USAF photo by Lt. Col. Redmond Raux.

The 90-Year Tanker Saga

Start with a World War I Russian pilot and go from there to US power projection.

By Phillip S. Meilinger

A KC-10 tanker prepares to refuel an approaching B-52.

The United States Air Force operates 650 tanker aircraft—the largest aerial refueler fleet on Earth. The rest of the world has perhaps as many as 250 tankers, and, of these, 80 belong to the US Marine Corps.

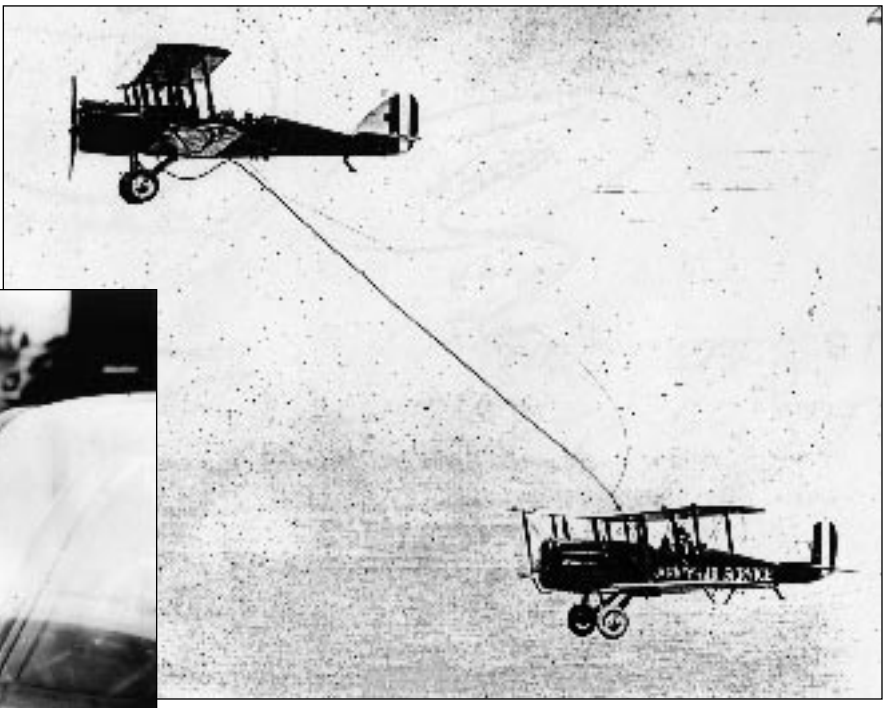
In short, the Air Force possesses a near monopoly on large-scale aerial refueling capability.

It is a unique asymmetric advantage, but it wasn't easy to attain. Aerial refueling has had a long, difficult, and convoluted history. Air Force leaders have recently placed acquisition of a new fleet of tankers atop USAF's priority list—recognition, if one were needed, of the tanker's enormous value.

Where did this capability come from? Where is it going?

Start with Alexander P. de Seversky of Imperial Russia. In World War I, Seversky became an ace fighter pilot in the Russian Navy, flying many missions. One of those missions had momentous repercussions. In it, Seversky recalled, he was escorting a Russian bomber, flying behind and below the bigger aircraft, when out of boredom or playfulness he reached out of his open cockpit and grabbed the bomber's long trailing radio antenna. (See "Sasha the Salesman," August 2003, p. 74.)

From this event sprang a simple idea: What if the wire actually were a



While in the World War I Russian Navy, Alexander de Seversky (below) came up with the idea of passing fuel from one aircraft to another. Right: Flying at the end of a long hose, a DH-4 biplane carrying Lt. Lowell Smith and Lt. John Richter, takes on fuel in a 1923 test.

hose that could pass gasoline from one airplane to another, thus extending its range? Escort fighters could then accompany the bombers to their targets and back.

The October 1917 revolution drove Seversky from his native land and he immigrated to the United States, becoming an American citizen and an aeronautical engineer. However, he never forgot about the air tanker idea. Seversky's first US patent covered the concept of an air refueling device that he sold to the Army Air Service.

In June 1923, a DH-4 biplane used Seversky's invention to refuel another DH-4 in flight. A few months later, the same airplane made a longer flight—from Suma, Wash., to San Diego—using four inflight refuelings. The gas-ups quadrupled the range of the receiving aircraft.

The pilots of the receiving aircraft were Lt. Lowell H. Smith and Lt. John P. Richter. In an indication of the marginal importance assigned at that time to the refueling community, most accounts do not even list the names of the pilots supplying the gas. Such disregard would become standard fare for tanker crews.

Question Mark

In January 1929, air refueling took another major step forward. The Air Corps' C-2A *Question Mark* on New Year's Day took off from Los Angeles with the crew aiming to find out how long it could keep the aircraft aloft. Two Douglas C-1 transports were equipped with hoses that would allow them to transfer gas down to *Question Mark.* (See "Question Mark," March 2003, p. 66.)

The Fokker C-2A flew over the Rose Bowl football game (final score, Georgia Tech 8, California 7). The mission went on for another six days. The C-1s passed 5,660 gallons of gas to *Question Mark,* as well as food, parts, oil, tools, and mail.

Of *Question Mark's* five-man crew, two would later become four-star generals: Carl A. Spaatz and Ira C. Eaker. The other three crew members were 2nd Lt. Elwood R. Quesada (later a lieutenant general), 1st Lt. Harry Halverson, and Sgt. Roy Hooe. The five crewmen received Distinguished Flying Crosses; the crews of the two tankers were ignored.

Although the flight of *Question Mark* seemed to herald an aeronautical revolution, the day of the air refueler had not yet come. The military could see no practical application for the capability.

Then came World War II, which

Lt. Frank Seifert (l) and Lt. Virgil Hines on June 28, 1923 flew the refueling DH-4 biplane in the world's first air refueling. The nozzle shown here was mated to the receiving aircraft below.

demonstrated the need for extended range. Although B-17 and B-24 bombers could reach Berlin from forward bases in England and Italy, the ranges in the Pacific Theater were more extreme. Even the Mariana Islands were not close enough to allow those bombers to strike the Japanese home islands.

Only B-29s, not available until mid-1944, had the range to hit Japan, and tankers would have been very useful.

More important, aerial refueling would have extended the range of escort fighters accompanying the heavy bombers—the use that Seversky had contemplated in 1917. The lack of escort fighters early in the war led to Allied catastrophes at places such as Schweinfurt, when the bombers went in alone against heavy German defenses and suffered horrendous losses. (See "Against Regensburg and Schweinfurt," September 1993, p. 48.)

Yet American factories were straining to produce enough aircraft to supply a global war. The idea of diverting production capacity for construction of tankers was unthinkable.

So air refueling lay dormant through yet another world war. It was not until the coming of the Cold War that the advantages offered by air refueling were re-examined.

In this face-off, NATO nations confronted the Soviet-led Warsaw Pact in Central Europe, where the East had a ground-force superiority of three to one. NATO couldn't match these numbers with conventional forces. Instead, "massive retaliation" against the Soviet heartland—based on America's nuclear bomber force—was to serve as a deterrent against a Soviet invasion.

Moscow was, to put it mildly, a long way from the United States. Air refueling would have to provide greater range to USAF B-29s and the bombers that succeeded them.

Grab and Drag

USAF looked first at the old "grab and drag" method which had been employed in the 1920s. Tanker aircraft trailed a hose to be grappled by the receiver. The receiver would then winch in the hose, plug it into the aircraft's fuel system, and begin pumping gas. This was a cumbersome and somewhat hazardous system, but it worked—at least for large aircraft.

In February 1949, the Air Force flew a B-50 bomber, *Lucky Lady II,* on a nonstop flight around the world. Stationed along the route were several KB-29 tankers, equipped with the looped-hose system. Ninety-four hours and one minute after takeoff, *Lucky Lady II* landed in Texas, completing history's first around-the-world nonstop flight. (See "Lucky Lady II," March 1999, p.72.)

A KB-29 tanker, a converted B-29 Superfortress bomber, prepares to pass fuel to a trailing F-84 fighter. The year was 1950.

It was a momentous event, designed to show Moscow that all targets were now within range of Strategic Air Command bombers.

The crew of *Lucky Lady II* was hailed, feted, and honored with Distinguished Flying Crosses. Like the tanker pilots who had made the 1929 *Question Mark* flight a reality, the tanker crews who enabled the 1949 circumnavigation were ignored.

Over the next several years, the number of B-29s, B-50s, and C-97s modified to use the looped-hose system multiplied. Soon, however, Air Force officials realized that this system had serious limitations—it could not be used at speeds surpassing 218 mph, nor by fighter aircraft.

The Air Force asked for new ideas. One of these was the probe-and-drogue system. In this setup, a hose reeled out from the tanker. Attached at the end of it was a basket that looked like a huge shuttlecock. The receiver aircraft was equipped with a jutting probe that plugged into the basket as the two airplanes closed toward each other.

This system worked well for smaller aircraft, but large aircraft were difficult to maneuver to plug into a basket.

Moreover, the probe-and-drogue could transfer only a small amount of fuel—about 250 gallons per minute. At that rate, it would take more than an hour to fill a B-52 bomber.

These kinds of limitations led to a new system—a flying boom—which was perfected by 1950. This was, in effect, a retractable pipeline. Once deployed from the tanker aircraft, it could extend, telescope-like, to twice its usual length. A boom operator, sitting in the old tail gunner's position aboard the tanker, could actually "fly" the boom because it was equipped with small wings. The receiver maneuvered behind the tanker and flew formation; the boomer would then fly his boom into the receiver aircraft's receptacle. The boom transferred fuel at 700 gallons per minute—nearly triple that of the probe and drogue.

The Jet Tanker

With the move toward an all-jet bomber force, even boom-equipped KB-50s and KC-97s were inadequate. Piston-driven tankers couldn't keep up with jet bombers, nor could they match their altitude while loaded with fuel.

The Air Force needed a jet-powered tanker, and the solution was the KC-135, which made its first flight in 1956.

The KC-135 provided a huge leap in capability over the KB-50. It had space for cargo and passengers and could offload nearly six times as much fuel as the KB-50, at the same speed and altitude as the receiving bomber.

SAC embraced the KC-135. The

command purchased 732 KC-135 Stratotankers, to go with its 744 B-52 bombers.

The SAC concept of operations was straightforward: Bomber and tanker aircraft sat alert together, launched together, and flew together. As the bombers approached enemy airspace, the tankers would break off and return home.

For the next 30 years, this was the SAC routine, and both types of aircraft spent most of their time on alert.

There were, however, exceptions to the above scenario.

What of the thousands of Air Force fighters? Tactical Air Command went heavily into the nuclear delivery role in the late 1950s, and fighter pilots trained to deliver nuclear weapons as much as they trained to conduct close air support. As the fighters immersed themselves in the nuclear role, they began to call for air refueling, too.

SAC would not let go of its new KC-135s, but grudgingly relinquished some older KB-50s. Even at the time, TAC realized that, someday, it would have to jettison these antiquated, piston-engine aircraft. What then?

That question was answered sooner than expected.

With rising US involvement in Vietnam, American fighters began deploying to Asia with refueling support provided by the piston-driven tankers of TAC and Pacific Air Forces.

Then disaster struck. In October 1964, a KB-50 crashed after takeoff from Takhli AB, Thailand. The entire crew was killed, and the subsequent investigation determined that the wings were badly corroded and had simply snapped off. Other KB-50s displayed similar decay. TAC's entire KB-50 inventory was immediately and permanently grounded.

SAC was willing to fill the gap, on the condition that it retained control of all tankers. Even though the nation was at war in Southeast Asia, nuclear deterrence needed to remain in force, so as not to tempt the Soviets into doing something foolish. Washington granted SAC's wishes.

The KC-135 was essential to the war in Southeast Asia. (See "The Young Tigers and Their Friends," June 1998, p. 74.) During the Rolling Thunder bombing campaign of 1965-68, virtually every Air Force strike sortie flown north required air refueling. Because TAC's fighters used the probe and drogue, the Stratotankers added a boom adapter that allowed them to continue this practice; eventually, all Air Force fighters were equipped with receptacles.

KC-135 operations in Southeast Asia lasted more than nine years, with the tankers flying some 200,000 sorties and providing more than 800,000 air refuelings. Of greater significance was the impact the tankers had on the Air Force. Essentially, air refueling turned short-range fighters into long-range bombers.

Nickel Grass

Shortly thereafter, a crisis in the Middle East indicated that air refueling was necessary for cargo aircraft as well.

In October 1973, Egypt and Syria went to war with Israel. The October War found Israel in dire straits after several weeks, and Jerusalem asked the US for weapons and spare parts. Arab oil-producing nations retaliated by threatening an oil embargo against any nation helping Israel. In response, US NATO allies refused landing rights to US aircraft en route to Israel.

The exception was Portugal, which allowed the use of its airfield in the Azores, an island group in the Atlantic 800 miles west of Lisbon.

Over the next several weeks, US airlifters flew from the East Coast to the Azores—more than 3,500 miles—refueled, and then flew a further 3,000 miles to Tel Aviv's Lod Airport. This airlift operation, termed Nickel Grass, demonstrated that airlifters would be far more efficient if they too could be refueled in air (at that point only the C-5 had a refueling receptacle).

Nickel Grass proved that air mobility was a key facet of power projection. In order to ensure global influence, the US required big tankers and cargo airplanes. But what if those capabilities existed in the same aircraft? (See "Nickel Grass," December 1998, p. 54.)

The Air Force had already seen the demands on its tanker fleet increase dramatically. In 1960 there were 2,000 air refuelable aircraft in its inventory; by 1980 that number had jumped to 4,500—3,000 of which were fighters.

At the same time, SAC was doing almost as much refueling for the Navy and Marines as it was for the Air Force. Although the KC-135 fleet still had many years of life ahead of it, the hundreds of thousands of sorties flown worldwide had taken their toll. New engines were needed to rejuvenate the Stratotankers.

In early 1980 the Air Force began replacing the original J57 engines on the KC-135s with new CFM56s that allowed the airplanes to offload 50 percent more fuel while also being 25 percent more fuel efficient. The Stratotankers were also strengthened to carry extra weight and received cockpit and instrumentation upgrades, new brakes, and other improvements. These aircraft became KC-135Rs.

The cost of this modification was about $20 million per airplane, so USAF elected to refit 157 aircraft with

A KC-135 refuels F-4 Phantoms. The Stratotanker was invaluable in the Vietnam War, since virtually every mission headed to North Vietnam required air refueling.

USAF photo by SSgt. Douglas Nicodemus

A1C Ben Davis, a boom operator, refuels a B-52 from aboard a KC-135. The average age of a KC-135 is 44 years.

used TF33 engines. Although not as powerful, the TF33s were less than half the cost of new engines. These tankers were designated KC-135Es.

New Tanker

The Air Force also decided to buy a new tanker. Wanting a large aircraft that could double as an airlifter, USAF settled on the KC-10. First delivered in 1981, the KC-10 Extender is equipped with both a boom and a hose reel and drogue. It can refuel either type of receiver on the same flight. Later, 20 KC-10s were fitted with wing pods holding hose reels and drogues that allowed it to refuel two aircraft simultaneously.

As an airlifter, the KC-10 can carry up to 27 pallets or 75 people and 17 pallets. More significantly, the Extender has a refueling receptacle allowing it to be air refueled.

This last capability was demonstrated in 1986 during Operation El Dorado Canyon, when Air Force and Navy aircraft bombed Libya in retaliation for terrorist attacks. France and Spain refused permission for the strike aircraft to overfly their territory, so tankers were essential. A total of 29 refuelers were employed: KC-135s topped off the KC-10s, which then provided multiple air refuelings to the attacking F-111s. (See "El Dorado Canyon," March 1999, p. 56.)

The Air Force had elected not to put a refueling receptacle on the bulk of its KC-135 fleet. Only eight Stratotankers were modified to be air refuelable.

Saddam Hussein's invasion of Kuwait in August 1990 provoked a rapid response. Within days, mountains of materiel and the personnel needed to fight for Kuwait's liberation began moving into the Middle East. Over the next six months, US airlifters moved 500,000 people and 540,000 tons of cargo into the theater, and 100 tankers operated from nine countries to form an "air bridge."

During Desert Storm, the tankers flew 16,865 sorties to support coalition aircraft—and 24 percent of all refueling events were for Navy and Marine aircraft.

Afterward, the use of Air Force tankers to support Navy and Marine aircraft took on increased emphasis. The sea services felt the Air Force was not sufficiently supportive of their needs.

After the Persian Gulf War, the US and its coalition partners flew more than 300,000 sorties in Operation Northern Watch and Operation Southern Watch over Iraq.

With the terrorist attacks of 9/11, the homeland air defense mission of Operation Noble Eagle was launched, while al Qaeda terrorist camps in Afghanistan and the overthrow of the Taliban regime required global power projection into a region with little modern infrastructure.

Tankers allowed fighters from all the services and allied countries to deploy to bases in the crisis regions; they refueled the airlifters maintaining the air bridge from the US; and they refueled aircraft throughout the combat operations themselves.

Despite the obvious necessity of air refueling in all phases of military operations, the tanker community within the Air Force has rarely enjoyed either power or prestige.

No Four Stars

There were no tanker wings in SAC until 1988. Previously, there were only bomb wings with both bomber and tanker squadrons. These wings were almost always commanded by a bomber pilot. After 1992, with the creation of Air Mobility Command, tanker personnel still had trouble obtaining the influence of the top positions. Since the formation of AMC, the command has had eight commanders: three have been fighter pilots, four have flown airlifters (C-141, C-5, or C-17 pilots), and one was a bomber pilot.

Indeed, in the entire history of the Air Force there has never been a career tanker pilot who has reached the four-star level.

The E model KC-135s, those with the used engines, are worn out, and many have been grounded for safety reasons, perhaps permanently. The average age of the KC-135 exceeds 44 years.

A related issue has also arisen. The Air National Guard and Air Force Reserve own 58 percent of the KC-135 force. This force structure situation gives the refuelers an unusual amount of protection from Congress and the various state governments where the tankers are based.

This manifested itself recently when Congress barred the service from retiring any of the maintenance-intensive aircraft, even though many of them were grounded for being unsafe. (See "Washington Watch: The Hit List: 654 Airplanes," p. 12.)

The top Air Force leadership has realized that modernization of the aerial refueling force is essential, and after many fits and starts a refueling tanker modernization program is finally moving forward, with a KC-X program scheduled to begin replacing the oldest KC-135s.

Thus, the hidden hero of US power projection—aerial refueling—is hidden no longer. ■

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