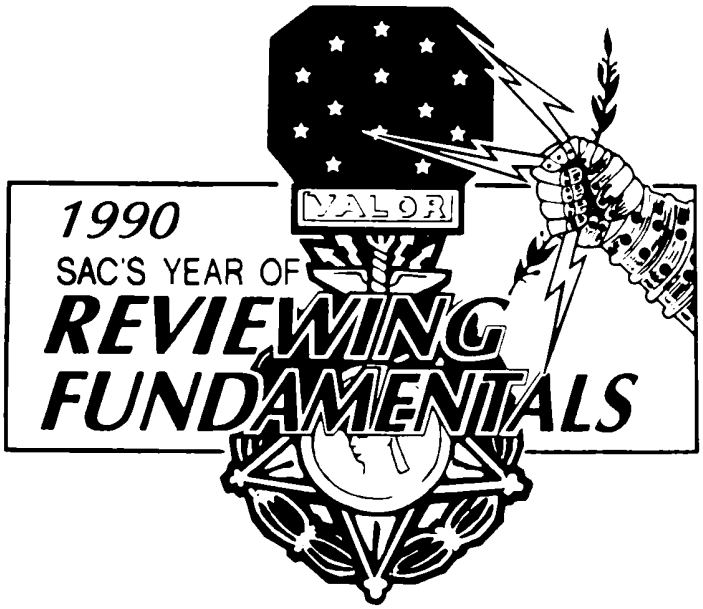
SEVENTY YEARS OF STRATEGIC AIR REFUELING 1918 - 1988

A CHRONOLOGY

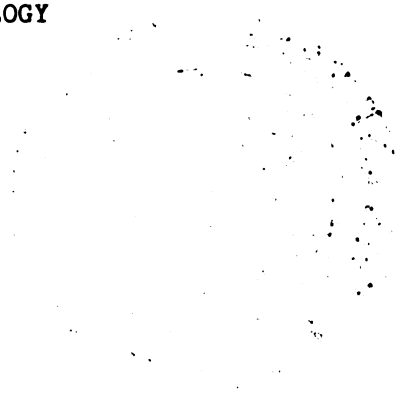


OFFICE OF THE HISTORIAN
HEADQUARTERS STRATEGIC AIR COMMAND
OFFUTT AIR FORCE BASE, NEBRASKA
MAY 1990

SEVENTY YEARS OF STRATEGIC AIR REFUELING

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FOREWORD

This Strategic Air Command Office of History monograph, Seventy Years of Strategic Air Refueling, 1918-1988: A Chronology, has been timed for publication during the Military Heritage Month of SAC's Year of Reviewing Fundamentals because it emphasizes adherence to basics in developing one of the most successful programs in the Air Force. From pre-military and Army Air Corps aerial refueling experiments through initial Air Force recognition of the need for a strategic tanker force, the fundamentals for sustaining global readiness and warfighting remained unchanged. Although subsequent improvements in weapon systems, capabilities, and techniques have allowed SAC air refueling to continually expand to meet and exceed the growing demands placed upon it by command, Air Force, other services, and allied nation needs and requirements, the fundamentals upon which we built our program have been the same for forty-five years. A thorough review of the basics is essential for understanding how we shape our policies and practices. Seventy Years of Strategic Air Refueling provides a chronological account of fundamental developmental concepts and applications that continue to guide the dynamics of worldwide military operations.

The Strategic Air Command's refueling operations often take second place in the public eye to the more glamorous aspects of air power. In conjunction with this mistaken view, tanker aircraft crews and support personnel at times feel they are taken for granted. This erroneous perception is due largely to the continuing success of both peacetime and wartime air refueling operations. Tankers tend to be prepared and in place when and where they are needed with little fanfare. At all times tankers are airborne and meeting the challenges proffered; refueling crews and their equipment allow the sustained operations necessary for the projection of modern strategic and tactical air power throughout the world. I strongly encourage all members of the Air Force, as well as the general public, to read this chronology for an understanding of a mission vital to our national interest.

Donald L. Marks

DONALD L. MARKS
Major General, USAF
Chief of Staff
Strategic Air Command

ACKNOWLEDGMENTS

Seventy Years of Strategic Air Refueling, 1918-1988: A Chronology, is the product of research and writing by two members of the Strategic Air Command Office of History. Over a number of years, Lieutenant Colonel David W. Harvey, USAFR, researched and wrote a draft of the study. In addition to work on the project during his annual two-week reserve duty in the Office of History, he devoted considerable private time to research for the study. Dr. Vincent A. Giroux, Jr., Chief of the Research Division of the Office of History, conducted additional research and wrote the final version of the chronology.

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THE BIRTH OF AIR REFUELING
1920 - 1929

In 1918, Lieutenant Godfrey L. Cabot, a US Navy Reserve pilot, began snaring cans of gasoline positioned on floats as a test of the viability of putting fuel on ships in such a way that aircraft could grab it on nonstop transatlantic flights. From this early experiment with a grappling hook and a five-gallon can, the seeds of inflight refueling grew in the 1920s to encompass both commercial and military applications. While many of the early aerial refueling events were stunts and attempts at endurance records, significant strides were made in an area of flight which would soon bring aviation toward its potential and revolutionize the movement of people, cargo and military might.

1921

2 October — Rudimentary flight refueling was demonstrated at Washington, D.C., when a US Navy Lieutenant in the rear cockpit of a Huff-Daland HD-4 aircraft used a grappling hook to snatch a five-gallon can of gasoline from a float in the Potomac River.[1]

21 November — Wesley May, a wing walker with a five-gallon can of gasoline strapped to his back, climbed from an airborne Lincoln Standard to a JN-4, then poured the gasoline into the tank of the second aircraft. This Long Beach, California, publicity stunt was the first "air-to-air" refueling on record.[2]

1923

20 April — Two US Army Air Service de Haviland DH-4Bs, under the direction of Major Henry H. "Hap" Arnold, performed the first inflight hose contact. Although no fuel transferred during the forty minute test at San Diego, California, the modified tankers demonstrated the feasability of gravity flow air refueling.[3]

27 June — The Army Air Service conducted its first successful air refueling. The six hour and thirty-eight minute flight of a DH-4B at San Diego was made possible through two hose refuelings by a second DH-4B.[4]

27-28 August — Through the use of gravity flow refueling, Army Air Service Captain Lowell H. Smith and Lieutenant John P. Richter set new marks for duration and distance. Maneuvering over Rockwell Field in San Diego in a modified DH-4B, the aviators flew 3,293 miles in thirty-seven and a quarter hours. The two DH-4Bs made fifteen hose contacts during the flight.[5]

25 October — In the first aerial refueled flight between two points, an Army Air Service DH-4B flew nonstop from Lamas, Washington, to Tijuana, Mexico. Tankers positioned at Eugene, Oregon, and Sacramento, California, provided the three air-to-air refuelings required during the 1,280 mile mission.[6]

18 November — The first aerial refueling-related fatality occurred during an air carnival at Kelly Field, Texas, when the fuel hose became entangled in the right wings of the refueler and the receiver aircraft. The Army Air Service pilot of the refueler, Lieutenant P. T. Wagner, was killed in the ensuing crash.[7]

1929

1-7 January — In a test of both the practical value of inflight refueling and crew and aircraft endurance, a modified Atlantic (Fokker) C-2A, the "Question Mark," established a world duration record of 150 hours and 40 minutes. The Army Air Corps (the Army Air Service had been renamed the Air Corps on 2 July 1926) high-wing, trimotor monoplane had been specially outfitted with a large capacity fuel tank in the cabin, a large hopper in the cabin for receiving fuel, and lines and hand-operated pumps for transferring the fuel to the wing tanks. The tankers, two modified Douglas C-1 biplanes, were each equipped with two 150-gallon cabin tanks and a 40 foot fueling hose. Shuttling in the airspace between Santa Monica and San Diego, California, a distance of approximately 110 miles, the tankers made 43 contacts with the "Question Mark," allowing it to remain airborne until engine problems forced it to land at its starting point near Burbank. Tanker-receiver contacts averaged seven and one-half minutes and a total of 5,700 gallons of fuel was transferred through the one-and-three-fourths-inch diameter hose. Oil, food, water and other items were also passed during the refueling contacts. The transfers occurred as both aircraft flew at approximately 80 miles per hour, at a separation of 15 to 20 feet, with day refuelings taking place at 2,000 to 3,000 feet above ground level and night contacts between 5,000 and 7,000 feet. The five crew members of the "Question Mark," commanded by Major Carl A. Spaatz, who was to become the post-World War II commanding general of the Army Air Forces and, in 1947, the first chief of staff of the newly-independent United States Air Force, were awarded the Distinguished Flying Cross for the mission; the tanker crews received letters of commendation from the Chief of the Air Corps. The duration record established by the

"Question Mark" lasted only until 26 May, when two commercial pilots in Texas, flying a reconditioned Ryan Brougham monoplane, managed to stay airborne for 172 hours and 32 minutes. Seventeen air refuelings by a second Ryan Brougham were made during the flight above Fort Worth, Texas.[8]

21-22 May — The Assistant Secretary of War for Aviation, Trubee Davison, directed the Army Air Corps to hold a public demonstration of the usefulness of air refueling in military operations. What was to be a round-trip, nonstop Dayton, Ohio, to New York City bomber mission failed to reach fruition when weather grounded the tanker. The Keystone bomber, however, continued on to New York and Washington, D.C., where the pilot landed at Bolling Field. On the return leg the bomber and tanker successfully rendezvoused over New York City, an event broadcast over radio by the National Broadcasting Company. For the benefit of people watching from the ground, the hookup was repeated four times, although no fuel was tranferred.[9]

15-20 August — The Texas Company sponsored a transcontinental flight to test the viability of long distance air refueled commercial passenger service. The Spokane, Washington, to New York City Buhl Airsedan CA-6 flight took 115 hours and 45 minutes and required eleven inflight fuelings, including one conducted in a howling gale and an emergency refueling using gasoline lowered from another plane in a five-gallon can.[10]

27 August — A modified Boeing Model 95 mail plane shuttled between Oakland, California, and New York City in the first air-to-air refueling experiments conducted by the Boeing Airplane Company. Specially-equipped Boeing 40B-4s and an Army Air Corps Douglas C-1 provided fuel to the mail plane, piloted by Air Corps Captain Ira C. Eaker and Lieutenant Bernard Thompson. Eaker proposed the flights in order to investigate military uses of cross-country aerial refueling.[11]

27-29 November — Two aviatrixes, 23 year old Bobbi Trout and Elinor Smith, 17, established a women's flight endurance record of 42 hours. Their Commercial Sunbeam C-1 was refueled by a Curtiss Carrier Pigeon.[12]

CIVIL AVIATION REFINES AERIAL REFUELING
1930 - 1939

In the early 1930s, flight endurance records continued to be set and broken as non-military aerial refueling gained in popularity. In June and July 1930, John and Kenneth Hunter's Stinson Detroiter made 223 refueling contacts with its tanker while establishing an aviation duration mark, a record which lasted only one and one-half months. Women pilots were also actively engaged in air-to-air fueling, and the women's endurance record was broken at least three times between 1931 and 1933. The decade saw little direct military involvement with aerial refueling, although civilian experimentation in the United States and Great Britain paved the way for military studies and tests in the 1940s.

1934

October — Sir Alan Cobham, who had begun inflight refueling experiments two years earlier, formed the British firm of Flight Refuelling Limited. A pioneer in military applications of aerial refueling, Flight Refuelling Limited was originally sponsored by a commercial enterprise, Imperial Airways.[13]

4 June-1 July — While establishing a new endurance record over Mississippi, Al and Fred Key, flying a Curtiss Robin, communicated with the ground station at the Meridian Airport through the use of a very high frequency (VHF) radio system. The communications system employed a one hundred-foot antenna wire, which was reeled out to trail from the rear of the plane during radio transmissions. The flight was also noteworthy because of the tanker's hose nozzle, which incorporated an automatic shutoff valve developed by Albert D. Hunter, an aerial refueling enthusiast and pioneer. The tanker, also a Curtiss Robin, made 113 sorties and 484 airborne contacts with the receiver aircraft during the twenty-seven day endurance flight.[14]

1939

5 August — Imperial Airways of Britain successfully accomplished the first non-experimental commercial application of aerial refueling. On the maiden flight of its weekly mail service between Southampton, England, and New York City, with an intermediate stop at Montreal, Canada, Imperial Airways two Short "C" class flying boats were refueled shortly after departure from the United Kingdom. Fifteen air refueled transatlantic crossings were made before the outbreak of World War II halted the flights at the end of September.[15]

EXPERIMENTATION WITH MILITARY APPLICATIONS OF AIR REFUELING 1940 - 1949

With Britain's, and then America's, entry into World War II, military experimentation with aerial refueling picked up. Although neither Britain nor the United States employed inflight fueling operationally during the war, the array of possible applications for military contingency operations gave impetus to studies and tests of new equipment. After the Department of the Air Force was created as an armed service separate from the Department of the Army in 1947, the results of wartime and continuing studies were incorporated to make aerial refueling an integral facet of modern air power.

1940

10 February — Flight Refuelling Limited, under contract to the British Air Ministry, began experimenting with simultaneous receiver and tanker launches, with the connecting cable between them already secured. Once airborne, the refueler's hose was drawn to the receiver.[16]

1942

10 January — The Army Air Forces, created in 1941 to command both the Air Corps and the Air Force Combat Command, considered several proposals for employing aerial refueling in the war in the Pacific. Plans were drawn up to launch B-17 bombers against Tokyo from Midway Island, using modified B-24 bombers as tankers. Planners also considered the use of B-24s launched from Hawaii against Japan, with refueling provided by US Navy seaplanes. A third option under study was the feasibility of fuel-filled gliders, towed by B-17s, which would serve as tankers for the bombers. None of the proposals were implemented.[17]

23 February — Based on an analysis of the January 1929 flight of the "Question Mark," the Materiel Division recommended the British looped hose refueling system for American military inflight fuel transfers. The method, developed by R. L. R. Atcherly, was unsophisticated, but effective. The receiver aircraft trailed a three hundred foot line with an attached three-pronged grapnel, and positioned itself slightly below and to one side of the tanker, which trailed a one hundred foot weighted line. When the lines crossed, the receiver hauled in the lines and the attached hose pipe from the tanker. A variant of the looped hose method was for the refueler to fire a line, with hose attached, using a harpoon-type gun. The receiver snared the tanker's line, and reeled

in the line and hose. With both variations, fuel transferred through gravity flow.[18]

1943

Spring — Pennsylvania Central Airlines installed equipment developed by Flight Refuelling Limited on a B-17E and a B-24D for aerial fueling tests at Eglin Field, Florida. During the seven weeks of testing, seven successful fuel transfers took place, with a maximum flow from the B-24D tanker of 1,500 gallons in eighteen minutes. Although the B-17 fueling trials were a success, the advent of the more capable B-29 Superfortress, which was being flight tested at the same time, resulted in the cancellation of B-17 refueling plans.[19]

1944

Summer — The Army Air Forces conducted studies at Wright Field, Ohio, to determine the feasibility of equipping the new B-29 with air refueling capabilities. The Engineering Division estimated that the 1,500 gallon capacity of a B-24 tanker would extend the B-29's range by only about 830 miles. The engineers also calculated that at least six months would be required to modify the aircraft. The study concluded that equipping the Superfortress with an inflight fueling capability was feasible, but not desirable, at the time. A second proposed method of extending the range of the B-29, air refueling from towed, pilotless, fuel-filled gliders, was tested in 1944 and 1945, but was not deemed satisfactory.[20]

In a test of the viability of air refueling for tactical aircraft, All American Aviation, under contract to the Army Air Forces, equipped and began flight testing a P-38 fighter in conjunction with a specially modified B-24 tanker. The tanker carried an external fuel tank, which was lowered by cable to the airspace forward of the P-38. The fighter then contacted the cable, slid it into a securing device mounted on the forward fuselage, and descended to the tank. When the tank made contact with the securing device, the trailing cable disconnected and a nitrogen bottle in the tank discharged, forcing fuel into the fighter. At the end of fueling, ejector springs caused the tank to be released. No contacts were completed, however, and in March 1945 the Army Air Forces concluded that the method was unsound.[21]

1946

July — Under auspices of the British government, day and night tests for air refueled passenger flights began. In May 1947, British South American Airways inaugurated its service between the United Kingdom and Burmuda, with two tankers stationed at Burmuda providing inflight refueling.[22]

1947

18 September — The Department of the Air Force was created as a military service coequal to the Department of the Army and the Department of the Navy. Strategic Air Command, which had been established in 1946 as one of the three major combat commands of the Army Air Forces, became a major command of the new United States Air Force. Among its missions, which also included long-range offensive operations, reconnaissance, and the maintenance of strategic forces throughout the world, SAC became the early focal point for USAF air refueling operations.[23]

Fall — Shortly after creation of the United States Air Force, the Heavy Bombardment Board requested a study of special aerial refueling installations. In November, Headquarters Air Materiel Command asked Boeing Airplane Company to examine inflight refueling methods and installations. Headquarters USAF, a month later, began looking at the possibilities of using B-29s or B-50s to aerial refuel P-80 and P-84 jet fighters.[24]

1948

January — Headquarters SAC recommended a research and development program for conversion of its B-36 bombers to tankers. SAC felt that the B-36's large bulk and low airspeed made it impractical as a combat aircraft.[25]

26 February — Headquarters USAF directed Air Materiel Command to study and develop methods and equipment for inflight refueling of bombardment aircraft, with one million dollars of fiscal year 1948 research and development funds allocated for the project. SAC was given responsibility for conducting all operational suitability tests.[26]

February-March — The United Kingdom conducted winter tests of transatlantic air refueling on cargo flights between England and Canada. Flight Refuelling Limited provided tanker support from Ireland and Newfoundland.[27]

12 March — While awaiting development of an American inflight refueling system, Headquarters USAF contracted with the Boeing Airplane Company for modification of the British hose-type system to make it more adaptable to United States military aircraft.[28]

17 March — The US Air Force purchased one set of British hose-type refueling equipment and contracted for an additional thirty-four sets from Flight Refuelling Limited. The contract covered complete patent and reproduction rights, and one year's maintenance by the British firm.[29]

28 March — Boeing and the Air Force's Air Materiel Command conducted Operation Drip, a feasibility study into the effectiveness of the British hose method for refueling B-29s. Two modified B-29s transferred four hundred gallons of water during the test. Headquarters USAF, which had ordered the demonstration only three days earlier, decided to modify eighty of Strategic Air Commands B-29s for inflight refueling, forty as tankers and forty as receivers.[30]

Spring — Simultaneous with the first SAC B-29s undergoing modification at Boeing's Wichita, Kansas, plant, the command placed selected crews from the 43rd and 509th Bombardment Groups on temporary duty at Wichita for inflight refueling orientation and training.[31]

13 April — Headquarters USAF expanded the nascent aerial refueling program by directing that an additional thirty-six B-29s undergo tanker modification. At the same time, it called for outfitting thirty-six B-50s as receivers. The B-50, America's newest bomber, had only been in the Strategic Air Command inventory since 20 February, when the first "A" model had been delivered to the 43rd Bombardment Wing at Davis-Monthan Air Force Base, Arizona. On 19 April, Air Force headquarters in Washington called for the refitting of eighty more B-29s for tanker duty, with an additional 208 B-50s to be modified as receivers.[32]

5 May — Boeing conducted its first flight tests of the modified B-29s. The company's modifications for tanker operations included the removal of equipment not essential for aerial refueling and the installation of a hose reel, hauling line, additional fuel lines and nylon-lined aluminum fuel tanks in the forward and aft bomb bays. Receiver aircraft modification necessitated removal of some oxygen equipment and the addition of fueling lines. Both modified versions of the B-29 were

outfitted with radar capable of guiding aerial refueling operations. In the flight tests, the tanker and receiver encountered difficulty using the British harpoon-type method to achieve contact, and a new means of snaring the refueling line had to be developed. However, the basic British hose system functioned well and, ultimately, the Air Force converted ninety-two B-29s, redesignated as KB-29Ms, to hose-method tankers. Seventy-four B-29s were equipped to receive aerial refuelings by hose.[33]

15 May — Ten days after Boeing began flight testing the British inflight refueling system with B-29s, the Air Force's Air Materiel Command asked the company to proceed immediately with development of a uniquely American aerial fueling method, the flying boom.[34]

May — An Air Materiel Command staff study report on the benefits of air refueling for long-range bomber missions found that a single aerial contact on the way to a target would increase the range of a B-29 with a 10,000 pound bomb load to 2,700 miles. One refueling in each direction would result in a range of 3,400 miles. This increase of more than seventy-five percent over the non-refueled radius of 1,950 miles would be further enhanced for a B-50. The flight data branch of the engineering division estimated that one 6,400-gallon refueling at a point 2,200 miles from its target would give a B-50 with a 10,000 pound bomb load a range of 4,030 miles.[35]

June — The United States Air Force instructed Boeing to include hose-type aerial refueling equipment on all production models of heavy bombers, with compliance expected by the end of the calendar year. Headquarters Air Materiel Command also considered modifying the B-35 for use as a tanker, but the proposal was never tested.[36]

30 June — Strategic Air Command activated the first two aerial refueling units in the Air Force, the 43rd Air Refueling Squadron, at Davis-Monthan AFB, Arizona, and the 509th Air Refueling Squadron, at Roswell AFB, New Mexico. No tanker aircraft were assigned to the units at the time of activation.[37]

July — Strategic Air Command received its first set of air refueling aircraft, a KB-29M tanker and a modified B-29 bomber. By the end of the month, Boeing had modified five sets of B-29s.[38]

7-9 December — A B-50A, belonging to SAC's 43rd Bombardment Group and commanded by Lieutenant Colonel Michael McCoy, flew from Carswell AFB, Texas, to Hawaii, and back to Carswell, without stopping. The 9,870 mile flight was made possible by three aerial refuelings by KB-29Ms from the 43rd and 509th Aerial Refueling Squadrons.[39]

31 December — At the end of the year, Strategic Air Command was assigned two medium air refueling units, the 43rd and 509th Air Refueling Squadrons. Each unit was authorized twenty KB-29M tankers.[40]

1949

14 January — The B-50B made its first flight. All except one of the forty-five "B" models were equipped for inflight hose refueling, as were fifty-seven "A" models.[41]

26 February-2 March — The world's first nonstop around-the-world flight was made by "Lucky Lady II," a 43rd Bombardment Group B-50A commanded by Captain James Gallagher. The mission, which originated and ended at Carswell AFB, Texas, and covered 23,452 miles in 94 hours and 1 min ute, refueled in flight four times. Tanker support was provided by KB-29Ms from Davis-Monthan AFB. Refuelings took place over the Azores, Saudi Arabia, the Philippine Islands, and Hawaii. For the record-setting flight, the National Aeronautic Association awarded its Mackay Trophy, signifying the outstanding flight of the year, to the crew of the Lucky Lady II.[42]

March — Air Materiel Command reported to Strategic Air Command that, in the area of fighter aircraft inflight refueling, an F-86 was undergoing modification to incorporate a receptacle in the nose for compatibility with the flying boom method. An F-84 would be modified by placing the fueling receptacle in the leading edge of the wing.[43]

April — In Great Britain, Flight Refuelling Limited demonstrated its probe and drogue method of aerial refueling. Using a one hundred foot straight hose with a conical drogue at the end, the tanker guided the drogue until it made contact with a refueling probe located on the receiver's wing or nose. Fuel automatically flowed as soon as the receiver made contact with the drogue, and ended when the probe was withdrawn.[44]

13 May — The first of 122 B-50Ds flew. The B-50D was distinguished by 700-gallon external drop fuel tanks under each wing, and was the first B-50 produced with single

point refueling and modified for flying boom use.[45]

May — Headquarters USAF ordered that forty B-29s be converted to flying boom-type tankers and redesignated KB-29Ps. The Boeing flying boom was a tubular structure with a telescoping section permitting extension from twenty-five to forty-five feet. The boom was attached to the underside of the tanker just forward of the tail. Ruddevators at the end of the boom, controlled by the boom operator, who watched the refueling activities through a plastic bubble toward the rear of the plane, guided lateral and vertical movement. To refuel, a tanker and receiver would meet at a preselected altitude heading. The receiver would position itself approximately ten feet aft and twenty-five feet below the tanker. The refueler's boom was then maneuvered into the proper position and the nozzle extended into the receiver's nose. Fuel was pumped, under pressure, as soon as proper contact was made. Breakaway was automatic when the receiver tanks were full, or could be manually accomplished. The KB-29P possessed a total fuel capacity of 12,056 gallons and carried a crew of seven. One hundred sixteen B-29s were eventually modified as KB-29P tankers, with the first being delivered to the 97th Air Refueling Squadron (SAC), at Biggs AFB, Texas, on 1 September 1950.[46]

22 August — Headquarters SAC requested a study on the applicability of the British probe and drogue refueling method to fighter aircraft. An Air Force contract with Flight Refuelling Limited, dated 7 December 1949, directed the British firm to incorporate the probe and drogue system in six USAF aircraft.[47]

31 December — By the end of 1949, Strategic Air Command had six air refueling squadrons, although only two were fully equipped with KB-29Ms.[48]

MILITARY AIR REFUELING COMES OF AGE
1950 - 1959

During the 1950s, aerial refueling grew in sophistication and importance. Military applications increased as inflight refueling was first used in combat during the Korean War, tactical aircraft were routinely fueled in the air, and the age of jet power ushered in an increased need for aerial refueling. As aircraft capabilities grew, air-to-air fueling capabilities also increased. New tankers, more receivers, increased fuel capacities, and more efficient means of transferring aviation gasoline were hallmarks of the decade. KC-97 and KC-135 refuelers joined the KB-29 fleet and the number of air refueling squadrons assigned to Strategic Air Command spiraled to meet the continually expanding strategic and tactical missions of America's fighter, bomber, reconnaissance and cargo aircraft.

1950

January

A ten-day test of severe winter conditions on mid-air refueling, conducted at Goose Bay, Labrador, Canada, saw five KB-29s successfully refuel B-29s on nine occasions.[49]

The British firm of Flight Refuelling Limited conducted tests of the viability of its probe and drogue system for refueling American B-29 and F-84 aircraft.[50]

July

A Boeing KB-29P, in flight testing prior to delivery to the Air Force, successfully employed its flying boom to refuel an RB-45C reconnaissance bomber and an F-86 fighter. On 1 September, the 97th Air Refueling Squadron, at Biggs AFB, Texas, received the first KB-29P in the SAC inventory. The air-refuelable KB-45C joined the SAC fleet on 26 August.[51]

22 September

In a joint American-British test of probe and drogue refueling to increase the range of fighters, Strategic Air Command provided tanker support for the first non-stop transatlantic flight by jet aircraft. The SAC B-29 used to refuel the two F-84s on one segment of the England-to-Maine flight had been modified with the probe and drogue system by Flight Refuelling Limited; USAF's Air Materiel Command furnished two F-84s for the North Atlantic crossing. Aerial refuelings of both F-84s over Prestwick, Scotland, and Keflavik, Iceland, conducted by Flight Refuelling Limited's tankers, were successful, but problems developed with the final refueling. One of the F-84s was unable to take fuel from the SAC tanker near Labrador and the pilot was forced to parachute to safety. The second fighter

successfully rendezvoused with the KB-29 and completed the 3,800-mile journey in ten hours and 1 minute.[52]

December — The Boeing Airplane Company unveiled the KC-97A Stratofreighter, the first C-97 model converted to a tanker-transport. The KC-97, a propeller-driven, four engine aircraft, was equipped with a flying boom and extra fuel tanks. The tanker was the result of a SAC request for an improved aerial refueling platform made earlier in the year, and was able to match the minimum speed of the B-47 bomber. On 14 July 1951, the first KC-97 in SAC's active aircraft inventory, an "E" model, was delivered to MacDill AFB, Florida.[53]

31 December — By the end of 1950, SAC had twelve air refueling squadrons, double the number active at the end of the preceding year, and a total of 126 KB-29 tankers assigned.[54]

1951

June — An Air Material Command KB-29M, with a SAC crew from the 43rd Air Refueling Squadron, deployed to Yokota Air Base, Japan, for Project Hightide, a test of probe and drogue refueling in the Korean theater of operations. Two additional KB-29Ms and crews were added in September and October, and the three refuelers formed Detachment 3, 91st Strategic Reconnaissance Squadron, assigned to the Far East Air Forces (FEAF) Bomber Command for Korean War service. In early summer, a SAC KB-29P deployed from Barksdale AFB, Louisiana, to Yokota, and was assigned to Detachment 2, 91st Strategic Reconnaissance Wing.[55]

July — On 6 July, the KB-29M delivered to Yokota during the preceding month conducted history's first aerial refueling under combat conditions. Operating out of Japan, the tanker refueled four RF-80s flying a reconnaissance mission over North Korea. Eight days later, on 14 July, the first KB-29P flying boom refueling took place over enemy territory when an RB-45C was refueled over the north.[56]

September — The 27th and 31st Fighter-Escort Wings became the first SAC units to receive F-84G aircraft, the first fighters built with an aerial refueling capability. Refueling of the "G" model Thunderjet was by flying boom to a receptacle in the fighter's port wing. After a relatively short program for training F-84 pilots, SAC had a fighter refueling capability by early 1952.[57]

25 September — Strategic Air Command and Air Materiel Command discussed the production schedule for conversion of the fueling receptacle on B-50, RB-50 and RB-45 aircraft to the universal type. The first KB-29P models were equipped with the then standard nozzle, but Boeing later developed the universal nozzle and receptacle, which was compatible with the F-84G. Production KC-97 tankers were equipped with universal nozzles; B-47 bombers had universal receptacles. KB-29P squadrons retained both types of nozzles in order to refuel both the F-84G and the B-50G.[58]

28 September — Two KB-29Ms of the 43rd Air Refueling Squadron refueled an RF-80 six times over Korea. The mission established a flight endurance record for jet aircraft of 14 hours and 15 minutes, and earned two combat sortie credits for the tankers. One month later, on 29 October, the first aerial refueling of F-84s during combat occurred when three KB-29Ms, temporarily deployed to Taegu, Republic of Korea, refueled eight Thunderjets.[59]

3 November — Strategic Air Command tankers supporting F-84s on a bombing mission played an instrumental role in the rescue of a downed pilot in the water near Wonsan Harbor. By providing additional refuelings, the KB-29Ms kept the F-84s airborne long enough to provide air cover until the pilot was rescued.[60]

31 December — On the final day of 1951, SAC's tanker fleet consisted of 187 KB-29s and 21 KC-97s.[61]

1952

January — The Air Force awarded a contract to Consolidated Vultee Aircraft Corporation (Convair) to convert a B-36 bomber to a tanker using the probe and drogue aerial refueling system. A successful test of the modified B-36 and a B-47 receiver occurred on 25 May.[62]

17 January — Headquarters USAF directed Strategic Air Command to furnish probe and drogue-modified KB-29Ms to the Far East Air Forces as quickly as possible. In April, six tankers from the 9th and 301st Air Refueling Squadrons arrived in Tokyo to begin Korean War service with the FEAF Bomber Command. The first large-scale mission with F-84Es took place on 11 April.[63]

4-7 February — Offutt AFB, Nebraska, home of Headquarters SAC since November 1948, was the site of a demonstration pitting the probe and drogue system of refueling against the flying boom method. After a series of flights in which

no fuel was transferred, the Headquarters SAC Director of Operations, Brigadier General John B. Montgomery, concluded that the flying boom presented "the best solution to the in-flight refueling problems for the present time."[64]

4-6 July — KB-29Ps assisted the first mass fighter deployment supported by inflight refueling, fifty-nine F-84Gs, from Turner AFB, Georgia, to Japan. The first refueling rendezvous occurred between Georgia and California; the second took place between the West Coast and Hawaii. After Hawaii, the fighters island hopped to their destinations at Misawa and Chitose Air Bases, arriving on 16 July. The second major air-to-air refueled fighter deployment to Japan, seventy-five F-84Gs which departed Bergstrom AFB, Texas, on 3 October, was fueled by KB-29P boom tankers twice enroute to Misawa AB. Ground fuelings augmented the aerial refuelings.[65]

11 July — The SAC Director of Operations' February verdict notwithstanding, Headquarters Air Research and Development Command recommended to Headquarters USAF that the probe and drogue refueling system be the standard for future aircraft production. The research and development command based its recommendation on initial costs substantially lower than those for flying boom units, shorter training time, reduced accident potential, and ease of use for the receiver pilot.[66]

29 July — An RB-45C, assigned to the 91st Strategic Reconnaissance Wing and aided by two inflight KB-29 refuelings, made the first nonstop transpacific crossing, a flight from Elmendorf AFB, Alaska, to Yokota AB, Japan.[67]

13 August — The Under Secretary of the Air Force approved probe and drogue system instructions submitted by Air Research and Development Command. The list included the requirement that the probe and drogue system be designated as the tentative standard for USAF receiver aircraft and the required equipment for convertible bomber-tankers and cargo-tankers. In the same month as the probe and drogue decision, a flying boom refueling test at MacDill AFB, Florida, demonstrated the viability of aircraft-to-aircraft ground refueling. The transfer of 1,750 pounds of fuel per minute from a KC-97 to a B-47 indicated that the procedure could also be used to refuel F-84s on the ground.[68]

16 November — Two KB-29Ps stationed at Walker AFB, New Mexico, aerial refueled the F-84Gs flying escort for Operation Ivy, an

Atomic Energy Commission test involving the dropping of an atomic bomb by a B-36 bomber.[69]

31 December — By the end of 1952, Strategic Air Command's aerial refueling capability had increased substantially. Twenty air refueling squadrons and 318 tankers provided inflight services to an increasingly broad spectrum of military aircraft.[70]

1953

January — Convair continued the B-36 modification tests begun a year earlier. The B-36H tanker, outfitted with an improved Flight Refuelling Limited probe and drogue system, was capable of refueling multiple aircraft in the air. The tanker version of the B-36, which could be returned to its standard bomber configuration in approximately twelve hours, never became a part of SAC's refueling fleet.[71]

Winter — Headquarters USAF developed plans for the refueling of a new jet bomber, the B-52, which would enter SAC's aircraft inventory in June 1955. The Wright Air Development Center began an inflight test program using the KC-97 to aerial refuel the Stratofortress. The program, which extended into 1954 and tested both the flying boom and the probe and drogue methods, proved the feasibility of B-52 aerial refueling. Strategic Air Command favored incorporating equipment for flying boom refueling operations, a decision upheld when production of the jet bomber commenced.[72]

29 May — Strategic Air Command received its first KC-97G, a flying boom-type tanker capable of dispensing 8,513 gallons of aviation gasoline. The plane was a convertible tanker-transport, able to carry ninety-six troops or heavy equipment without modification. Between May 1953 and December 1965, when the last Stratofreighter left the SAC inventory, 592 "G" model KC-97s performed air-to-air refueling and transport duties.[73]

20 August — Thirteen and one-half months after the first aerial refueled mass fighter deployment across the Pacific, F-84Gs from the 31st Strategic Fighter Wing made the initial nonstop transatlantic mass fighter flight. KC-97s refueled the Thunderjets on their Operation Longstride journey from Turner AFB, Georgia, to French Morocco. A second flight of twenty F-84Gs, assigned to the 508th Strategic Fighter Wing at Turner and also a part of Operation Longstride, refueled from KB-29 and KC-97 tankers enroute to bases in England.[74]

1 September — Headquarters USAF announced the first aerial refueling of a jet aircraft by a jet tanker. In 1951 and 1952, Boeing had converted two B-47Bs for probe and drogue fueling trials. Upon completion of the tests, the redesignated KB-47B tanker and the receiver aircraft were converted to normal configuration.[75]

25 September — The 506th Air Refueling Squadron, the first Strategic Air Command aerial refueling unit specifically designated for fighter support, was activated at Dow AFB, Maine, and assigned to the F-84G-equipped 506th Strategic Fighter Wing.[76]

19 November — General Curtis E. LeMay, Commander, Strategic Air Command, urged production of two hundred jet tankers to support the B-52 and B-58 bomber fleet. In September, Headquarters SAC had informed the Air Force Council that a proposed cargo-tanker, dubbed the C-132, would not satisfy the command's requirements. At the end of November, Air Research and Development Command informed the Wright Air Development Center that the Council wanted an evaluation of Air Force requirements for a jet tanker.[77]

December — A Boeing B-47 Stratojet, aerial refueled by flying boom-equipped tankers, established a record for the East-to West Atlantic crossing. The 4,480-mile flight from England to MacDill AFB, Florida, was accomplished in slightly less than nine hours.[78]

31 December — Strategic Air Command closed out the year with 502 tankers assigned. The number of KB-29s had decreased by 36 from the 1952 year end figures, but KC-97s assigned had increased from 139 to 359, a growth of 258 percent. With the growth of the tanker force came a concomitant increase in the amount of fuel transferred. In 1953, SAC tankers transferred 11.5 million gallons; only three years earlier the total had been 358,200 gallons.[79]

1954

17-23 February — Operation High Gear, an operational exercise to test an air division task force's ability to deploy to a forward operating base, relied on tanker support provided by the 22nd and 91st Air Refueling Squadrons. Flying from Wheelus Air Base, Tripoli, the KC-97s made 113 successful refuelings of the B-47 bombers and YRB-47 reconnaissance aircraft deploying to Sidi Slimane AB, French Morocco. The final mission report stated that "air refueling for range extension of B-47 aircraft has

been proven feasible under all conditions," and recommended inclusion of the tactics used in the tactical doctrine for refueling.[80]

5 May — Headquarters USAF announced that a turbo-jet tanker was needed in order to meet the air refueling needs of the expanding tactical and strategic aircraft fleet. Later in May, Air Research and Development Command invited the Lockheed, Convair, Douglas, Boeing, Fairchild, and Martin aircraft manufacturing corporations to participate in a jet tanker-transport design parameter study. The jet tanker competition began on 18 June; all invited manufacturers except Martin entered the competition.[81]

14 May — Two months after announcing that a prototype jet tanker was nearing completion at its Renton, Washington, plant, the Boeing Airplane Company rolled out its 367-80 model aircraft. Two months after the plane was unveiled, it made its first flight, followed less than a month later by a USAF announcement that it would purchase twenty-nine of the jet tankers. On 1 September, Headquarters Air Materiel Command authorized Boeing to begin producing the aircraft, which would eventually be known as the KC-135. The first production model KC-135 Stratotanker rolled off of the assembly line at Renton on 18 July 1956. Design and development of the plane was unrelated to the June 1954 jet tanker competition.[82]

30 July — Two weeks after the maiden flight of Boeing's jet tanker-transport prototype, Headquarters Air Research and Development Command recommended that the Air Force "procure between 70 and 100 interim tankers...on a fast buildup." On 5 August, the Air Force announced that it would buy twenty-nine interim jet tankers from Boeing.[83]

10 November — Headquarters USAF received Air Research and Development Command's evaluation of the June jet tanker competition. ARDC recommended that the Boeing interim tanker be continued, but with modifications to fit the competition design. Strategic Air Command agreed with the recommendation, and the thirtieth and subsequent flying boom-type KC-135As were of the competition design configuration.[84]

31 December — At the end of 1954, with thirty-two medium air refueling squadrons and 683 tankers assigned, Strategic Air Command was able to announce that inflight fueling had become "as important to SAC global operations as are

takeoffs and landings." In a year which had seen the advent of a jet tanker program, the retirement of the last KB-29Ms from active service, and the addition of 233 KC-97s to the SAC inventory, the command underscored the importance of aerial refueling by noting that crew endurance, rather than fuel, had become the factor limiting bomber and fighter range.[85]

1955

8 March — The 4060th Air Refueling Wing, the Air Force's first aerial refueling wing, was organized at Dow AFB, Maine, and assigned to SAC's Eighth Air Force. The second air refueling wing, the 4050th, was organized at Westover AFB, Massachusetts, on 1 April. Organization of the wings began a SAC program to concentrate air refueling strength in the Northeast, providing the command with greater bomber mobility over the North Atlantic.[86]

29 June — Strategic Air Command's 93rd Bombardment Wing, at Castle Air Force Base, California, accepted delivery of the Air Force's first operational B-52 Stratofortress jet bomber. Outfitted for receiving fuel from flying boom-equipped tankers, the "B" model B-52's unrefueled range of approximately six thousand miles was extended to the limits of crew and equipment endurance through aerial refueling.[87]

20 October — Strategic Air Command retired the last B-50 from its bomber fleet, but the aircraft soon reentered the active Air Force inventory as a three-hose tanker. Between 1957 and 1959, the converted KB-50J/K, modified with underwing jet pods to supplement its piston engines, performed aerial refueling duties for the Tactical Air Command.[88]

31 December — SAC's assigned tanker fleet had grown to 761, an increase of 78 aircraft during the year. At the end of 1955, eighty-nine percent of the command's refuelers were KC-97s.[89]

1956

5 June — Headquarters Air Force approved a formal contract for sixty-eight additional KC-135 tankers above the twenty-nine that had been ordered in 1954.[90]

18 July — Mere moments after the first Boeing KC-135 production model rolled off of the assembly line in Renton, Washington, the 888th and final KC-97 tanker was manufactured. The last KC-97 produced, the 592nd "G"

model built by Boeing, was assigned to the 98th Air Refueling Squadron, at Lincoln AFB, Nebraska, on 16 November. Although the KC-97 was the backbone of SAC's tanker fleet and would remain in active service through 1965, the age of jet power required a KC-135-type refueler. The Air Force accepted its first KC-135A in January 1957.[91]

22 August — A month after the first production model KC-135 was unveiled, and five months before it was formally accepted by the Air Force, Headquarters USAF authorized the purchase of an additional 118 Stratotankers. This brought the number ordered to 215. The KC-135A made its first flight, at Boeing's Renton facility, on 31 August.[92]

November — In the face of a Soviet buildup of its long-range bomber force and development of intercontinental ballistic missiles, and amid fears that the USSR would employ the element of surprise in the event of war, Strategic Air Command planned an immediate retaliatory response to Soviet aggression. SAC's goal of keeping one-third of its bombers and tankers on ground alert at all times was tested between November 1956 and November 1957. Operation Try Out, the first test of the concept, proved that ground alert was feasible. Two additional tests, Operation Watch Tower and Operation Fresh Approach, worked out details and improved methods. During the tests, a total of four KC-97 refueling squadrons performed alert duty with B-47 bomber units. Although testing was not completed, on 1 October 1957, at the direction of the Commander in Chief, Strategic Air Command, General Thomas S. Power, tanker and bomber ground alert began at selected US and overseas bases. During 1957, SAC placed eleven percent of its bomber and tanker aircraft on alert status.[93]

11 December — SAC completed its largest and most complex B-47 and KC-97 training maneuvers, a combination of two similar exercises, Power House and Road Block. The two-week exercises saw more than one thousand bombers and tankers fly simulated combat missions over North America and the Arctic. KC-97 task forces positioned in the northern US, Newfoundland, Labrador, and Greenland since mid-November kept the B-47s airborne.[94]

31 December — SAC's growing refueling capability was made up of forty medium air refueling squadrons and 824 tankers. Ninety-one percent of the refuelers were KC-97s.[95]

1957

18 January — Under the command of Major General Archie J. Old, Jr., who flew the lead plane, "Lucky Lady III," three B-52s assigned to the 93rd Bombardment Wing completed Operation Power Elite, a nonstop around-the-world flight. The flight, which left Castle AFB, California, 45 hours and 19 minutes before landing at March AFB, California, received five aerial refuelings from KC-97s. The B-52s completed the journey in less than half the time required by the record-setting "Lucky Lady II" in 1949. General Curtis E. LeMay, SAC commander in chief, called the Power Elite flight a "demonstration of SAC's capabilities to strike any target on the face of the earth." The 93rd Bombardment Wing received the National Aeronautic Association's Mackay Trophy for the outstanding flight of 1957.[96]

31 January — The United States Air Force formally accepted the first KC-135A Stratotanker, a flying boom-type refueler capable of transferring nearly one thousand gallons of fuel per minute. Powered by four turbojets, the tanker had a fuel capacity of 31,200 gallons, which was available for transfer or for its own use. The first three KC-135As were delivered to the 93rd Air Refueling Squadron on 28 June 1957. The Stratotanker remained in production for eight years; the final KC-135 to be assigned to SAC was delivered to the 380th Air Refueling Squadron on 12 January 1965.[97]

4 April — The United States Air Force directed procurement of an additional 157 KC-135 aircraft, a figure subsequently reduced to 130.[98]

1 November — The 27th Air Refueling Squadron, the last KB-29 unit in Strategic Air Command, was inactivated at Bergstrom AFB, Texas. On 25 November, SAC's final two KB-29s, both "P" models, were sent to the aircraft storage facility at Davis-Monthan AFB, Arizona.[99]

31 December — At the end of 1957, the number of air refueling squadrons assigned to Strategic Air Command remained at forty, the number assigned at the close of 1956. The number of tankers actually declined during the year to 766, fifty-eight fewer than were assigned on 31 December 1956. While the command had phased out its KB-29 fleet during 1957, it had acquired twenty-four KC-135s.[100]

1958

15 April — Headquarters USAF approved procurement of eighty-one additional KC-135A aircraft, bringing the total ordered to date to 426.[101]

27 June — A KC-135, one of three assigned to the 99th Air Refueling Squadron which were setting off to break existing world speed records, crashed on takeoff at Westover AFB, Massachusetts. Among the fifteen casualties were Brigadier General Donald W. Saunders, 57th Air Division commander, and Lieutenant Colonel George M. Broutsas, 99th Air Refueling Squadron commander. Officials of the National Aeronautic Association and six journalists on board to cover the record-breaking flight were also killed.[102]

1 July — SAC assumed responsibility for all KC-97 combat crew training from Air Training Command. The 4397th Air Refueling Wing (SAC) was designated and organized at Randolph AFB, Texas, to provide the required training.[103]

14 July — After years of experimentation and consternation over the best method of aerial refueling, Headquarters USAF announced that the flying boom system would be the standard for its aircraft. The KC-97 and then the KC-135, both with flying booms, had already created a de facto standard. Combat aircraft without boom-fuelable capabilities that were already in service or in production were to retain their installed or programmed refueling systems, and boom-to-drogue adapters would be employed by SAC tankers to fuel probe-equipped aircraft on an interim basis.[104]

31 December — At the close of a year with sustained growth in its aerial refueling program, Strategic Air Command had forty-eight air refueling squadrons assigned. Tankers within the command numbered 962, with nineteen percent of them KC-135s.[105]

1959

25 January — Strategic Air Command and Tactical Air Command initiated plans for a KC-135 boom-to-drogue refueling adapter test, which began on 10 February. Two weeks later, General Curtis E. LeMay, USAF vice chief of staff, reiterated the Air Force's desire to establish "a single tanker force equipped to provide support to all combat operations requiring air refueling."[106]

26 August	Operation Stay On II, a SAC-TAC test of drogue adapter-equipped KC-135s capabilities for refueling probe-equipped Tactical Air Command aircraft, began. Stay On II showed the need for an improved boom-to-drogue adapter, increased rendezvous capability, modification to the fuel capacity of fighter aircraft, and standardized training requirements for aircrews.[107]
13-15 October	KC-135s participated in a major exercise for the first time. During Operation Fast Move, 70 KC-135s and 86 KC-97s refueled 29 B-52s and 164 B-47s. The tankers moved to forward bases in the northeastern United States and Canada for the exercise.[108]
31 December	Strategic Air Command was assigned fifty-seven air refueling squadrons and one KC-97 combat crew training wing, and 1,067 tankers.[109]

THE GROWTH OF MILITARY AIR REFUELING
1960 - 1969

The 1960s saw aerial refueling become the norm for military aircraft and operations. With the growing dependence on air-to-air refueling and the tremendous increase in the number of KC-135s in the United States Air Force fleet, Strategic Air Command emerged early in the decade as the single manager for Stratotanker operations. While the KC-135 was becoming the standard for air refueling, technological advancements were making older tankers obsolete; in 1965 Strategic Air Command retired its last KC-97 Stratofreighters. Shortly after Boeing delivered the last KC-135 to the Air Force, the necessity of advanced tanker support for modern combat and peacetime air defense led to USAF design studies for an improved air refueler.

1960

3 May — Vice Chief of Staff of the Air Force, General Curtis E. LeMay, following up on his February 1959 announcement of a single fueling system goal, told Strategic Air Command and Tactical Air Command that "the objective of a single tanker force, SAC managed and KC-135 equipped," to support both commands' training and combat needs, was approved for immediate programming, with full implementation by the end of fiscal year 1963.[110]

1 August — SAC accepted delivery of the B-58, America's first supersonic bomber. The B-58 Hustler was built with flying boom method air refueling capability. With a single aerial refueling the aircraft's radius was 3,800 nautical miles.[111]

31 December — At the close of the year, Strategic Air Command operated thirty medium and twenty-nine heavy air refueling squadrons. The command had 689 KC-97 and 405 KC-135 tankers assigned.[112]

1961

February — In Operation Stay On III, a SAC-TAC planning team completed testing on a boom-to-drogue refueling adapter. Headquarters USAF had directed Stay On III for additional flight testing and refinement of tactics and procedures after earlier tests had shown deficiencies with the adapter. By the end of February the new drogue adapters and rendezvous equipment had been installed on three KC-135s and several tactical aircraft. During the second phase of Operation Stay On III, in March, the three drogue adapter-equipped KC-135As flew twenty-three sorties and successfully

transferred a total of 844,440 pounds of fuel to F-100, F-101, F-105 and RB-66 receivers.[113]

November — Headquarters USAF established the Strategic Air Command KC-135 program at thirty-two squadrons, with a total authorized strength of 640 aircraft. Simultaneously, Air Force designated SAC as the single manager for all KC-135 air refueling operations. On 17 November, Secretary of Defense Robert S. McNamara approved the program. Seventy KC-135s would be made available to meet Tactical Air Command's refueling requirements; twenty would be used as command posts.[114]

1 December — Strategic Air Command accepted delivery of its first mobile KC-135 flight simulator. With one stationary refueling simulator for approximately three B-52 bases, the task of accomplishing periodic training was arduous, particularly since President John F. Kennedy had ordered fifty percent of the B-52 force to be kept on alert earlier in the year. Each mobile simulator, which was mounted on a Pullman rail car, served four bases.[115]

December — Headquarters USAF held a series of conferences to establish ground rules for KC-135 air refueling operations under the single manager concept. As a result of the conferences, a joint SAC-TAC directive on procedures for air refueling support of tactical aircraft was published.[116]

31 December — Strategic Air Command possessed its highest number of air refuelers, with 1,095 assigned. The number of KC-135s had increased by 39 over the previous year to 444, while KC-97s had decreased to 651. The command had sixty air refueling squadrons and one KC-97 combat crew training wing assigned.[117]

1962

2 May — A KC-135 wing cycle fatigue testing program, begun two years earlier, was completed. Skin cracks had been discovered on Stratotanker wings, and in May 1961 Boeing initiated tests to determine fatigue life expectancy. The manufacturer established a correlation between the wing contour and the probability of skin cracks, and Logistic Command's modification board approved a procedure for isolating a particular wing fastener. On 1 August 1961, one day after AFLC's special session approval, actual modifications under Project Wing Fix began.[118]

19 November — Headquarters USAF informed Pacific Air Forces (PACAF) that the KC-135 program would remain at the thirty-two squadron level, with Strategic Air Command as the single manager. SAC would provide KC-135 support to PACAF for limited war and contingency operations while the command phased out its KB-50 tanker force.[119]

31 December — Fifty-seven SAC air refueling squadrons provided tanker services to the Air Force. The command had 515 KC-135s and 503 KC-97s assigned.[120]

1963

6 May — Strategic Air Command completed a one and one-half year program to replace the main landing gear wheels on its KC-135 fleet. Since September and October 1961, a high condemnation rate had made wheel failures a serious problem. The original magnesium wheels were replaced with stronger aluminum ones.[121]

31 December — At the end of 1963, Strategic Air Command had a total of fifty-five air refueling squadrons, forty-one of which were designated as heavy air refueling squadrons. The KC-135s actively functioning as tankers were distributed among thirty-nine of the heavy squadrons. The rapidly diminishing KC-97 fleet, down to 306 aircraft by the end of the year, was spread among fourteen medium air refueling squadrons. During 1963, as part of SAC's program to phase out the B-47 and its associated tanker force, seven medium air refueling squadrons were either inactivated or equipped with KC-135s. In conjunction with the need for fewer KC-97s, SAC withdrew its tankers from Kindley Air Force Base, Burmuda, and several Royal Canadian Air Force Stations.[122]

1964

May — Operation Desert Strike, the first large-scale joint Army-Air Force exercise to employ tanker aircraft, saw twenty KC-135s transfer 8.7 million pounds of fuel during 1,581 refuelings.[123]

27 May — The Air National Guard's (ANG) 126th Air Refueling Wing, which had become the ANG's first air refueling wing on 1 July 1961, placed the first jet-augmented KC-97L into operation at its O'Hare International Airport, Illinois, base. Hayes International Corporation performed the modification.[124]

9 June — Strategic Air Command tankers entered the conflict in Southeast Asia. Four KC-135s, stationed at Andersen

AFB, Guam, but operating from Clark Air Base, Philippines, refueled eight F-100s on a mission to strike Pathet Lao antiaircraft emplacements in northern Laos. The Stratotankers of the Yankee Team Task Force also refueled two of the fighters on the return leg of the mission. The KC-135s, by direction of the Joint Chiefs of Staff (JCS) returned to Guam in mid-June and rejoined the main body of a larger task force supporting routine Tactical Air Command deployments. On 5 August, JCS reestablished the Yankee Team Tanker Task Force at Clark. On 28 September the force of eight KC-135s, renamed "Foreign Legion," began supporting Pacific Air Forces' fighters engaged in combat.[125]

11 June — SAC made final preparations for aerial refueling tests with United States Marine Corps' aircraft at Patuxent River Naval Air Station, Maryland. This was in response to a 7 May meeting at the Pantagon to discuss refueling compatibility, techniques, and procedures for boom-to-drogue adapter refueling.[126]

2 July — Strategic Air Command received the first of fourteen KC-135Bs, specially modified tankers to serve as airborne command posts. The KC-135B was powered by four turbofan engines, rather than the normal turbojets, and was equipped with a receptacle for inflight refueling. The final "B" model was delivered to SAC on 29 November 1964.[127]

October — USAF assigned responsibility for all aerial refueling in the Far East and Southeast Asia to Strategic Air Command. The action followed the grounding of Pacific Air Forces' KB-50 tanker fleet because of severe corrosion.[128]

7 October — With corrosion becoming a problem for the SAC KC-135 fleet, Air Force Systems Command recommended painting the entire aircraft to control the rust. The first Stratotanker entered the painting facility at the Oklahoma City Aircraft Maintenance Area on 7 October; painting the entire KC-135 fleet was projected to take approximately two years.[129]

31 December — KC-97 aircraft continued to be rapidly retired from SAC's tanker fleet during 1964, and by the end of the year only 190 remained in the active inventory. Overseas bases continued to close and, at the end of the year, Harmon AFB, Newfoundland, was the only overseas base that still supported KC-97s. On 31 December, nine medium air refueling squadrons remained. During the year, the number of heavy air refueling squadrons

increased to forty four, with 625 KC-135s assigned.[130]

1965

12 January — The final KC-135A to join the SAC inventory was delivered to the 380th Air Refueling Squadron, Plattsburgh AFB, New York. Boeing manufactured the last KC-135 in December 1964, ending nine years of almost continuous production.[131]

12 January — The 4252nd Strategic Wing was activated at Kadena Air Base, Okinawa, to provide KC-135 aerial refueling for PACAF fighter-bombers engaged in combat over Vietnam. On 25 January the first Young Tiger tactical tanker mission in Southeast Asia was flown.[132]

February — Supported by thirty-eight KC-135s, thirty B-52s deployed from the continental United States to Andersen AFB, Guam, in preparation for conventional bombing missions over Southeast Asia. To refuel the Arc Light bombing missions, which began on 18 June against a Viet Cong jungle stronghold, KC-135s from the 904th and 913th Air Refueling Squadrons formed an Arc Light tanker force at Kadena Air Base, Okinawa. For the initial Arc Light mission, thirty KC-135s refueled twenty-seven bombers on their way to Viet Cong targets.[133]

1 March — Four KC-135s from the Foreign Legion tanker force in the Philippines deployed to Don Muang International Airport, Thailand, to begin operations in Southeast Asia as the Tiger Cub Tanker Task Force.[134]

25 March — To coordinate what had quickly become a far flung combat tanker operation in Southeast Asia, Headquarters SAC established a liaison office with the 2nd Air Division at Tan Son Nhut Airfield, South Vietnam.[135]

March — Strategic Air Command and Britain's Royal Air Force conducted air refueling compatibility tests. Britain requested American tanker support after it grounded its Valiant refueler force. SAC's KC-135s proved to be satisfactory refuelers for the RAF's tactical aircraft.[136]

September — Strategic Air Command KC-135s deployed to Takhli Air Base, Thailand, to supplement the air refuelers operating from Don Muang International Airport. Both tanker units serviced Thailand-based fighters flying Southeast Asia combat missions.[137]

21 December — Strategic Air Command retired its last Stratofreighter tankers. The final two KC-97Gs, assigned at Pease AFB, New Hampshire, and Westover AFB, Massachusetts, were transferred to the Air Force's storage facility in Arizona. Retirement of the last KC-97s came forty-one days after the last Stratofreighter had been removed from ground alert status at Mountain Home AFB, Idaho. In October, Headquarters USAF had initiated Fast Fly, a program to accelerate Secretary of Defense Robert McNamara's objective of terminating the KC-97 program by the end of fiscal 1966. Fast Fly called for the end of Stratofreighter operations by the middle of the fiscal year. Between October and the end of 1965, SAC inactivated four KC-97 air refueling squadrons.[138]

28 December — Strategic Air Command completed the aerial refueling training and qualification of thirteen Air National Guard fighter squadrons. During the qualification program, SAC's KC-135s accomplished 1,110 inflight refuelings.[139]

31 December — Strategic Air Command finished an eventful 1965 with a total of forty-nine air refueling squadrons, only five of which were designated as medium. With retirement of the last KC-97 on 21 December, the medium air refueling squadrons had no aircraft assigned. The KC-135 fleet contained 641 aircraft, a slight decrease from 1964.[140]

31 December — By the end of its first year of operations in the Vietnam Conflict, SAC's Southeast Asia tanker task force had grown to fifty-five KC-135s and approximately eighty aircrews. Forty tankers were at Kadena, while ten were stationed at Takhli and five operated from Don Muang. Thirty tankers refueled B-52s on Arc Light bombing missions, while the remaining Stratotankers supported Pacific Air Forces fighters. During 1965, SAC's Southeast Asia tankers flew more than 9,200 sorties, performed 31,250 refuelings, and transferred approximately 315 million pounds of fuel.[141]

1966

7 April — Two Kadena-based KC-135s began weekly rotations to Andersen AFB, Guam, to provide emergency refuelings to B-52s returning from Vietnam bombing missions.[142]

2 June — Headquarters SAC activated the 4258th Strategic Wing at U-Tapao Airfield, Thailand, to satisfy the growing tanker requirements for the conflict in Southeast Asia. The wing's primary responsibility was to augment the

Kadena-based 4252nd Strategic Wing, activated a year and a half earlier, to refuel tactical combat aircraft. The 4258th's 919th Air Refueling Squadron launched the first tanker sortie from U-Tapao on 11 August. By September, the airfield had fifteen KC-135s assigned and had become the primary tanker base in Southeast Asia.[143]

29 June — The final KC-135 completed acquisition of an improved power-boosted rudder, the culmination of a modification program started three years earlier. The new equipment improved rudder control and increased stability, particularly for takeoffs in crosswinds or precipitation.[144]

1 July — An improved depot-level maintenance concept for KC-135s, a three-year-cycle inspection and repair as necessary program, became effective. Under the new concept, each tanker would be inspected at the Oklahoma City Aircraft Maintenance Area once every three years, with needed repairs made during the scheduled inspection. Before, aircraft were sent to the depot for maintenance or modification when problems occurred.[145]

5 July — The first of several notable saves of combat aircraft in danger of crashing because of low fuel occurred when tanker crew T-89, assigned to the 301st Air Refueling Squadron and commanded by Captain Howard G. Stalnecker, refueled a flight of four F-105s during a Southeast Asia emergency.[146]

27 September — A SAC KC-135 performed the first aerial refueling of an F-111, at Edwards AFB, California. Two air-to-air contacts for boom-to-receptacle refuelings were accomplished.[147]

31 December — Strategic Air Command had 620 KC-135 tankers authorized for its forty-three heavy air refueling squadrons. The last five medium air refueling squadrons had been phased out during the year.[148]

31 December — Seventy-five KC-135s were stationed in the Western Pacific to support aerial refueling needs in the Southeast Asia area of operations. The tankers flew 18,203 sorties and transferred more than 850 million pounds of fuel during the year.[149]

1967

1 February — U-Tapao, Thailand, became a main operating base, with the 4258th Strategic Wing assuming operational control of Young Tiger tactical tanker's stationed at the airfield. In March, the KC-135s at Takhli, which formerly fell under the operational control of the 4252nd Strategic Wing, were assigned to the 4258th. The 4252nd operated from Kadena, where it supported Arc Light bombers; tankers from the 4258th's two locations refueled fighters.[150]

31 May — A spectacular and complex life saving aerial refueling operation took place over the Gulf of Tonkin. What began as a routine fueling of two USAF F-104s quickly turned to an emergency when the KC-135, piloted by a crew from the 902nd Air Refueling Squadron, received word to intercept two US Navy aircraft dangerously short of fuel. While periodically fueling the two F-104s providing cover from enemy aircraft, the Stratotanker successfully rendezvoused with the Navy A-3 tankers, one of which was down to its last three minutes of fuel. As the second A-3 was refueling, two Navy F-8s, also low on fuel, entered the area. One F-8 was too close to empty to wait for the Navy tanker to complete its refueling. It hooked up to the A-3, which continued to draw fuel from the KC-135. While the unprecedented tri-level refueling was taking place, the first A-3 fueled the second F-8, then returned to the KC-135 for additional fuel. Immediately following the dramatic save and another refueling of the F-104s, the KC-135 successfully refueled two Navy F-4s, both of which could not reach their aircraft carrier because of a lack of fuel. After a final refueling of the two F-104s, the KC-135 was itself almost out of fuel and was forced to land at an alternate base in South Vietnam. The KC-135 pilot, Major John H. Casteel, and his three-man crew, received the Mackay Trophy for 1967, awarded for the most meritorious flight of the year.[151]

June — Strategic Air Command prepared a required operational capability statement for an advanced capability tanker. Justification for a new aerial refueler was based on KC-135 deficiencies, including inadequate range and dispersal capability, and excessive bomber-tanker alert strike team reaction time. The command felt that modifications to the KC-135 or a new tanker with four TF-39 engines would solve the problems. Cost effectiveness studies showed the new tanker, named KC-X for planning purposes, would be advantageous.[152]

31 December — Strategic Air Command finished 1967 with forty-two KC-135-equipped air refueling squadrons. Of the 629 Stratotankers assigned to the command, seventy-five were stationed in the Southeast Asia theater of operations. Tankers in the conflict area flew about 22,900 sorties during 1967.[153]

1968

January — Asia-based airpower increased as a result of several major hostile events, necessitating a concomitant growth in aerial refueling. The 21 January North Vietnamese attack on the US Marine Corps base at Khe Sanh, followed two days later by the North Korean seizure of the USS Pueblo in the Sea of Japan, and the 30 January start of the communist Tet Offensive in South Vietnam, led to the stationing of an additional nineteen KC-135s in the Western Pacific, including fifteen at Ching Chuan Kang Air Base, Taiwan. Ching Chuan Kang began refueling operations in February with the activation of the 4200th Air Refueling Squadron. The strategic importance of the Taiwanese hub for fueling-related activities was underscored by the relocation of KC-135 radio-relay aircraft from Takhli Air Base, Thailand, and the growth of its tanker inventory. By September 1968, Ching Chuan Kang was home to twenty-one KC-135s.[154]

24 September — Strategic Air Command's first tanker casualty in the Southeast Asia conflict, the crash of a KC-135A on an emergency landing at Wake Island, killed eleven Arc Light support personnel redeploying from U-Tapao Air Base, Thailand.[155]

October — The second Stratotanker crash in the Southeast Asia theater of operations, only seven days after the first, occurred on liftoff from U-Tapao with four fatalities. Three weeks later, on 22 October, a third KC-135 crash landed, at Ching Chuan Kang, Taiwan, killing six Air Force personnel.[156]

31 December — Even with the growth of inflight fueling activities in Southeast Asia, Strategic Air Command finished the year with six fewer KC-135s than had been available at the end of December 1967. The tankers were assigned to forty-one heavy air refueling squadrons. Although bombing north of the demilitarized zone in Vietnam had been suspended on 1 November, aerial refueling operations in Southeast Asia still broke all records in 1968. Approximately 32,000 Stratotanker sorties were flown and more than 129,000 refuelings conducted;

114,744 of the refuelings were to tactical aircraft. SAC tankers in the theater of operations transferred more than 1.6 billion pounds of fuel.[157]

1969

13 January — In answer to SAC's earlier request for a more capable tanker, Headquarters USAF directed Air Force Systems Command to conduct design studies for an advanced refueler while, at the same time, examining the feasibility of modifications to Lockheed's new C-5 transport, Boeing's 747, or the Boeing 707, the civilian airliner upon which the KC-135 was based.[158]

20 February — Strategic Air Command began a test program of satellite basing, a modification of the dispersal basing concept used by elements of the command in the late 1950s and early 1960s. In the first test of satellite basing, at Tactical Air Command's Homestead AFB, Florida, B-52s and KC-135s assigned to the 72nd Bombardment Wing, Puerto Rico, were placed on continuous ground alert. The successful test, which was completed on 20 May, was designed to reduce the time needed to get SAC's entire alert force airborne while simultaneously creating additional targets for an enemy attack. On 1 July, additional bases joined Homestead in the bomber-tanker satellite program.[159]

February — Strategic Air Command began a series of compatibility tests, using both KC-135s and KC-97Ls to refuel the A-37 probe-equipped aircraft. Trials with the KC-97L proved successful, but problems plagued connections to the KC-135's drogue. Incompatibility and recurring fuel spillage resulted in a USAF directive permitting KC-135 aerial refueling of A-37s only in emergency situations.[160]

1 September — The 4252nd Strategic Wing, at Kadena Air Base, Okinawa, became SAC's single manager for all KC-135s deployed to Southeast Asia. The wing was replaced the following year when the 376th Strategic Wing was activated at Kadena. On the same day, 1 April 1970, the 307th Strategic Wing replaced the 4258th at U-Tapao Air Base, Thailand.[161]

12 December — Strategic Air Command received the draft advanced tanker study report from Air Force Systems Command. After consideration of alternatives, Headquarters SAC concluded that the best solution for meeting present and future tanker demands was an incremental purchase of either the Boeing 747 or Lockheed C-5. When modi-

fied for aerial refueling, either plane would provide at least four times the transfer capability of the KC-135. Further studies, tests, demonstrations and budget constraints would delay approval of the new tanker until 1977.[162]

19 December — Ching Chuan Kang Air Base, Taiwan, was again the site of a fatal KC-135A crash. All four crew members were killed in what would be the final Stratotanker crash in the Southeast Asian conflict.[163]

31 December — Thirty-seven heavy air refueling squadrons and 617 authorized KC-135s constituted Strategic Air Commands aerial refueling force.[164]

31 December — In Southeast Asia, SAC tankers accomplished 138,164 aerial refuelings during 1969, the highest number for any year during the war. However, the approximately 28,000 sorties and 1.4 billion pounds of fuel transferred were both below the 1968 totals.[165]

THE GOLDEN AGE OF AIR REFUELING
1970 - 1979

The decade of the 1970s witnessed a tremendous expansion of air refueling in combat and in peacetime, with a resultant demand for Strategic Air Command's tanker services that far outstripped existing capabilities. To meet the Air Force's strategic and tactical requirements, and those of other US and allied services, the command continued modernization of its refueling fleet. The decade saw approval of an advanced tanker-cargo aircraft and plans for a major KC-135 upgrade program to extend Stratotanker service well into the twenty-first century.

1970

16 August — B-52s on Arc Light bombing missions ceased operating from Andersen AFB, Guam, and by 19 September all Arc Light activities were concentrated at U-Tapao. With Arc Light bombers and tankers collocated at the Thai air base, the need for air refueling support from Okinawa was eliminated.[166]

29 September — In response to Strategic Air Command's request for an advanced capability tanker, a Headquarters Air Force study recommended a modified version of the KC-135A.[167]

31 December — Strategic Air Command's assigned aerial refueling capability stood at forty heavy air refueling squadrons and 630 KC-135s. While the total number of squadrons and tankers was up from the 31 December 1969 figures, air refueling activity in Southeast Asia declined during 1970 to the lowest level in five years. SAC's tankers flew approximately 19,540 sorties and transferred 888.2 million pounds of fuel during the year; by 31 December, only forty-eight refuelers remained in the Western Pacific.[168]

1971

18 November — Headquarters USAF instructed Air Force Systems Command to initiate procurement of a Boeing 747 to evaluate the flight characteristics of a large wide-body aircraft relative to the maneuvering required for air-to-air refueling. To determine whether a 747 could safely fly at only a boom-length distance from another high speed aircraft, Systems Command's Aeronautical Systems Division and Boeing were to jointly conduct flight tests. The 747 was equipped with a KC-135 dry boom, but with none of the plumbing found on a tanker, and was not able to actually transfer fuel. The flight trials lasted until 6 July 1972, and saw the 747 make

contact with B-52G, FB-111A, F-4C, and SR-71A aircraft. The detailed evaluation showed that a wide-body jet was a viable aerial refueling platform.[169]

31 December — At the close of the year, Strategic Air Command's tanker force consisted of thirty-eight heavy air refueling squadrons and 622 KC-135s. While the overall tanker force showed a slight decline from 1970, aerial refueling activities in Southeast Asia continued a markedly downward trend until late in the year. During 14,400 sorties, tankers conducted 62,600 refuelings and transferred 618.5 million pounds of fuel. All but about 1,200 of the fueling contacts were with fighter aircraft.[170]

1972

July — The Young Tiger tanker task force supporting tactical operations in Southeast Asia had, by mid-summer, grown to 115 aircraft. Spurred in November and December 1971 by Operation Commando Hunt VII against activity on the Ho Chi Minh trail, then by preparation for and execution of a major communist offensive into South Vietnam during the spring, SAC expanded both its B-52 and KC-135 fleets and Tactical Air Command deployed nine fighter squadrons to the theater of operations. In May, seventy tankers deployed to Don Muang, Takhli, and Korat air bases in Thailand, and to Clark Air Base, Philippines. The additional aircraft for refueling fighters joined the forty-five already stationed at U-Tapao. By the end of June, approximately sixty KC-135s at Kadena served the recently revived B-52 operations from Guam. In August, Ching Chuan Kang Air Base, Taiwan, replaced Clark as a major tanker operating base.[171]

September — Strategic Air Command KC-135s flew 3,902 sorties in support of the conflict in Southeast Asia, the highest monthly total for the nine years of war-related tanker operations. During the month, 159.6 million pounds of fuel were transferred through 12,509 refuelings. After the September high, tactical refueling requirements began to diminish, coincidental with the resumption of peace negotiations in Paris and the employment of long-range F-111s in the war zone. On 10 October, the tanker squadron at Don Muang was inactivated; the Ching Chuan Kang and Korat units followed on 8 November.[172]

October — Air Force Systems Command developed an aerial refueling technology plan to investigate engineering development actions required for acquisition of improved, modern

air refueling equipment.[173]

December — On 18 December, with the beginning of Linebacker II operations and the resumption of large-scale bombing of North Vietnam, SAC's tanker force again increased, to approximately 195 KC-135s, an all-time high for Southeast Asia refueler strength. During the eleven-day bombing of the Hanoi and Haiphong areas, tankers flew 1,390 sorties and made 4,625 inflight refuelings. For the year, SAC tankers flew about 34,700 sorties, conducted 115,272 refuelings, and transferred more than 1.4 billion pounds of fuel in support of conflict operations.[174]

31 December — Strategic Air Command's worldwide Stratotanker force was organized into thirty-eight heavy air refueling squadrons. Of the 615 KC-135s authorized for SAC's fueling duties, thirty-one percent were in the Southeast Asia theater of operations.[175]

1973

May-June — In conjunction with the Paris Air Show, Strategic Air Command KC-135s provided aerial refueling services for non-Air Force aircraft. Six F-4Js belonging to the US Navy's Blue Angels and a Marine Corps F-14 received deployment and redeployment support. In 1971, SAC had provided the Blue Angels with non-combat aerial refuelings during the precision flight team's Southeast Asia tour.[176]

9 July — In answer to March 1973 Navy requests for transoceanic tanker support, Strategic Air Command responded with detailed statistics on the growth and extent of its aerial refueling requirements. SAC believed that the current overcommitment of its Stratotanker force precluded extending regular support to the other military services. The 70,100 tanker sorties flown in 1972 represented 145 percent of the annual capability established by the Secretary of Defense in 1961 as justification for procurement of the KC-135. Since 1961, Headquarters USAF, major Air Force commands, the Air Force Reserve, and the Air National Guard had acquired aircraft that required KC-135 inflight refueling, but the original fleet of 620 KC-135s could adequately support only existing strategic operations and Tactical Air Command ferry, training, and contingency needs. However, USAF agreed to extending tanker support to the Navy on a fully reimbursable basis. The Navy declined the offer.[177]

15 August — A final US air strike in Cambodia marked the end of direct American involvement in the nation's longest war. From the introduction of the first tankers in 1964 to the end of combat operations, SAC KC-135s in Southeast Asia amassed a total of 911,364 flying hours, provided 813,878 aerial refuelings, and transferred more than 8.963 billion pounds of aviation gasoline. With the end of hostilities, tankers returned from the war zone as aircraft requiring refueling redeployed. Headquarters SAC began planning for the 1 July 1974 inactivation of the provisional tanker unit at U-Tapao.[178]

15 December — Headquarters SAC submitted to a revised requirement for an advanced multi-purpose tanker to Air Force. Continuing in the tenor of the 9 July response to the Navy's request for transoceanic refueling support, the command stressed the necessity of correcting the existing tanker fleet's inability to support its own current and future bomber refueling requirements, and discussed Military Airlift Command's airlift and bulk petroleum needs. SAC reiterated its belief that the advanced cargo-tanker should be a derivative of a commercial civilian transport aircraft.[179]

31 December — Strategic Air Command possessed thirty-eight heavy air refueling squadrons, with 615 KC-135s assigned.[180]

1974

10 January — Air Force Systems Command's Aeronautical Systems Division accelerated by one year the projected starting date for the Advanced Tanker/Cargo Aircraft project (ATCA), to fiscal 1975, and identified $20 million for the new tanker's first year. Advanced Tanker/Cargo Aircraft was the Headquarters USAF designation for what SAC had referred to as the advanced multi-purpose tanker. On 8 March, USAF reviewed and validated SAC's advanced tanker request. On 31 July, USAF named Systems Command as the implementing command for the tanker.[181]

22 March — Headquarters Strategic Air Command revised an earlier proposal for an improved KC-135 navigation system. The existing system, which incorporated an ASN-6/7 navigation computer and APN-81 Doppler radar, suffered from a high failure rate. Because of its inability to meet international navigation accuracy standards, KC-135s were limited to altitudes below 29,000 feet. In late 1973, SAC had devised an interim solution which met peacetime navigation standards, and Headquarters USAF had authorized the rental of the Palletized Internal

Navigation System (PINS) for use on tankers over international waters. The first Atlantic PINS mission occurred on 4 March 1974; 123 flights later the system evinced 96.7 percent reliability. As an additional benefit, PINS resulted in substantial fuel economy, with a total savings of approximately 128,000 pounds of fuel each week in the Atlantic area. While the SAC proposal for a permanent system was pending, Headquarters USAF authorized continued use of PINS.[182]

29 July — The Secretary of Defense directed that SAC transfer 128 KC-135s to the air reserve forces, with three Air Force Reserve and thirteen Air National Guard units to receive eight Stratotankers each. In the event of wartime mobilization, SAC would gain control of the squadrons. The transfer of air refueling assets was programmed to take four years, but a later decision cut the time to three years. On 1 July 1975, the Ohio Air National Guard's 160th Air Refueling Group, at Rickenbacker AFB, became the first reserve unit to convert to the KC-135 under the program.[183]

30 August — SAC began air refueling training and qualification of Military Airlift Command C-5 aircraft crews, an outgrowth of a 15 May Secretary of the Air Force decision approving development of an aerial refueling capability for the Galaxy. Although Lockheed manufactured the aircraft with an inflight refueling system, it had not been used. An accelerated initial qualification program, from 9 September through 19 December, allowed C-5s to complete 257 training missions, sufficient to qualify seventy-two Galaxy crews in air refueling.[184]

28 September — Congressional action reduced the Air Force's original budget request for the advanced tanker-cargo aircraft by $18 million. The $2 million dollars appropriated for fiscal 1975 prompted Headquarters USAF to direct that Systems Command take all actions possible within the constrained funding to prepare for source selection and full-scale development the following year, with procurement funding to be based on a fleet of up to 150 new aircraft.[185]

18 November — Headquarters Air Force instructed Systems Command to fund modification of a Boeing 747 with KC-135 refueling equipment for advanced tanker demonstration purposes. Four days later, Secretary of Defense James R. Schlesinger asked John L. McLucas, Secretary of the Air Force, to approve the purchase of "six or so" Boeing 747s for conversion to advanced tanker-cargo aircraft. Secretary Schlesinger wanted potential users of the

advanced tanker-cargo aircraft to assess performance and capabilities under actual operating conditions before the Air Force began purchasing production models in fiscal 1976.[186]

31 December — Strategic Air Command's worldwide KC-135 authorizations KC-135 stood at 592. The command's refueling capabilities were vested in thirty-eight heavy air refueling squadrons.[187]

1975

February — Air Force Chief of Staff, General David C. Jones, explored the possibility of leasing aircraft for the advanced tanker-cargo prototype and flight demonstration. Based on his cost analysis, leasing would be less expensive than either development of a new plane or the purchase and modification of an existing aircraft. General Jones hoped that selection, evaluation, and tests of the aircraft type could be completed during fiscal 1976, with full-scale engineering development of the advanced tanker-cargo prototype the following year. The only acceptable aircraft available for lease were the McDonnell Douglas DC-10 and Boeing's 747.[188]

February — Air Force and Strategic Air Command received a blow to their plans for an advanced tanker-cargo aircraft when a study of future tanker requirements, prepared by the office of the Secretary of Defense for presentation to the Secretary in April, concluded that "the current tanker force can adequately support the SIOP [Single Integrated Operational Plan] and contingencies both today and in the future." On 28 July, only a few months after the study was presented to the Secretary of Defense, an Office of the Secretary of Defense tentative program decision memorandum concurred with its conclusion. As a result, all funding for an advanced tanker-transport, except for $10 million allocated for a study of modifications necessary to make wide-body aircraft capable of carrying outsized cargo, was eliminated from the proposed budget.[189]

April — KC-135s assisted in the evacuation of Americans, local national refugees, and citizens of friendly nations from Cambodia and the Republic of Vietnam, the final US military activities in Southeast Asia. As communist forces overran the rural areas and cities, SAC tankers maintained a ground alert posture. When the situation worsened around Phnom Penh, Cambodia, KC-135s refueled tactical aircraft flying cover for the evacuation

operations. During the fall of Saigon, SAC tankers provided air-to-air fueling throughout the Frequent Wind evacuation operation.[190]

21 April — A SAC KC-135 from the 22nd Air Refueling Squadron, March AFB, California, conducted the first inflight refueling of the B-1 bomber.[191]

13 August — General David C. Jones, Air Force Chief of Staff, proposed his advanced tanker-cargo aircraft lease-domonstration concept to Secretary of Defense James Schlesinger, who approved the method of source selection. General Jones also informed General Russell E. Dougherty, Commander in Chief, Strategic Air Command, that the need for new wide-body cargo aircraft, not requirements for an increased-capacity tanker, had been the prime factor in the decision. Two weeks later, General Dougherty and General Paul K. Carlton, the commander in chief of Military Airlift Command, enthusiastically reviewed a joint lease-demonstration program with a Boeing 747 and a McDonnell Douglas DC-10. The proposed cargo-transport and aerial refueling demonstration was planned to take six months. However, on 5 December, the Department of Defense canceled the leased aircraft demonstration in favor of the direct procurement of two advanced tanker-cargo prototypes.[192]

20 August — The Secretary of Defense directed the Air Force to provide air refueling support for the peacetime training and transoceanic movements of US Navy and Marine Corps tactical aircraft. He also tasked the Air Force with providing in inflight refueling capability sufficient to sustain support of general purpose forces during increased periods of tension. Although SAC had earlier balked at additional refueling requirements levied upon its existing tanker force, Secretary Schlesinger's directive gave impetus to acquisition of additional tankers. A memorandum of understanding for USAF refueling support for Navy and foreign military sales aircraft was signed on 23 July 1976.[193]

22 December — The last Young Tiger KC-135 departed from U-Tapao, ending Strategic Air Command's tanker operations from the Thai airfield.[194]

31 December — SAC possessed six hundred KC-135s assigned to thirty-six air refueling squadrons. Seventeen KC-135s were assigned to the air reserve forces.[195]

1976

10 June — After coordination with the major Air Force commands requiring extensive aerial refueling support, Strategic Air Command submitted to Headquarters USAF an expanded rationale for acquisition of advanced tanker-cargo aircraft. In SAC's estimation, the need to overcome KC-135 fuel transfer limitations, reduced basing options, and the growing number of aircraft needing inflight refueling, plus the ability to carry more troops and oversized cargo, made the proposed wide-body tanker-transport the logical plane for correcting current deficiencies and meeting future needs. SAC published a revised multi-command concept of operations for the aircraft in May 1980.[196]

1 July — Headquarters Air Force designated Strategic Air Command the wartime gaining command for all KC-97Ls assigned to the Air National Guard.[197]

27 August — Headquarters USAF released to the aerospace industry its request for proposals for the new advanced tanker-cargo aircraft. Within a week, Air Force Systems Command relinquished management of the advanced tanker-transport program to Air Force Logistics Command. Almost simultaneous with the request for proposals and the program management change, USAF informed SAC that Air Force studies indicated that sixty-nine of the new aircraft would adequately support future general purpose deployment requirements. In conjunction with purchase of the new aircraft, Headquarters USAF proposed transferring additional KC-135s to the reserve fleet, a suggestion which SAC viewed with concern.[198]

1 October — Four Air National Guard and one Air Force Reserve unit converted to KC-135s under the SAC transfer program, joining the two reserve force units that had converted in 1975. Following training by SAC personnel, each reserve unit conducted local air refueling missions, participated in tanker task forces, and supported SAC alert operations. Strategic Air Command inspection teams evaluated each unit to ascertain readiness for operational commitments.[199]

6 November — The Office of the Secretary of Defense approved production of two Douglas KC-10 advanced tanker-cargo aircraft prototypes, at a projected total cost of $148 million, a decision changed later in the month to the purchase of only one prototype in fiscal 1978; the second KC-10 was rescheduled for acquisition in fiscal 1982.[200]

8 November — An Air Force source selection and evaluation board, chaired by the commander of the Aerospace Systems Division and attended by representatives from Headquarters USAF, Strategic Air Command, and the major Air Force commands having substantial aerial refueling and airlift requirements, convened at Wright-Patterson AFB, Ohio, to discuss acquisition of the new advanced tanker-cargo aircraft.[201]

31 December — At the end of the year, Strategic Air Command was equipped with 559 KC-135s. The tankers were distributed among thirty-five heavy air refueling squadrons. The Air Force Reserve had three refueling wings with KC-135s; the Stratotankers transferred to the Air National Guard by SAC were assigned to four air refueling groups.[202]

1977

January — Before leaving office on 20 January, President Gerald R. Ford authorized an increase in the size of the programmed advanced tanker-cargo force to ninety-one aircraft, a substantial gain from the number envisioned by USAF only a couple of months earlier. The authorization, however, was subject to the approval of the next president, James E. Carter, and congressional budget appropriations. President Ford's proposed budget for fiscal 1978 included $276.6 million for the purchase of six modified DC-10s. The six aircraft would comprise the initial step of a six-year procurement program.[203]

24 January — Although the former president had seen an increase to ninety-one aircraft as the way to effectively provide necessary refueling services to combat and transport aircraft "without dependence upon foreign-controlled intermediate bases," the incoming Acting Assistant Secretary of Defense, Installations and Logistics, Dale R. Babione, felt that any increase above the forty-one advanced tanker-cargo aircraft already programmed was unnecessary. He stated that no requirement analysis supported additional aircraft, and that the proposed wide-body design was an expensive method of obtaining increased cargo and transport capacity. He further believed that an expensive advanced tanker-cargo aircraft procurement could endanger a C-5 wing modification program which the Department of Defense considered "essential to the Air Force maintaining its outsize cargo capability. He recommended that $2.818 billion proposed for the tanker-cargo aircraft in the Air Force's fiscal 1980-82 budget submission be deleted.[204]

8-9 February — Headquarters USAF hosted a conference to develop a joint interservice support agreement on air refueling support for the Navy and Marine Corps. Navy peacetime requirements included Strategic Air Command KC-135 support for carrier air wing swapouts, the delivery of replacement aircraft to operational units, and for transfers of aircraft sold through the foreign military sales program.[205]

19 February — In conjunction with the views expressed by the Acting Secretary of Defense less than a month earlier, the Assistant Secretary of Defense, Comptroller, directed a halt to the advanced tanker-cargo aircraft selection process while the Carter Administration reassessed the program, deferring action on the $276.6 million proposed for six advanced tankers in former President Ford's fiscal 1978 budget. By early August, after consulting with President Carter, Secretary of Defense Harold Brown approved the acquisition of between twelve and twenty advanced tanker-cargo aircraft.[206]

24 March — In the midst of the advanced tanker funding controversy, Strategic Air Command released a required operational capability statement calling for more powerful engines on its KC-135s. The statement was the result of an examination directed by Headquarters USAF late in 1976 and showed that more efficient jet engines would give the Stratotankers greater flexibility, at lower cost, than was afforded by the original Pratt and Whitney engines. The SAC study showed that modern engines would permit the refuelers to operate from shorter runways, allow takeoffs at a heavier gross weight, reduce fuel consumption and environmental pollutants, and lower maintenance and operating costs.[207]

August — Less than one-half year after SAC aired its case for new engines, a structural advisory group from the Aeronautical Systems Division met to discuss and assess the C-135-series fleet integrity program. Fatigue-life tests conducted by Boeing in 1973 had determined that the lightweight aluminum used on the lower wing surface, specifically requested by Air Force during the design stage because of its high strength-to-weight ratio, was brittle and prone to crack with age, and had a life expectancy of less than ten thousand safe flying hours. Based on the Boeing study, Air Force began a modification program, replacing the lower wing skins with the same weight aluminum used on commercial 707 models. The reskinning took place at 8,500 flying hours, if possible; reduced load limits were placed on

unmodified 135s with more than 8,500 hours. Replacing the aluminum extended the service life of the aircraft to 27,000 flying hours and, in 1978, Air Force increased the rate at which modification took place from three to six per month. The program, scheduled to modify more than 640 RC and KC-135s by 1988, at a projected cost of $400 million, would provide SAC with refueling and reconnaissance 135s into the twenty-first century.[208]

19 December — Secretary of the Air Force John C. Stetson announced the selection of the McDonnell Douglas DC-10 as the commercial wide-body airframe to be modified into the advanced tanker-cargo aircraft. The Secretary made the choice based upon the Air Force Source Selection Board's recommendation. The new aircraft, to be called the KC-10A, would be of the type described by SAC in its 1967 required operational capability study. The initial KC-10A prototype was scheduled for delivery to SAC in October 1980, at which time it would begin six months of operational testing and evaluation.[209]

31 December — The Strategic Air Command aircraft inventory included 547 KC-135 tankers, assigned to thirty-four heavy air refueling squadrons. During the year the command sent Stratotankers to five additional air reserve fleet units, bringing the total number of KC-135s transferred since July 1975 to ninety-three. At the close of 1977, the Air Force Reserve and Air National Guard had a total of twelve active air refueling wings or groups.[210]

1978

23 March — Captain Sandra M. Scott of the 904th Aerial Refueling Squadron, at Mather AFB, California, became the first female tanker pilot to perform alert duty for Strategic Air Command. A month later, two women assigned to KC-135 units in California shared the distinction of being the first female navigators to perform SAC alert duties.[211]

March — Based on an initiative by SAC, the Department of Defense formed the Aerial Refueling Systems Advisory Group to bring the Air Force, Navy, and civilian industry together for matters affecting inflight refueling.[212]

7 April — While Air Force Logistics Command remained the program manager for acquisition of the advanced tanker, Headquarters USAF designated Strategic Air Command as the KC-10 operating command. At USAF direction,

Logistics Command began planning for the procurement and modification of the aircraft. The maximum number of KC-10s approved for acquisition were expected to cost $969.2 million, an increase of $94.6 million over the 1977 estimate. In January, SAC had prepared a concept of operations for a force of fifteen to twenty KC-10s, with a primary mission of air-to-air refueling and a secondary tasking of cargo transport. On 6 November, Secretary of Defense Harold Brown approved the purchase of twenty KC-10s, at a cost of approximately $35 million each, with the first aircraft scheduled for delivery to SAC in October 1980.[213]

19 June — Strategic Air Command issued a program management plan for the design and implementation of an improved aerial refueling system for the KC-135 fleet. The technology incorporated in the KC-10 portended improvements in refueling capabilities for the older tankers, including development of an advanced aerial refueling boom. The advanced boom's new features included a fly-by-wire flight control capability, an automatic load alleviation system, and an advanced nozzle. The new boom's increased length permitted receivers to remain clear of tanker turbulence, which resulted in greater fuel efficiency during fueling operations. The advanced refueling boom performed well on KC-135's during tests conducted between October 1977 and April 1978, and proved suitable for both the Stratotanker and the KC-10.[214]

23 June — The Last KC-97L, assigned to the 136th Air Refueling Group, Texas Air National Guard, was retired from active service and transferred to storage at Davis-Monthan AFB, Arizona.[215]

July — The selection process for the Air Force's program to upgrade the engines on all KC-135s, a program which had emanated from a USAF-directed engine study in 1976, was suspended pending reclama meetings with the Secretary of Defense. The suspension prompted an urgent message from General Richard H. Ellis, SAC's commander in chief, to the Chairman of the Joint Chiefs of Staff, General David C. Jones, urging restoration of the program as necessary to meet increasing aerial refueling requirements. On 10 August, Secretary Brown restored research and development funds. The planned KC-135 modifications included new engine nacelles, engine pylons, horizontal stabilizer, landing gear, brakes, and cockpit instruments. In September, Air Force Systems Command began evaluating new engines proposed by General Electric and Pratt and Whitney.[216]

16 September — Strategic Air Command completed the transfer of 128 KC-135s to the Air Force Reserve and Air National Guard. During the three year program, SAC transferred sufficient Stratotankers to equip eleven refueling groups and five air refueling wings.[217]

31 December — With completion of the transfer program to the reserve fleet, SAC's KC-135 force was down to 487 aircraft. Thirty-four air refueling squadron's accomplished the command's worldwide inflight fueling requirements. To support major tactical deployments to and from the United States, SAC maintained tanker task forces in New Hampshire, Alaska, Guam, and Germany.[218]

1979

July — Global Shield 79, one of the largest SAC exercises ever and the first to test every phase of the command's role in the Single Integrated Operational Plan short of nuclear war, featured full participation by the wartime aerial refueling forces. Air Force Reserve and Air National Guard units which would be gained by SAC during contingency mobilization joined the command's active forces, generated to alert, and dispersed to preselected locations, where they flew combat refueling maneuvers.[219]

31 December — At the end of the year, Strategic Air Command's active KC-135 fleet remained at 487 aircraft, but the command's air refueling capabilities were organized in one fewer squadron than at the close of 1978. During 1979, SAC, Air Force Reserve, and Air National Guard tankers flew 42,923 sorties, with the reserve forces accounting for 36.7 percent of the total.[220]

SERVING THE PRESENT AND LOOKING TO THE FUTURE
1980 - 1988

The 1980s saw a tremendous increase in air refueling, both in tanker capabilities and in services provided. Delivery of the KC-10 and upgrading of the existing KC-135 fleet, including new engines and modifications to allow fueling by boom or the probe and drogue method, guaranteed the ability to meet the growing air refueling needs of the Air Force and other military services well into the twenty-first century. With the added capabilities, Strategic Air Command found its aerial refueling proficiencies tested in virtually all contingency operations and major worldwide exercises occurring during the decade. The American preemptive strike in Grenada, a series of crises in the Middle East, and the US air raid against terrorist targets in Libya during 1986, were supported by inflight tanker operations. As the decade drew to a close, Strategic Air Command maintained vigilance throughout the world, refueling routine flying, and exercising for the combat role it could be called upon to perform at any time.

1980

16 January — The 1980s began with welcome news for SAC's Stratotanker operations when Headquarters USAF authorized $15 million to re-engine one KC-135. On 22 January, the Assistant Secretary of the Air Force for Research, Development and Logistics selected the General Electric/Snecma International CFM-56 turbofan engine as the new power plant for the KC-135. The Air Force awarded a $13.65 million contract to Boeing for the integration of the new engines into existing Stratotanker systems, the strengthening of the landing gear, and the design of new nacelles and pylons.[221]

February — The Department of Defense Aerial Refueling Systems Advisory Group recommended that all large, general purpose tankers, including the KC-135, be equipped with both the flying boom and the probe and drogue refueling systems. Addition of the probe and drogue capability would allow the SAC tanker to fuel a greater number of Air Force, Navy, Marine Corps, and NATO aircraft.[222]

12-14 March — Two B-52H bombers, assigned to the 410th Bombardment Wing, made a nonstop around-the-world flight, assisted by Strategic Air Command refuelers. KC-135 tankers provided each B-52 with approximately six hundred thousand pounds of fuel during the forty-two and one-half hour flight.[223]

March — The first KC-135 refitted with the new Teledyne APN-218 Doppler navigation system and the Delco Carousel IV-E

inertial navigation system arrived at Grissom AFB, Indiana. Flight tests of both systems, which were shielded against electromagnetic pulses, showed them to be considerably more accurate and reliable than the original navigation equipment. By mid-October, 342 KC-135s possessed the new inertial navigation system; thirteen had both the inertial and the Doppler navigation systems.[224]

11 October — Employing two tankers and crews stationed at Riyadh Royal Saudi Air Base, Strategic Air Command began supporting E-3A flights in Saudi Arabia. By the end of the year, the KC-135s had flown 119 sorties for the airborne warning and control missions.[225]

20 October — The Boeing Military Airplane Company began a preliminary design review for the integration of the General Electric/Snecma International CFM-56 engines into the KC-135; Boeing issued a production readiness review for the installation in November. On 2 December, Secretary of Defense Harold Brown authorized the new engines for one hundred KC-135s. The fiscal 1982 budget included only $30 million for the CFM-56 engines, a far cry from the $250 million sought by Air Force. However, the incoming administration of President Ronald W. Reagan soon restored funding in its fiscal 1982 budget request. On 11 March 1982, Secretary of Defense Caspar E. Weinberger proposed $234.3 million for the KC-135 engine program through an Administration amendment to the Department of Defense budget submission. As Congress debated the proposal, Headquarters USAF completed its Program Objective Memorandum for fiscal 1983, which included $420 million for the new engines during fiscal 1984.[226]

31 December — Strategic Air Command was assigned 487 KC-135 tankers, distributed among thirty-three heavy air refueling squadrons. The 128 KC-135s assigned to the Air Force Reserve and Air National Guard were flown by crews of eleven refueling groups and five refueling wings. Since SAC became the single manager for tankers in 1961, demands for aerial refueling had skyrocketed and, by 1980, 43.8 percent of the command's sorties were to support non-SAC operations. To provide refueling for Air Force, Navy, and Marine Corps aircraft, the command maintained five tanker task forces.[227]

1981

26 January — For the third consecutive year, Strategic Air Command practiced its Emergency War Order procedures in a

command-wide, no-notice exercise. In response to a simulated escalation in cold war tensions, the command dispersed more than 120 bombers and tankers to thirty secure locations, a response designed to improve the fleet's ability to survive a surprise attack. Shortly before the simulated attack, about four hundred SAC bombers and KC-135s at approximately seventy locations in the continental United States conducted minimum interval launch operations, a test of procedures for ensuring that the entire command could become airborne within minutes.[228]

28 January — The 4200th Test and Evaluation Squadron finished almost four months of tests on a new fuel pump transfer system designed to overcome deficiencies inherent in an aerial refueling system originally manufactured in the 1950s to fuel strategic bombers. The primary problems encountered with the existing system were a low rate of fuel transfer and, for smaller tactical aircraft, problems with the pressure regulator. The J. C. Carter Company-developed fuel pump successfully tested with eleven different receiving aircraft was able to transfer 1,200 gallons per minute, while the new regulator controlled nozzle pressure at all rates of flow.[229]

17 March — The long-awaited KC-10, the advanced tanker-cargo aircraft proposed by Strategic Air Command in 1967, was delivered to the command. SAC accepted the first KC-10A Extender at Long Beach, California, thirty-nine months after the Air Force had selected the aircraft over Boeing's 747. The modified DC-10 had competed with the Boeing entry for more than one year and had been chosen because of lower unit cost, greater operational capability, and a longer life expectancy. The Air Force version of the McDonnell Douglas wide-body commercial aircraft was manufactured with military avionics, an aerial refueling boom, equipment for probe and drogue-type fueling, a refueling receptacle, and a station for the refueling operator. In addition, the KC-10 had six fuel tanks, with a total capacity of more than 356,000 pounds of fuel, and the ability to transfer 1,500 gallons per minute. The plane was substantially larger than the KC-135 and was capable of carrying almost twice as much fuel. Used as a tanker, it had an unrefueled range of more than 11,500 miles and was air refuelable. When performing its secondary mission, the KC-10 could transport up to seventy-five people and approximately 170,000 pounds of cargo over a non-refueled range of about 4,400 miles. On 1 November, SAC assigned the first six KC-10As to the 32nd Air Refueling Squadron at Barksdale AFB.[230]

June — Congress appropriated $37.3 million to replace the engines on eighteen KC-135s, three of which were assigned to SAC, with Pratt and Whitney JT-3D engines previously mounted on Boeing commercial airliners. On 28 September, Boeing was awarded a $70.2 million contract to accomplish the engine modification. Congress extended the engine-change program on 29 December when it appropriated $56 million to purchase twenty-eight Boeing 707s from American Airlines and $29 million to install the engines on sixteen USAF aircraft. The program was separate from the emerging General Electric CFM-56 engine replacement project.[231]

27 July — The Air Force Systems Acquisition Review Council recommended production of the CFM-56 engine for the KC-135. USAF had issued a directive for the prototype in February, and Boeing had conducted a critical design review in April.[232]

14 October — As part of SAC's participation in the Bright Star 82 exercise, command tankers provided three air refuelings to two flights of B-52Hs on the longest nonstop Stratofortress bombing mission in SAC history. The 15,000 mile flight from North Dakota to a simulated runway target in Egypt took thirty-one hours. The speed with which the inflight-refueled B-52s reached the distant target demonstrated the the rapid strike capabilities of the Strategic Projection Force.[233]

31 December — For the first time since December 1965, when the last two KC-97Gs left the command's active tanker fleet, SAC was equipped with two different refueler aircraft. The 487 KC-135s and six KC-10s were assigned to thirty-two heavy air refueling squadrons. The air reserve force tanker capabilities remained at eleven heavy air refueling groups and five heavy air refueling wings, with 128 KC-135s assigned. SAC, the Air Force Reserve, and the Air National Guard flew a combined 31,359 air refueling sorties during the year, with the reserve forces accounting for nineteen percent of the total.[234]

1982

26 January — Boeing delivered the first KC-135E, a Stratotanker refitted with Pratt and Whitney JT-3D engines, to USAF. What started in mid-1981 as a modest program to replace the existing engines on eighteen KC-135s with power plants from retired American Airlines commercial aircraft, grew to include the acquisition of Trans World Airlines' 707s and spare engines for refitting on eighty-eight Air National Guard tankers. The first

Guard KC-135E was delivered on 20 July 1982, with the final "E" model scheduled for completion in February 1983. However, in February 1983, USAF awarded Boeing a $95.3 million contract to replace the engines on an additional twenty-eight Air National Guard KC-135s. The final KC-135E under the contract was delivered on 17 November 1983.[235]

26 January — The first KC-135 to undergo refitting with the new CFM-56 engine entered Boeing's Wichita plant. On 26 February, Air Force signed a full production contract for the installation of the new engines. The first CFM-56-equipped Stratotanker, dubbed the "R" model, was completed on 22 June. During 1982, SAC placed sixteen KC-135s under contract to Boeing for installation of the modern engines. One of the largest aircraft modernization projects in Air Force history, the CFM-56 program enabled the older tankers to benefit from advanced engine technology and subsystem upgrading, improvements that resulted in a fifty percent increase in fuel transfer capability, a twenty-five percent reduction in fuel consumption, and a twenty percent shorter takeoff distance. While the operational capabilities of the aircraft were significantly enhanced, substantial reductions in noise, smoke, and gaseous emissions addressed environmental concerns. Flight testing of the KC-135R was conducted between August 1982 and April 1983, followed by two years of operational test and evaluation programs. By the end of 1985, SAC had secured funding for forty-three KC-135Rs above those already planned and was looking forward to a fleet of 439 modernized Stratotankers by the projected end of the program in 1994.[236]

10 June — An important accomplishment for women in the Air Force, the first aerial refueling flight by an all-female crew, occurred when the crew from SAC's 924th Air Refueling Squadron, commanded by the command's only female aircraft commander, Captain Kelly S. C. Hamilton, refueled a B-52 during a five-hour training mission.[237]

21 June — Strategic Air Command's tanker operations reached another milestone in the quest to be a truly worldwide force with an aerial refueling 750 miles north of the South Pole. While establishing the mark for the southernmost inflight fueling, the KC-10A transferred a record 67,400 pounds of aviation gasoline during the rendezvous in support of Military Airlift Command resupply operations in Antarctica.[238]

11 August — SAC's tanker fleet expanded with the delivery of three KC-10s to the 9th Air Refueling Squadron, March AFB, California. With the activation of the second squadron equipped with KC-10s, the aircraft were operational at Barksdale AFB, Louisiana, and March AFB. Reserve and active duty crews flew KC-10 missions from both locations.[239]

28 August — Two SAC KC-135s operating from Cairo West Air Base began a month-long aerial refueling training program for F-4 and F-16 pilots of the Egyptian Air Force. The training of foreign aircrews in aerial refueling techniques was infrequent, but not unprecedented. Strategic Air Command had provided limited training sorties to the British Air Force since the mid-1960s. Congressional easing of foreign agreement requirements in 1980 expanded opportunities for air refueling training with allied nations.[240]

1 October — KC-10As supported the longest non-stop F-15 deployment ever while, at the same time, demonstrating the Extender's versatility. One KC-10, carrying 50,000 pounds of cargo and fifty passengers, refueled six F-15s flying between Yokota Air Base, Japan, and Eglin AFB, Florida, while a second launched from Elmendorf AFB, Alaska, to refuel the tanker and fighters. The two KC-10s transferred almost 500,000 pounds of fuel before the deployment ended in Florida.[241]

31 December — Strategic Air Command had authorizations for 487 KC-135s and ten KC-10s in its active tanker fleet; air reserve forces had 128 KC-135s assigned. SAC's air inflight refueling resources were organized in thirty-four heavy air refueling squadrons, and eleven air refueling groups and five air refueling wings constituted the reserve force strength. Of the 36,522 SAC tanker sorties flown during 1982, KC-10As accounted for 993.[242]

1983

14-24 February — Operation Early Call, in Egypt, demonstrated the KC-10's dual importance as a tanker and a cargo carrier. Three KC-10s were stationed at Cairo West Airport to refuel E-3A aircraft being used to monitor Libyan air traffic and preparations for a possible attack on Khartoum by the regime of Muammar Qadhafi. During their ten-day deployment, the KC-10s flew twenty-one air refueling sorties, servicing both American and Egyptian aircraft. The KC-10s also carried cargo during deployment to the Middle East.[243]

March — Strategic Air Command base planners surveyed Seymour Johnson AFB, North Carolina, the announced location for the third KC-10 main operating base. The command also conducted a survey of Robins AFB, Georgia, the site of a possible fourth main operating base for the Extender. Air Force and SAC attempted to retain $17 million in fiscal 1985 military construction funds to support the Seymour Johnson main operating base program, but Pentagon and congressional restraints resulted in only $11 million being appropriated for the project.[244]

4-17 April — While also supporting operations in the United States, Europe, the Middle East, and Central America, Strategic Air Command flew aerial refueling sorties for Navy and Air Force tactical aircraft participating in Fleetex 83, the largest United States exercise in the North Pacific since World War II. SAC tankers were instrumental in the success of the exercise, which included three Navy carrier battle groups and more than three hundred aircraft in simulated operations to defend the Aleutian Islands. KC-135s and KC-10s flew aerial refueling missions during Fleetex, with KC-10 operations particularly noteworthy. On two occasions KC-10As provided sufficient fuel to Navy fighters to allow them to reach alternate airfields after their primary landing sites had been closed. In a third save, a KC-10 led a flight of A-6s and A-7s the 1,100 miles to Misawa Air Base, Japan, when fog made carrier landings impossible.[245]

3 August — SAC tankers provided extensive refueling support to fighters, E-3As, and command bombers during the fourth Red Flag exercise of calendar year 1983. Red Flag, a Tactical Air Command exercise held several times each year in Nevada and Utah, provided excellent training against aircraft employing Soviet tactics.[246]

1 September — Strategic Air Command KC-135s began aerial refueling missions in support of the American search and rescue effort following the Soviet downing of Korean Air Lines flight 007 near Sakhalin Island. The civilian airliner, with 269 persons aboard, had been shot down without warning, killing all crew members and passengers. Tankers from Kadena Air Base, Japan, flew 157 sorties during search for survivors and the aircraft's flight data recorder.[247]

5 September — Captain Robert J. Goodman and his Loring AFB-based KC-135 crew saved a USAF F-4E Phantom fighter over the North Atlantic while deploying to the European Tanker Task Force from its Maine home station. The F-4E, one

of a group being refueled by the Stratotanker, lost power in one engine and was diverted to Gander International Airport, Newfoundland. On the way to the Canadian airfield, the Phantom was forced to shut down one engine and reduce power in the other, resulting in a severe loss of altitude and speed, and necessitating the jettisoning of the centerline fuel tank. Through four inflight refueling hookups and towing, the KC-135 enabled the crippled fighter to reach Gander without mishap. For its heroic service, the tanker crew received the Air Force's Mackay Trophy, awarded annually for the most meritorious flight.[248]

22 October — KC-10s and KC-135s assigned to Strategic Air Command began aerial refueling operations in Urgent Fury, the US assault on the Caribbean nation of Grenada. The preemptive strike to preserve peace in the region and safeguard the lives of more than 1,100 American citizens on the tiny island, was ordered by President Reagan as a response to a communist-inspired seizure of power by radical elements of the government. SAC tankers, operating from several bases in the continental United States, supported virtually all operations, refueling numerous types of USAF aircraft before Urgent Fury aerial refueling activities effectively concluded in November.[249]

31 December — Strategic Air Command's tanker fleet continued to expand during 1983 with the addition of nine KC-10 advanced tanker-cargo aircraft. The number of KC-135s in the active inventory remained at the December 1982 total of 487. The reserve fleet of 128 Stratotankers was also unchanged from a year earlier. The number of air refueling units and their distribution among Strategic Air Command, the Air Force Reserve, and the Air National Guard were the same as at the close of 1982.[250]

1984

April-May — Strategic Air Command tankers provided extensive air refueling support during Ocean Venture 84, a Caribbean-area exercise. KC-135s flying from Robins AFB, Georgia, refueled more than three hundred receivers, while two Barksdale AFB-based KC-10s, operating from Roosevelt Roads Naval Air Station, Puerto Rico, refueled 227. Most of the aircraft supported were US and Puerto Rican Air National Guard fighters. In conjunction with Ocean Venture, one KC-10 escorted six F-16s from Hill AFB, Utah, to Puerto Rico.[251]

20 June — After completion of a two-year operational test and evaluation program, Boeing transferred the first KC-135R to SAC's 384th Air Refueling Wing. On 2 July, General Bennie L. Davis, Commander in Chief, Strategic Air Command, formally accepted the refitted Stratotanker. Additional testing and evaluation, including appraisals of the Quick Start auxiliary power unit and performance in cold weather, and the training of aircrews and maintenance specialists, followed delivery of the aircraft.[252]

31 December — Strategic Air Command finished 1984 with 487 KC-135s and twenty-seven KC-10As; the air reserve fleet remained unchanged from December 1982 with 128 Stratotankers assigned. The Air Force Reserve and Air National Guard refueling services were provided by eleven refueling groups and five wings. SAC had thirty-five heavy air refueling squadrons, two of which operated KC-10s.[253]

1985

13 May — The Air Force Flight Test Center completed its evaluation of the KC-135R under minimum interval takeoff conditions, concluding that in several respects the aircraft showed considerable improvement over the KC-135A. During almost four months of testing, the "R" model demonstrated seventy percent greater thrust and an eight percent increase in the allowable gross takeoff weight, leading to the conclusion that refitted KC-135s with properly qualified crews could safely take off at twelve-second intervals.[254]

May — Strategic Air Command created a foreign military sales focal point within the headquarters to manage and account for tanker operations with foreign governments. SAC's increased participation in conventional operations around the world was paralleled by a steady growth in requests for refuelings from other nations. By May 1985, the command was aerial refueling aircraft from thirteen countries. Under SAC's new concept, its focal point would provide tanker availability and pricing information during rendezvous planning phases, monitor the refueling operations, compile reports verifying services rendered, and initiate billing.[255]

27 August — A KC-135 crashed while practicing touch-and-go landings at Beale AFB, California, killing seven crew members from the 93rd Bombardment Wing, Castle AFB, California.[256]

6 December — Strategic Air Command completed equipping its first fully operational KC-10 squadron, with nineteen primary authorized aircraft, at Barksdale AFB, Louisiana. By the end of the year, March AFB had received sixteen wide-body tankers. The third KC-10 main operating base, Seymour Johnson, in North Carolina, had received its first Extender on 11 October.[257]

31 December — By the end of the year, fifty-eight KC-135Rs had been outfitted with the Fuel Savings Advisory/Cockpit Avionics System, a computerized program which used engine performance and the flight environment to determine and automatically set the proper fuel mixture for maximum efficiency and economy. During 1985, SAC secured funding for an additional forty-three KC-135Rs, bringing the total funded to 102. The command envisioned that by the end of "R" model procurement in 1994, 439 aircraft would have completed the modernization program, giving SAC a KC-135 fleet with a service life to beyond the year 2020. At the close of 1985, two air refueling squadrons, the 91st and the 384th, both at McConnell AFB, Kansas, were the only Strategic Air Command units to be fully equipped with KC-135Rs.[258]

31 December — Strategic Air Command's inflight refueling resources consisted of thirty-six heavy air refueling squadrons, 499 KC-135s, and thirty-nine KC-10s. The Air Force Reserve and the Air National Guard had, between them, 128 KC-135s. During 1985, SAC flew 31,081 refueling sorties; fifty-four percent of the inflight refuelings were to non-SAC aircraft.[259]

1986

4 March — USAF approved Strategic Air Command's concept of operations for refueling support to foreign aircraft participating in joint exercises. In Bright Star exercises, SAC tankers refueled Egyptian aircraft under a joint exercise umbrella, which required that receiver pilots be qualified in Air Force refueling practices and that Egypt pay for the fuel transferred. The concept of operations was designed to establish a global policy for exercises, since the growing commonality among air forces resulting from foreign purchases of US inflight-refuelable aircraft made crisis and contingency refueling a probability.[260]

14-15 April — Strategic Air Command tankers played a vital role in the US air raid against suspected terrorist strongholds in Tripoli and Benghazi, Libya, a retaliatory response

to the bombing of a discotheque in West Berlin and other terrorist activities supported by Libyan leader Muammar Qadhafi. At 1713 Zulu (Greenwich Mean Time) on 14 April, twenty-eight KC-10s and KC-135s departed the Royal Air Force bases at Fairford and Mildenhall, England, followed shortly by twenty-four F-111s from the British base at Lakenheath. The tankers that proceeded on the long journey to Libya refueled the F-111 strike force four times, maintaining radio silence for the entire mission. On the return leg immediately following the joint Air Force-Navy raid, the tankers refueled each F-111 twice before the fighter-bombers landed in the United Kingdom at 0810 Zulu on 15 April.[261]

4 December — Strategic Air Command established guidelines for a major KC-135 refurbishment program, which became known as Glossy Eagle, the first large-scale renovation since the tanker entered service in January 1957. After thirty years of flying, the tankers showed age and wear, particularly in interior compartments. SAC directed each KC-135 unit to establish its own schedule for cleaning and repainting the aircraft, with the command providing advice, standardization of color schemes, and supply assistance. The relatively new KC-10 had already begun a repainting program in 1984, to provide it with a camouflaged exterior to help minimize detection during combat conditions. By the end of 1986, twenty-five Extenders had been repainted.[262]

31 December — The 472 KC-135s and forty-nine KC-10s authorized to SAC's thirty-five air refueling squadrons flew a total of 33,052 air refueling events during 1986.[263]

1987

13 March — A KC-135 assigned to the 92nd Bombardment Wing, Fairchild AFB, Washington, crashed while preparing to conduct an aerial refueling above its home station's runway. Six crew members and one motorist were killed in the accident.[264]

20 May — In the wake of the success of the KC-10 repainting program, SAC gained Air Force approval to camouflage the entire active duty and reserve KC-135 fleet. The paint scheme, to be applied to the aircraft during scheduled periodic depot maintenance, was designed to enhance survivability on the ground, while conducting low-altitude aerial refuelings, and during tactical withdrawal. Four Stratotankers received new exterior paint during 1987.[265]

June — Strategic Air Command and Military Airlift Command signed an extension of the memorandum of understanding for KC-10 operations, an agreement by which SAC would maintain operational command and control of the Extender in both its refueling and airlift roles. The document updated terms agreed upon during long-term negotiations.[266]

22 July — SAC tankers began support for Operation Earnest Will, the US Navy escort of reflagged Kuwaiti oil tankers through the Persian Gulf. From 22 July through the end of the year, Strategic Air Command supported twenty-two gulf transits by refueling the Navy fighters protecting the convoys.[267]

1 October — A KC-10 active duty-reserve associate maintenance program was implemented. The maintenance program authorized the addition of air reserve technician positions in the maintenance complexes at the three KC-10 main operating bases, providing training to Air Force Reserve personnel who would be called to active duty with their associated SAC units in the event of mobilization.[268]

16 November — The 305th Air Refueling Wing, from Grissom AFB, Indiana, deployed to Beale AFB, California, for the first Busy Tiger movement since inception of the program in July. SAC's goal in creating Busy Tiger was the development of unit integrity and skills through the planning of short-notice deployments and the conducting of operations away from home station. The concept of unit deployments for aerial refueling operations was new to SAC; historically, tanker activities had been tied to specific bomber or fighter requirements. Tanker support for combat operations normally meant singling out specific refuelers, frequently from several units, to handle a particular assignment. Busy Tiger directed that a numbered air force assign a specific unit to deploy from five to eight tankers, along with sufficient personnel and equipment to sustain operations for up to a week. In Busy Tiger's initial test, the Grissom unit deployed twelve KC-135 crews and 108 support personnel, enough to service and fly forty-eight sorties and transfer 2.513 million pounds of fuel.[269]

31 December — During 1987, the SAC KC-135 force remained relatively stable and the command increased its KC-10 fleet to fifty-seven possessed aircraft, only three short of the number authorized for acquisition under the Extender program. By the end of the year, Strategic

Air Command tankers had completed a total of 32,774 air refueling events. KC-135s accounted for 29,349 refueling events, while the KC-10s assigned to March, Seymour Johnson, and Barksdale AFBs performed 3,425. Command tankers flew 104,300 air refueling hours during 1987.[270]

1988

17 March — In a two-day period during a Secretary of Defense-approved, Joint Chiefs of Staff-directed short-notice deployment of US forces to Honduras, twenty-three SAC tankers refueled thirty-one Military Airlift Command planes, transferring a total of 1.49 million pounds of fuel.[271]

18-19 April — Strategic Air Command tankers provided extensive air refueling support to US Navy aircraft pounding Iranian offshore oil platforms and warships in the Persian Gulf. The two-day American campaign was a measured military response by the Reagan Administration to Iran's provocative mining of international waters, which had injured ten sailors when a US Navy frigate hit an underwater mine on 14 April.[272]

29 July — Mighty Warrior 88, the largest conventional exercise in Strategic Air Command history, included aerial refueling missions by all Eighth Air Force tanker units. The KC-10s and KC-135s, flying from fourteen locations during the two-week exercise, refueled bombers in support of simultaneous European and Southwest Asian contingency operations, the type of two-theater situation which Eighth Air Force might face in a global conventional war.[273]

1 August — Headquarters SAC initiated a KC-135 low altitude refueling training program, with missions flown down to 3,000 feet above ground level. The normal altitudes for aerial refueling was above 10,000 feet. The command ultimately sought to conduct refuelings at 1,000 feet above ground level, a program furthered on 1 November by USAF's decision to have Systems Command's flight evaluation of the KC-135R include such a demonstration. The final phase of SAC's initiative envisioned including the KC-10 in the low altitude refueling program.[274]

31 December — Ground and airworthiness evaluations of a KC-10 wing pod-test aircraft were completed at the Air Force Flight Test Center. An Air Force decision to equip only twenty Extenders with wing-mounted drogue refuel-

ing pods cut in half the number of KC-10s originally slated to possess both flying boom and probe and drogue refueling capabilities. Completion of the modification on all twenty aircraft was expected in late 1991.[275]

31 December — By the close of the year, Strategic Air Command tankers had conducted 32,427 aerial refueling events and had flown 97,233 air refueling hours. Slightly more than 4,000 events had been flown by KC-10s; KC-135s performed 28,368 air refueling events. To supplement SAC's active tanker force, thirteen Air National Guard and three USAF Reserve units operated KC-135s, while Air Force Reserve associate units at March, Barksdale, and Seymour Johnson AFBs flew and maintained KC-10As.[276]

AIR REFUELING CHRONOLOGY

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244. Ibid. (TS/RD), p 43, information used is Unclassified.

245. Ibid. (TS/RD), pp 339-340, information used is Unclassified.

246. Ibid. (TS/RD), p 214, information used is Unclassified.

247. Ibid. (TS/RD), pp 320-321, information used is Unclassified.

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250. Ibid., p 255; History (TS/RD), Strategic Air Command, January-December 1983, Vol I, pp 43-44, information used is Unclassified.

251. History (TS/RD), Strategic Air Command, January-December 1984, Vol I, p 309, information used is Unclassified.

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AWARDS TO AIR REFUELING UNITS
1959-1988

BEST AIR REFUELING SQUADRON
SAUNDERS TROPHY

1959	55th Air Refueling Squadron (SAC), Forbes AFB, Kansas
1960	310th Air Refueling Squadron (SAC), Schilling AFB, Kansas
1961	915th Air Refueling Squadron (SAC), Ramey AFB, Puerto Rico
1962	46th Air Refueling Squadron (SAC), K. I. Sawyer AFB, Michigan
1963	46th Air Refueling Squadron (SAC), K. I. Sawyer AFB, Michigan
1964	42nd Air Refueling Squadron (SAC), Loring AFB, Maine
1965	922nd Air Refueling Squadron (SAC), Wright-Patterson AFB, Ohio
1966	906th Air Refueling Squadron (SAC), Minot AFB, North Dakota
1967	Not Awarded
1968	Not Awarded
1969	919th Air Refueling Squadron (SAC), McCoy AFB, Florida
1970	11th Air Refueling Squadron (SAC), Altus AFB, Oklahoma
1971	11th Air Refueling Squadron (SAC), Altus AFB, Oklahoma
1972	Not Awarded
1973	Not Awarded
1974	911th Air Refueling Squadron (SAC), Seymour Johnson AFB, North Carolina
1975	Not Awarded
1976	92nd Bombardment Wing (SAC), Fairchild AFB, Washington
1977	384th Air Refueling Wing (SAC), McConnell AFB, Kansas
1978	28th Air Refueling Squadron (SAC), Ellsworth AFB, South Dakota
1979	380th Bombardment Wing (SAC), Plattsburgh AFB, New York
1980	384th Air Refueling Wing (SAC), McConnell AFB, Kansas
1981	379th Bombardment Wing (SAC), Wurtsmith AFB, Michigan
1982	509th Bombardment Wing (SAC), Pease AFB, New Hampshire
1983	190th Air Refueling Group (ANG), Forbes Field, Kansas
1984	380th Bombardment Wing (SAC), Plattsburgh AFB, New York
1985	452nd Air Refueling Wing (AFRES), March AFB, California
1986	92nd Bombardment Wing (SAC), Fairchild AFB, Washington
1987	940th Air Refueling Group (AFRES), Mather AFB, California
1988	42nd Bombardment Wing (SAC), Loring AFB, Maine

The Saunders Trophy, donated by Headquarters Air Force and first awarded in 1960, was established in honor of Brigadier General Donald W. Saunders, former commander of the 57th Air Division. General Saunders was killed in a KC-135 crash at Westover AFB, Massachusetts, in 1958. Except for 1962 through 1966, and in 1969, the Saunders Trophy was awarded to the aerial refueling unit exhibiting the best overall performance during Strategic Air Command's annual bombing and navigation competition. For 1962, 1963, 1964, 1965, 1966, and 1969, the award was based upon overall operational performance during the year. The Saunders Trophy replaced the award for the best air refueling unit in the SAC bombing and navigation competition, which was presented only in 1959, the first year tankers competed in the event.

GENERAL CARL "TOOEY" SPAATZ TROPHY

1975	11th Air Refueling Squadron (SAC), Altus AFB, Oklahoma (July 1974-June 1975)
1975	22nd Air Refueling Squadron (SAC), March AFB, California (July-December 1975)
1976	41st Air Refueling Squadron (SAC), Griffiss AFB, New York
1977	306th Strategic Wing (SAC), Ramstein AB, Germany
1978	912th Air Refueling Squadron (SAC), Robins AFB, Georgia
1979	307th Air Refueling Group (SAC), Travis AFB, California
1980	452nd Air Refueling Group (AFRES), March AFB, California
1981	305th Air Refueling Squadron (SAC), Grissom AFB, Indiana
1982	46th Air Refueling Squadron (SAC), K. I. Sawyer AFB, Michigan
1983	42nd Bombardment Wing (SAC), Loring AFB, Maine
1984	906th Air Refueling Squadron (SAC), Minot AFB, North Dakota
1985	906th Air Refueling Squadron (SAC), Minot AFB, North Dakota
1986	43rd Air Refueling Squadron (SAC), Fairchild AFB, Washington
1987	32nd Air Refueling Squadron (SAC), Barksdale AFB, Louisiana
1988	909th Air Refueling Squadron (SAC), Kadena AB, Japan

The Spaatz Trophy, established in 1975 to honor the memory of General Carl A. Spaatz, the first United States Air Force Chief of Staff and a pioneer in the field of inflight refueling, was awarded by Strategic Air Command to the best air refueling unit. The trophy, donated by Tactical Air Command in appreciation for SAC's aerial refueling support of its fighter fleet, was awarded on a calender year basis in 1976 and 1977; from 1977 through 1988, the award was determined by overall performance during the previous fiscal year.

JAMES S. McDONNELL and DONALD W. DOUGLAS, SR., KC-10 TROPHY
RICHARD H. ELLIS KC-10 TROPHY

1982	2nd Bombardment Wing (SAC), Barksdale AFB, Louisiana
1983	Fifteenth Air Force (SAC), March AFB, California
1984	Eighth Air Force (SAC), Barksdale AFB, Louisiana
1985	Eighth Air Force (SAC), Barksdale AFB, Louisiana
1986	2nd Bombardment Wing (SAC), Barksdale AFB, Louisiana
1987	2nd Bombardment Wing (SAC), Barksdale AFB, Louisiana
1988	22nd Air Refueling Wing (SAC), March AFB, California

The McDonnell-Douglas KC-10 Trophy, presented by the manufacturer of the KC-10 aircraft, was first awarded at the 1982 Strategic Air Command bombing and navigation competition. The trophy was initially awarded to the best KC-10 unit in the competition, but from 1983 through 1985 was presented to the numbered air force with the best Extender team. In 1986 the award was renamed in honor of General Richard H. Ellis, Commander in Chief, Strategic Air Command, from August 1977 through July 1981. The Ellis Trophy was awarded to the best KC-10 unit.

STRATEGIC AIR COMMAND BOMBING AND NAVIGATION COMPETITION AWARDS

NAVIGATION TROPHY
BRUCE K. HOLLOWAY TROPHY

1977	380th Bombardment Wing (SAC), Plattsburgh AFB, New York
1978	924th Air Refueling Squadron (SAC), Castle AFB, California
1979	157th Air Refueling Group (ANG), Pease AFB, New Hampshire
1980	305th Air Refueling Wing (SAC), Grissom AFB, Indiana
1981	92nd Bombardment Wing (SAC), Grissom AFB, Indiana
1982	509th Bombardment Wing (SAC), Pease AFB, New Hampshire
1983	452nd Air Refueling Wing (AFRES), March AFB, California
1984	9th Strategic Reconnaissance Wing (SAC), Beale AFB, California
1985	452nd Air Refueling Wing (AFRES), March AFB, California
1986	7th Bombardment Wing (SAC), Carswell AFB, Texas
1987	White Team from 151st Air Refueling Group (ANG), Salt Lake City, Utah, and 161st Air Refueling Group (ANG), Phoenix, Arizona
1988	42nd Bombardment Wing (SAC), Loring AFB, Maine

Although SAC had presented the Navigation Trophy since 1951, it was not until 1977 that it became an award for the tanker unit with the highest score in navigation. In 1986 the award was renamed in honor of General Bruce K. Holloway, former Commander in Chief of Strategic Air Command and Vice Chief of Staff of the Air Force.

BEST BOMBER-TANKER TEAM

1959	100th Bombardment Wing/100th Air Refueling Squadron (SAC), KC-97G crew T-14, Pease AFB, New Hampshire

BEST TANKER CREW--NAVIGATION AND AIR REFUELING

1959	55th Air Refueling Squadron (SAC), KC-97G crew J-11, Forbes AFB, Kansas
1960	310th Air Refueling Squadron (SAC), KC-97G crew J-96, Schilling AFB, Kansas
1961	911th Air Refueling Squadron (SAC), KC-135A crew J-20, Seymour Johnson AFB, North Carolina

BEST TANKER CREW--NAVIGATION

1959	55th Air Refueling Squadron (SAC), KC-97G crew J-11, Forbes AFB, Kansas
1960	310th Air Refueling Squadron (SAC), KC-97G crew J-96, Schilling AFB, Kansas
1961	310th Air Refueling Squadron (SAC), KC-97G crew J-93, Schilling AFB, Kansas

BEST KC-97 UNIT

1959 55th Air Refueling Squadron (SAC), Forbes AFB, Kansas
1960 310th Air Refueling Squadron (SAC), Schilling AFB, Kansas
1961 340th Air Refueling Squadron (SAC), Whiteman AFB, Missouri

BEST KC-135 UNIT

1959 917th Air Refueling Squadron (SAC), Biggs AFB, Texas
1960 96th Air Refueling Squadron (SAC), Altus AFB, Oklahoma
1961 915th Air Refueling Squadron (SAC), Ramey AFB, Puerto Rico

BEST KC-135 CREW

1976 92nd Bombardment Wing (SAC), crew R-162, Fairchild AFB, Washington
1977 384th Air Refueling Wing (SAC), crew E-108, McConnell AFB, Kansas
1978 924th Air Refueling Squadron (SAC), crew R-113, Castle AFB, California
1979 380th Bombardment Wing (SAC), crew S-152, Plattsburgh AFB, New York
1980 384th Air Refueling Wing (SAC), crew E-108, McConnell AFB, Kansas
1981 320th Bombardment Wing (SAC), crew S-101, Mather AFB, California
1982 509th Bombardment Wing (SAC), crew S-121, Pease AFB, New Hampshire
1983 9th Strategic Reconnaissance Wing (SAC), crew E-125, Beale AFB, California
1984 5th Bombardment Wing (SAC), crew E-118, Minot AFB, North Dakota
1985 92nd Bombardment Wing (SAC), crew S-102, Fairchild AFB, Washington
1986 92nd Bombardment Wing (SAC), crew S-152, Fairchild AFB, Washington
1987 452nd Air Refueling Wing (AFRES), crew R-015, March AFB, California
1988 93rd Bombardment Wing (SAC), crew IT-015, Castle AFB, California

BEST KC-135 CREW--SINGLE MISSION

1974 911th Air Refueling Squadron (SAC), crew E-113, Seymour Johnson AFB, North Carolina

BEST KC-10 CREW

1982	32nd Air Refueling Squadron (SAC), crew E-232, Barksdale AFB, Louisiana
1983	79th Air Refueling Squadron (AFRES), crew E-201, March AFB, California
1984	32nd Air Refueling Squadron (SAC), crew E-232, Barksdale AFB, Louisiana
1985	2nd Bombardment Wing (SAC), crew E-232, Barksdale AFB, Louisiana
1986	2nd Bombardment Wing (SAC), crew E-278, Barksdale AFB, Louisiana
1987	2nd Bombardment Wing (SAC), crew R-016, Barksdale AFB, Louisiana
1988	452nd Air Refueling Wing (AFRES), crew E-792, March AFB, California

Note: Strategic Air Command's bombing and navigation competition, begun in 1948 and expanded in following years, was not held in 1962, 1963, 1964, 1967, 1968, 1972, 1973, and 1975. A military exercise, Operation High Noon replaced the 1975 competition; the other cancelations were the result of operational commitments. In 1986 the official name of the competition, Giant Voice, was changed to Proud Shield. For additional information on the competition, see, Andrew J. Birtle and Robert D. Brunkow, Proud Shield: SAC Bombing and Navigation Competition, 1948-1986, SAC Historical Study No. 213, Offutt AFB, NE: Strategic Air Command Office of the Historian, 1 February 1987.

MACKAY TROPHY

While not an air refueling award, the Mackay Trophy, presented annually by the Chief of Staff, USAF, for the most meritorious United States Air Force flight, has been won by tanker personnel on three occasions. In addition, air refueling made possible nine other Mackay Trophy-winning flights.

AWARDED TO AIR REFUELERS

1967	Awarded to Major John H. Casteel and the crew of a KC-135 assigned to the 902nd Air Refueling Squadron, Clinton-Sherman AFB, Oklahoma, for saving six fuel-starved, carrier-based United States Navy aircraft over the Gulf of Tonkin, North Vietnam, on 31 May.
1983	Awarded to Captain Robert J. Goodman and the crew of a KC-135 assigned to the 42nd Bombardment Wing, Loring AFB, Maine, for the save of a USAF F-4. After the fighter lost engine power over the North Atlantic and its pilot was forced to jettison the centerline fuel tank, the KC-135 towed, escorted, and

provided four inflight refuelings, enabling the F-4 to land safely at Gander International Airport, Newfoundland, Canada.

1985 Awarded to Lieutenant Colonel David E. Faught, 97th Bombardment Wing, Blytheville AFB, Arkansas, for saving the lives of his fellow KC-135 crew members and preventing the loss of his aircraft. After a six-hour training mission, the nose gear on the Stratotanker failed to extend, preventing a landing at the home station. While the weather deteriorated and the fuel supply diminished, Faught tried unsuccessfully to extend the nose gear. After thirteen hours in the air and numerous refuelings from an EC-135 and a KC-10, Faught brought the KC-135 in to Blytheville with a successful nose up landing.

AIR REFUELING-AIDED MACKAY TROPHY FLIGHTS

1949 Four inflight refuelings by KB-29 tankers assigned to the 43rd Air Refueling Squadron assisted Captain James Gallagher and the crew of the Lucky Lady II, a B-50 belonging to the 43rd Bombardment Group, in accomplishing the first nonstop around-the-world flight, completed on 2 March.

1952 The first nonstop transpacific flight, from Elmendorf AFB, Alaska, to Yokota AB, Japan, on 29 July, was made possible by two KB-29 air refuelings. The two-man crew of the RB-45C, commanded by Major Louis H. Carrington and assigned to the 91st Strategic Reconnaissance Wing, received the Mackay Trophy.

1953 Operation Longstride, the first nonstop mass transatlantic deployment of fighter aircraft, garnered the Mackay Trophy for Strategic Air Command's 40th Air Division. The August movement of F-84s from the 31st and 508th Strategic Fighter Wings, Turner AFB, Georgia, was divideded into two flights. The first, taking the southern route, received three refuelings from KC-97s of the 305th Air Refueling Squadron, at Kindley AFB, Burmuda, and the 26th Air Refueling Squadron, operating from Lajes AFB, Ajores. The second flight, traveling over the North Atlantic to England, was refueled by KB-29s from the 100th Air Refueling Squadron and KC-97s from the 26th and 306th Air Refueling Squadrons.

1954 The 308th Bombardment Wing was awarded the Mackay Trophy for a nonstop Hunter AFB, Georgia,-to-French Morocco, and return, flight by two B-47s on 6 and 7 August. KC-97s refueled each B-47 four times.

1957 The 16-18 January around-the-world flight of three 93rd Bombardment Wing B-52s, dubbed Power Elite, required five air refuelings.

MACKAY TROPHY

1962 Three KC-135 refuelings enabled the crew of a B-58, assigned to the 43rd Bombardment Wing, to set three speed records during a New York-Los Angeles-New York flight on 5 March.

1971 A record-breaking 15,000 mile flight by an SR-71 assigned to the 9th Strategic Reconnaissance Wing, Beale AFB, California, was made possible by several KC-135 inflight refuelings. The Mackay Trophy was awarded to the SR-71's two-man crew for the 26 April flight.

1980 Another around-the-world flight, this time by two B-52Hs assigned to the 410th Bombardment Wing, K. I. Sawyer AFB, Michigan, resulted in the Mackay Trophy for the two seven-man bomber crews. During the 12-14 March flight, each B-52 received almost 600,000 pounds of fuel from KC-135s during rendezvouses over eastern Canada, the North Atlantic, the Mediterranean Sea, the Indian Ocean, and the Western Pacific.

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