically not penetrating denied airspace, had to operate more discretely. The unit's aircraft filed flight plans, received the usual clearances from air traffic controlling agencies, and in general, conducted themselves as would any

other aircraft. Only the actual mission was concealed by installing sensors in such a way that their presence could not be confirmed without an internal search of the aircraft. This mission was said to be covert.[28]

The 7405th Support Squadron (SUPRON), a part of the 7499th Support Group mentioned earlier, based at Wiesbaden Air Base, Germany, until 1975, and later at Rhein Main Air Base, flew the most successful covert Air Force reconnaissance mission of the Cold War. Beginning in about 1952, the 7405th SUPRON daily patrolled the twenty-mile-wide air corridors leading from West Germany to Berlin and the forty miles in diameter control zone surrounding the city (Project Rain Drop). Technically, there was no need to resort to covertly configured aircraft because the four-power agreement governing the use of the air corridors, drafted jointly by the Soviet Union, the United States, Great Britain, and France, did not prohibit any specific types of aircraft from using that airspace. Moscow's interpretation, however, was that the three western allies enjoyed aerial access to Berlin only to logistically support their military garrisons stationed there. Rather than make an issue of it, the United States elected to use cargo aircraft outfitted with covertly mounted sensors.[29]

Over the years, the 7405th SUPRON's covert aircraft—RB–47s, RB–29s, RC–97s, RC–130s, etc.—collected optical imagery using a variety of cameras with focal lengths ranging from 6 inches for vertical photography to 240 inches for long-range oblique photography, as well as thermal imagery from vertical and forward-looking infrared systems. In addition, one of the RC–97s and one of the later RC–130s had electronic intercept suites. Sliding external panels covered the camera ports and all antennas, and dielectric domes were fully retractable.[30]

Still, for any number of reasons, the Soviets and East Germans knew perfectly well what was going on. Of all the aircraft transiting the air corridors, only those of the 7405th SUPRON requested their own navigation, followed routes different from other aircraft, routinely flew 500 feet off their assigned altitudes, and traced random flight patterns while in the Berlin Control Zone. Berlin Air Traffic Control Center, the American-operated radar facility that monitored and directed air traffic in the corridors and control zone, allowed this freedom of action because it was privy to the mission. Further, the spectacle of transport aircraft landing at Berlin Tempelhof Airfield, and the crew (sometimes numbering upward of fifteen) having lunch and then returning to West Germany, with no effort to either onload or offload passengers or cargo, strained the cover story beyond any credibility. Moreover, ground-based photography taken through telephoto lenses clearly showed open camera doors up to 10,000 feet, the highest altitude allowed in the corridors and control zone.[31]

Why did the Soviets, who had a veto on any aircraft entering the corridors, allow the mission to operate even though it was hidden by only the barest of fig leaves? There is no way of knowing for certain, but several reasons suggest themselves. Supposedly covert flights spared the Soviets the insult of an

overt reconnaissance mission operating in airspace over which they had control. East Germany, not the Soviet Union, was under observation, which understandably lessened nationalistic sensitivities. The Kremlin must have known that the United States would not pass up the chance to conduct aerial reconnaissance over the most heavily militarized section of the Warsaw Pact. Having positively identified the mission aircraft, they could, to a degree, control what was and was not seen. There was also tacit reciprocity, an unspoken understanding that by allowing the 7405th SUPRON to operate without interference, the Soviets could carry out similar missions using covertly configured aircraft, mainly civilian airliners, to venture into the West. Finally, there was probably an understanding by Moscow that allowing corridor reconnaissance was a signal that it had nothing to hide, whereas denying that right would alert the West and raise tensions. Whatever the reasoning, the 7405th SUPRON's covert missions flew for almost four decades without a serious incident, giving the corridor missions the advantage of being a low-risk endeavor that returned intelligence of great value.

Although neither the Berlin air corridor missions nor the Air Force overflights of the Soviet Union in the 1950s resulted in any losses to hostile action, other missions and aircraft were not so fortunate. Trouble with Moscow over peripheral reconnaissance began in 1947 when an RB–29 flew perilously close to the shoreline of the Chukotski Peninsula. Fortunately, the incident was resolved via diplomatic exchanges; unfortunately, that civility did not long endure. Beginning in 1950 and continuing on through the 1960s, the Cold War was littered with incidents involving hostile action taken against reconnaissance aircraft.[32]

Those incidents illustrated the delicate balance inherent in peacetime reconnaissance and the potential consequences should either side upset that balance. With the exception of the U–2 missions that policed the cease-fire that ended the 1973 Middle East War, the United States never negotiated with any target nation the ground rules governing peacetime reconnaissance. Instead, the ground rules evolved through a process known as mission assessment, performed at various levels within the military and federal government. The assessment took into account a target nation's sensitivity to intelligence operations in general, the state of its relations with the United States, its shoot-down capability, and whether it flew reconnaissance missions of its own (tacit reciprocity). In all cases, whether or not an aircraft flew a particular route on a particular day was a judgment call that balanced the anticipated intelligence gain against the potential threat to the aircraft and its crew. No aircraft ventured into a high-threat area without the potential of gathering intelligence of great importance.

In the vast majority of the cases, mission assessment proved valid, but the capriciousness of the Sino-Soviet bloc reactions, which sometimes seemed to border on the mindless, made it less than foolproof. Peacetime reconnais-

sance, therefore, despite the precautions, remained one of the more hazardous missions of the Cold War. Fighters intercepted American reconnaissance aircraft on numerous occasions and attacked them at least thirty-three times, resulting in the loss of eleven aircraft. Surface-to-air missiles destroyed two U–2s, and although it cannot be proven, three other aircraft disappeared under circumstances that suggest that they fell victim to hostile action. Three of the downed aircraft—the U–2 of Francis Gary Powers (1960), an RC–130 over Soviet Armenia (1958), and a U–2 over Cuba (1962)—had violated international boundaries, but as far as is known the other lost aircraft were operating in international airspace, well clear of any reasonable claims of sovereignty.[33] Table 3, which includes aircraft operated by the Navy and the CIA as well as by the Air Force, summarizes those losses.

TABLE 3
American Reconnaissance Aircraft Lost on Operational Missions, 1946–1991*

			Number of Men			
Mission Date	Acft. Type	Where Lost	On Board	Recov. Alive	Recov. Dead	Not Recov.
Apr 8, 1950	PB4	Baltic Sea	10			10
Nov 6, 1951	P2V	Sea of Japan	10			10
Jun 13, 1952	RB–29	Sea of Japan	13			13
Oct 7, 1952	RB–29	Kurile Islands	8			8
Jul 29, 1953	RB–50	Sea of Japan	17	1	2	14
Sep 4, 1954	P2V	Siberian Coast	10	9		1
Nov 7, 1954	RB–29	Sea of Japan	11	10	1	
Apr 17, 1955	RB–47	North Pacific	3			3
Aug 22, 1956	P4M	Formosa Straits	20		4	16
Sep 10, 1956	RB–50	Sea of Japan	16			16
Sep 2, 1958	RC–130	Armenia	17		4	13
May 1, 1960	U–2	USSR	1	1		
Jul 2, 1960	RB–47	Barents Sea	6	2	1	3
Oct 26, 1962	U–2	Cuba	1		1	
Dec 14, 1965	RB–57	Black Sea	2			2
Apr 15, 1969	RC–121	East China Sea	31	0	2	29
Total			176	23	15	138

*Sources: FAX, Dir, Log JCS to AF/IN, Sep 19, 1992; MFR, Subj: Incidents Involving United States Reconnaissance Aircraft, 1950–1966, Feb 27, 1967, copy furnished by HQUSAF/INX.

The shootdowns ceased with the arrival of détente between the United

States and the Soviet Union in the early 1970s and a greater tolerance by most nations of aerial reconnaissance, although a few unsettling incidents still occurred. Then in the mid-1980s, accelerating economic decline and growing social unrest prompted Soviet Premier Mikhail Gorbachev to begin dismantling the elaborate network of state controls that for two generations had directed and stifled the nation and its citizens. The deepening crisis also forced a dramatic reduction in Soviet military spending and an equally dramatic retraction of Soviet power, thereby realizing the main American objective of the Cold War. Over the next several years, the Soviet Union withdrew its military forces from the satellite nations of Central Europe, ended or drastically reduced assistance to friendly nations and groups, permitted the reunification of Germany, dissolved the Warsaw Pact, and allowed the restive ethic minorities around the Soviet periphery to become fourteen separate and independent nations. Then, in 1991, the Soviet Union dissolved, and its remnant became Russia, thereby placing a finishing touch to some of the most memorable events of this century.

The complete collapse of Soviet power and the end of the Cold War meant that the United States could also trim its defense budget, which had soared during the presidency of Ronald Reagan. Air Force reconnaissance faced particular reductions. Left without a mission after German reunification, the covertly configured RC–130s that had plied the Berlin air corridors stood down permanently, and the 7405th SUPRON disbanded. The RC–135's fleet, already thin, got thinner when some of the aircraft in the active fleet were placed in backup status. Neither move came as a surprise.[34]

Then came the real shock: the retirement of the entire SR–71 fleet. In fact, the SR–71 had operated under a cloud for virtually its entire operational life. The success of reconnaissance satellites robbed the aircraft of its primary mission, that of penetrating the heavily defended airspace of the Sino-Soviet bloc. To be sure, SR–71s flew numerous peripheral missions and occasionally overflew other, less well defended countries. But RC–135s and U–2s could have performed the bulk of these missions, making it increasingly difficult to justify the SR–71's sky-high operating costs estimated in the $70,000 per flying-hour range. It still took the demise of the Soviet Union to end the aircraft's career.[35]

Nonetheless, the aircraft's phenomenal performance, unequaled by any reconnaissance aircraft to this day, prompted the intelligence community to hedge its bet. Six SR–71s were placed in flyable storage, along with six sets of sensors and a six-month supply of spare parts and fuel. The Air Force also tagged the records of all personnel associated with the aircraft so that they could be recalled to those duties quickly if needed. These actions theoretically gave the Air Force the ability to conduct limited SR–71 operations within three months of notification, although skeptics warned that even this modest capability would steadily erode as idle equipment deteriorated and personnel

progressively lost proficiency in their former skills, or left the service. The warnings proved correct, and within a few years, the SR–71s were completely out of the inventory with no plans to recall them.[36]

Conversely, the venerable U–2 survived the first wave of post–Cold War cuts in a numerically commanding position, and for good reason. Its operational altitude gave its sensors excellent line-of-sight capability, its endurance allowed it to reach distant targets and loiter once there, and it could overfly less well defended countries. Financial considerations also entered the decision-making process. "It was cheap," observed Brig. Gen. Raymond Haupt, a former commander of the 100th SRW. Another retired officer, Maj. Richard Davies, recalled an expenditure in the 1970s of only $1,500 per flying hour, a bargain even when adjusted for subsequent inflation. In 1991, the Air Force strategic reconnaissance fleet had only RC–135s and U–2s in its inventory, the latter constituting the bulk of the inventory.[37]

What did Air Force reconnaissance accomplish during the Cold War that justified the millions of dollars spent, the international tensions generated, and the lives lost? Admittedly, these missions could claim few intelligence coups, such as the discovery of offensive Soviet missiles in Cuba in October 1962. Their contribution to American security must be judged by the quantity and quality of the data gathered, not by the hours flown, the percentage of on-time takeoffs, on-station reliability, or publicly acclaimed events. Rather, they collected countless shards of information worldwide, much of it unavailable from any other source. When those bits and pieces of evidence were combined with information gained from other sources, the intelligence community could create and continually update databases on any number of locales, weapon systems, command and control structures, deployment patterns, and decision-making networks. In other words, airborne reconnaissance greatly assisted the intelligence community in keeping a finger on the pulse of internal events within potentially hostile nations worldwide.

Although earth-orbiting reconnaissance satellites have reduced the value of airborne reconnaissance, aircraft retain one important advantage. Satellites are remarkable instruments whose prying eyes and ears have made ours a safer world, but they cannot escape Kepler's laws of orbital physics. A satellite's orbit once established remains fixed, making its movement as predictable as the rising and setting of the sun. Conversely, aircraft are responsive vehicles that can arrive at certain locations at certain times and alter their positions and altitudes as needed. That flexibility and the multispectral collection capability both justified their mission during the Cold War and insures that they will continue patrolling the world's trouble spots until technological advances render them obsolete. That day will surely come, but it is probably well in the future.

Notes

1. Thomas F. Troy, *Donovan and the CIA: A History of the Establishment of the Central Intelligence Agency* (New York: Aletheia Books, 1981), pp. 9, 18; Harry Howe Ransom, *The Intelligence Establishment* (Cambridge: Harvard University Press, 1970), p. 56.

2. *Ibid.*; Oral Intvw, Lt. Gen. Robert Breitweiser by James C. Hasdorff and Lt. Col. John N. Dick, Jr., Dec 4–5, 1975, Air Force History Support Office (AFHSO), K239.0512–877; "USAFSS: Thirty Years of Cryptologic Support, 1948–1978" (unpublished manuscript), Air Intelligence Agency History Office (AIA/HO), n.d., chap. 1, pp. 8, 18.

3. Speech, Maj. Gen. George C. McDonald to the Air War College, "U.S. Air Force Intelligence prior to and during World War II and Today," Nov 12, 1947, pp. 1–2, AFHSO K239.716246–6.

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5. Troy, *Donovan and the CIA*, pp. 78–84.

6. "Lend Lease Aid to Soviet Electronics," *Scientific Intelligence Review*, Apr 1946, AFHSO 170.2224–4; *Webster's New Geographical Dictionary* (Springfield, Mass.: Merriam-Webster Inc., 1984), pp. 210, 257, 755, 1247, 1251.

7. 55th Strategic Reconnaissance Wing (SRW) History, Apr–Jun 1966, p. 6.

8. An aircraft's alphabetic prefix denotes its mission. A B–29 was a bomber, but when converted into a reconnaissance role it became an RB–29. A KC–135 was an aerial tanker until sensors were added when it became an RC–135. The "U" in the U–2 signified a "utility" aircraft, an early attempt to disguise its mission. The "SR" of the SR–71 meant "strategic reconnaissance."

9. Ken White, *World in Peril: The Origin, Mission, and Findings of the 46th/72d Strategic Reconnaissance Squadron* (Elkhart, Ind.: private printing, 1992), pp. 31, 46–47; Memo to the Chief of the Air Intelligence Requirements Division, Subj: Coordinating Photo and Electronic Intelligence Activities, Dec 11, 1947, Folder 2–66 to 2–699, Entry 214 (Top Secret Cable and Controls Division), Record Group (RG) 341 (Records of Headquarters, United States Air Force), National Archives and Records Administration (NARA); Oral Intvw, Col. Maynard White, Nov 16, 1992, the Vance O. Mitchell Collection, AFHSO; Memo for Record, Subj: Photographic Coverage—Chukotskie Peninsula Air Fields, Undated, Folder 2–1500 to 2–1599 (May 1948), Entry 214, RG 341, NARA; *SAC Intelligence Digest*, May 1984, Tab Q, Mitchell Collection, AFHSO.

10. Record and Routing Sheet, DOIN to the Director of Training and Requirements, Subj: A O E R A, May 26, 1948, Decimal 320, Entry 213, RG 341, NARA; H O S O 1-1, p. 47, Strategic Air Command History Office (SAC/HO); Survey of Project Rickrack, n.d., Operations-Rekon K–30 Camera Folder, SAC/HO; Ltr, Alaskan Air Command Commander (Armstrong) to the Air Force Chief of Staff (Vandenberg), Subj: Photographic Coverage of Northeastern Siberia, Nov 4, 1949, Item 2–1097, Entry 214, RG 341, NARA; Record and Routing Sheet, Operations Division of the Air Intelligence Requirements Division, Subj: P C O T F E W K–3, 1–1 C, Mar 7, 1950, Item 1–1879, Entry 214, RG 341, NARA.

11. H O S R O, 1–1, pp. 47–48; Record and Routing Sheet, DOIN Executive to the Directorate of Inspection Services, Subj: Annual Tactical Inspection, 7499th Composite Squadron, APO 633, Jul 11, 1951, Item 2–22109, Entry 214, RG 341, NARA; Memo for Record, Untitled, Oct 28, 1952, Item 2–5686, Entry 214, RG 341, NARA; Ltr, Deputy USAFE/A–2 to DOIN, Subj: P F P, Mar 6, 1953, Item 3–901, Entry 214, RG 341, NARA; Ltr, DOIN to United States Air Force Group, Ankara, Turkey, Sep 8, 1953, Item 3–3353, Entry 214, RG 341, NARA: U S E O M A S I P (L S A C), Section B, Nov 9, 1963, TSC 745–63 Folder, Box 1, Accession (ACC) 66A–3382, RG 341, Washington National

Records Center (WNRC).

12. 91st Reconnaissance Squadron History, Oct 1951, Overlay 1 and tabs Q, U, and V, SAC/HO; H O R S O, 1–1, p. 52; Record and Routing Sheet, Assistant for Intelligence Production to the Chief of the Intelligence Division, Subj: R F R O F J L, Jan 9, 1952, Item 2–22137, Entry 214, RG 341, NARA; Memo for the Director of Operations, Subj: F J L E R F O, Apr 23, 1953, Item 3–1740, Entry 214, RG 341, NARA: Record and Routing Sheet, Directorate of Intelligence to the Directorate of Operations, Subj: I R F E R, Dec 10, 1952, Item 3–4244, Entry 214, RG 341, NARA.

13. Oral Intvw, Col. Burton Barrett, Dec 4, 1992, p. 10, Mitchell Collection, AFHSO; 55th SRW History, Apr–Jun 1965, pp. 5, 7, and Jul–Dec 1966, p. 17, AFHSO K–WG–55–HI; Charles A. Ravenstein, *Air Force Combat Wings: Lineage and Honors, 1947–1977* (Washington, D.C: Office of Air Force History, 1984), pp. 47–48, 88–89.

14. Monograph, "H O C C O, FY 1, A H," p. 159–162, AIA/HO; Monograph, "A H O T U A S R P (A), 1–1," pp. 15–16, AIA/HO. General Power's attitude toward reconnaissance and intelligence was related to the author during a casual conversation with Maj. Gen. John Marks (USAF, Ret.).

15. 55th SRW History, Oct–Dec 1967, Chronology Section; S R H, J 1-J 1, Nov 7, 1973, Table 1, AFHRC HO–T–95–010.

16. Robert Hopkins, "The Tell Two Stratojets," *Air Enthusiast*, Vol. 41, pp. 18-21.

17. 6th SRW History, Jan–Jun 1988, pp. 29–30, AFHSO IRIS 1006767.

18. 6th SRW History, Jan–Mar 1975, Vol. I, p. 20, and Jan–Jun 1988, pp. 29–30; Foreign Technology Division History, Jul 1, 1972–Jun 30, 1973, Vol. I, p. 361 and Jul 1–Dec 31, 1976, pp. 23–24, AFHSO K341.01.

19. Thomas J. Doubek, ed., *Strategic Reconnaissance, 1956–1976: A History of the 4080th/100th SRW* (Dallas, Tex.: Taylor Publishing, 1967). p. 24. The U–2 first entered Air Force service with the SAC's 4080th SRW, Laughlin Air Force Base, Texas. In the 1960s, the unit's designation became the 100th SRW and it moved to Davis Monthan Air Force Base, Arizona. In 1976, the 100th deactivated and the U–2s moved to Beale Air Force Base, California to become part of the 9th SRW. The 9th SRW was also the parent unit of the SR–71.

20. 100th SRW History, Jan–Mar 31, 1975, pp 27–28, AFHSO K–WG– 100–HI; Ltr, Director of the Intelligence Community Staff to the Deputy Secretary of Defense, Subj: TR–1 Deployment to the UK, Nov 16, 1982, Folder 930007–930123, Box 1, ACC 85–0016, RG 340 (Office of the Secretary of the Air Force), WNRC; History of the United States Air Force in Europe, Calendar Year 1980, p. 11, AFHSO IRIS 1004339; H O S R O, F 1, p. 32. For an excellent general history of the U–2, see Chris Pocock, *Dragon Lady: The History of the U–2 Spyplane* (Asceola, Wis.: Motorbooks Co., 1989).

21. "S R H," Nov 7, 1973, Table 1; 9th SRW History, Oct–Dec 1974, Vol. I, pp. 81–82 and Jul–Dec 1987, pp. 59–60 and 79–80; Oral Intvw, Brig. Gen. Harold Confer, Feb 8, 1996, Mitchell Collection, AFHSO; "Blackbird Timeline of Events," n.d., 9th SRW History Office.

22. For an example of someone who believes that General LeMay ordered the overflights on his own authority, see Richard Rhoades, *Dark Sun: The Making of the Hydrogen Bomb* (New York: Simon & Schuster, 1995), pp. 564–566. For a glimpse at how tightly President Dwight Eisenhower controlled information on sensitive operations see Karl G. Harr "Eisenhower's Approach to National Security Decision Making," in Kenneth W. Thompson, ed., *The Eisenhower Presidency: Eleven Intimate Perspectives of Dwight D. Eisenhower*, Vol. III of *Portraits of American Presidents* (Lanham, Md.: University Press of America, 1984), p. 97. For compelling evidence that LeMay was ordered to make the overflights, see Memo, Secretary of Defense (Lovett) to Chairman of the Joint Chiefs of Staff (Bradley), Subj: Reconnaissance Requirements, Aug 12, 1952, Package 129, ACC 810-60, RG 342 (Records of the Major Air Commands), NARA.

23. Record and Routing Sheet, Director of Requirements, DCS/D to the Director of Intelligence, DCS/O, Subj: Intelligence Requirements for B–47s for Special

Reconnaissance Missions, Jan 4, 1951, Folder 2–17301 to 2–17399, Entry 214, RG 341, NARA; Oral Intvw, Brig. Gen. Richard Neeley, Mar 16, 1996, pp. 4–6, Mitchell Collection, AFHSO; Harold Austin, "A Cold War Overflight of the USSR," *Daedalus Flyer*, Spring 1995, pp. 15–19; Donald E. Hillman and R. Cargill Hall, "Overflight: Strategic Reconnaissance of the USSR," *Air Power History*, Spring 1996, pp. 35–38.

24. Oral Intvw, Maj. Gen. Jim Enney, Jan 10, 1997, pp. 1–2, Mitchell Collection, AFHSO.

25. R. Cargill Hall, "Cold War Overflights: Military Reconnaissance Missions over Russia Before the U–2," *Colloquy*, Apr 1997, pp. 12–30.

26. Two recently released studies have shed considerable light on the agency's U–2 and early satellite programs. See Gregory Pedlow and Donald E. Welzenbach, *The CIA and the U–2 Program*, 1954–1974 (Washington, D.C.: Central Intelligence Agency, 1998), and Kevin C. Ruffner, ed., C*orona: America's First Satellite Program* (Washington, D.C: Central Intelligence Agency, 1995). Both studies have material deleted for security reasons.

27. 9th SRW History, Oct 1980–Mar 1981, p. 66; 55th SRW History, Jan–Jun 1979, Vol. I, p. 58.

28. Memo, AFOIN–1A2 to the Director of Requirements, DCS/D, Subj: R F S R C S, May 5, 1955, Item 5–1207, Entry 214, RG 341, NARA.

29. U R O M A S I P (L S A C), Section B. Other nicknames associated over the years with the 7405th's covert mission included "Bold Bantam," "Ocean Gem," "Flintstone," "Eager Beaver," "Creek Flea," and "Creek Flush." Many of the insights into the Berlin corridor mission are based on the author's experience with the 7405th, which included six years as a crew member (1964–1967 and 1972–1975) and three years as the major air command staff officer responsible for the mission (1975–1978).

30. *Ibid.*; Ltr, Deputy USAF A–2 to DOIN, Subj: P F P, Mar 6, 1953, Item 3–901, Entry 214, RG 341, NARA; Record and Routing Sheet, AFOIN–A to the Directorate of Operations, DCS/O, Subj: R R, Apr 16, 1954, Item 4–935, Entry 214, RG 341, NARA; Detailed Photo Interpretation Report No. 60–5, Subj: N A, E G, Feb 1961, Folder 60–5, Box 5, ACC 69A–6201, WNRC.

31. Soviet–East German knowledge of the mission was confirmed by separate human intelligence sources during the author's tour as the program manager (1975–1978), as was the visibility of the camera ports in telephoto imagery. Enough information on the 7405th leaked out during its operational life for investigative reporters to come up with a fairly accurate assessment of its covert mission. See Dick van der Aart, *Aerial Espionage: Secret Intelligence Flights by East and West* (New York: Arco/Prentice Hall Press, 1985), pp. 13–15.

32. Soviet Note 261, Embassy of the Union of Soviet Socialist Republics, Jan 5, 1948, Folder 2–900 to 2–999, Entry 214, RG 341, NARA; Memo for Record, Problem: Limit on Offshore Distance for Reckon Flights in Pacific Area, n.d., Folder 2–1500 to 2–1599, Entry 214, RG 341, NARA.

33. Tables, "Incidents Reported between United States and Communist Nations," n.d., AFHSO K168.01; Ltr, Aerospace Studies Institute Historical Division to SAC/DIXH, Subj: Air Incidents, May 4, 1964, PE 120.2, SAC/HO.

34. E S C H, Jan 1–Dec 31, 1988, Vol. I, pp. 57–58, AIA/HO; Staff Summary Sheet, Subj: R–1 (R J) F S, May 9, 1986, Folder 86012–86071, Box 1, ACC 87–0013, RG 341, WNRC. Aircraft in backup status are maintained in flyable status but are not funded for fuel or crews. They are, however, rotated into and out of the active inventory to prevent their deterioration and provide a ready source of spare parts.

35. Confer Intvw, p. 10. The SR–71's operating costs were quoted to the author by Dr. Coy Cross, the 9th SRW historian.

36. Staff Summary Sheet, Subj: S–7 A C, Oct 10, 1990, Box 1, ACC 91–07, RG 340, WNRC.

37. Oral Intvw, Brig. Gen. Raymond Haupt, Mar 11, 1996, p. 10, Mitchell Collection,