

The week-long flight in 1929 provided object lessons in vision, planning, flying skill, logistics, and public relations.

Question Mark

It was near the end of the Roaring Twenties, and, even though the stock market was soaring, the US military was still on a tight budgetary leash. Nowhere was this more evident than in the undermanned and underpaid United States Army Air Corps.

Even so, the hopes of the Air Corps ran high on Jan. 1, 1929, particularly in the cockpit of *Question Mark*, a Fokker trimotor, as it prepared to make history. It lifted off, and neither the airplane nor crew members would touch the ground again for 150 hours, 40 minutes, and 14 seconds.

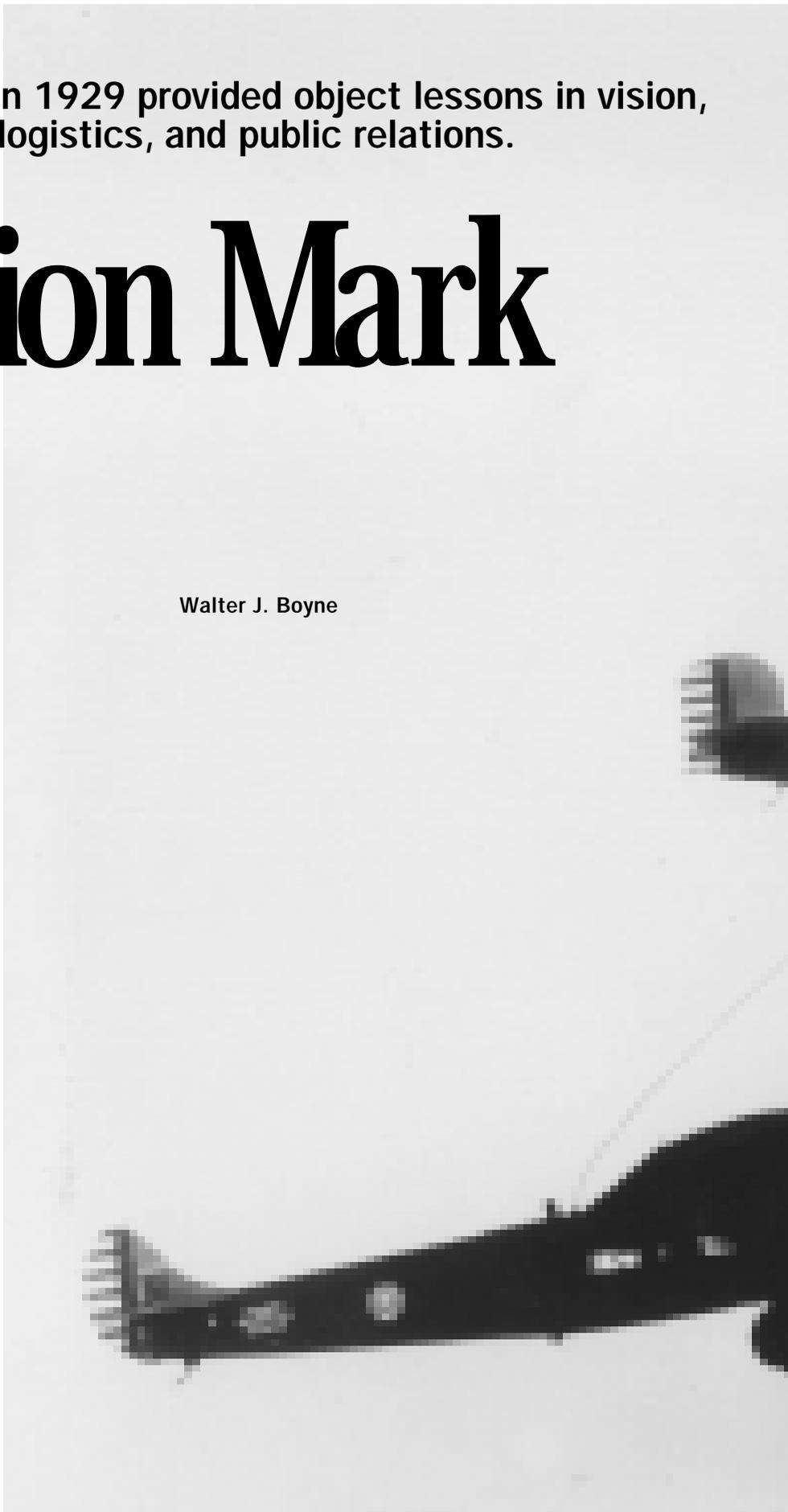
This was a remarkably long flight for an aircraft with wooden wings and steel-tube fuselage. In addition to its length, the flight had two other distinguishing characteristics.

First, the flight of *Question Mark* foreshadowed an era of routine aerial refueling, the sine qua non of modern airpower.

Second, it helped propel its five crew members to greater achievements. The crew contained future generals Carl A. Spaatz, Ira C. Eaker, and Elwood R. Quesada; Harry A. Halverson, who led a key bomb raid in World War II; and a future hall of fame master sergeant, Roy W. Hooe. The flight of *Question Mark* touched many others, including ground personnel and crews of the refueling airplanes.

The week-long saga was a demon-

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A photo taken from a chase airplane shows Question Mark and the Douglas C-1C refueler joined by a slender hose. The device allowed fuel to flow at a rate of 75 gallons per minute.



stration of Air Corps vision, planning, flying skill, logistics, and public relations.

It was not chance that those factors also matched the individual personalities of the participants. The flight would never have happened if this particular group of officers had not planned, politicked, and performed in their own special way.

De Seversky's Patented Idea

The basic idea of refueling in flight dated at least to 1917, when it was advocated by an officer in the Imperial Russian Navy air service, Alexander P. de Seversky. De Seversky came to the United States after World War I and took out many patents, including one in 1921 that covered aerial refueling. (The patent expired before the concept became commonplace.)

The concept of extending flight duration was attractive to many, and the first demonstration was the workman-like approach of Wesley May, who was flying over Long Beach, Calif., on Nov. 12, 1921, in a Lincoln Standard biplane. He climbed from his airplane to a Curtiss JN-4 with a five-gallon can of gasoline strapped to his back. When he poured the gasoline from the can into the tank, aerial refueling was born.

On May 2 and May 3, 1923, Lt. Oakley G. Kelly and Lt. John A. Macready set a new endurance record

of 26 hours and 50 minutes in a transcontinental flight.

The desirability of aerial refueling for military aircraft was obvious. Maj. Henry H. "Hap" Arnold, then commanding Rockwell Field at San Diego, authorized two DH-4Bs to practice in-flight hook-ups with a hose. The experience was put to the test June 27 when 1st Lt. Lowell H. Smith and 1st Lt. John P. Richter attempted an endurance flight but were forced to land after two refuelings. The flight lasted six hours and 38 minutes.

The same two tried again on Aug. 27, determined to set the world record. There were two refueling aircraft this time. Smith and Richter set an endurance record of 37 hours and 15 minutes and a world distance record of 3,286 miles.

Meantime, three strong personalities were coming together at Air Corps headquarters.

■ Spaatz, then a major, was assistant G-3 for training and operations, working closely with Maj. Gen. James E. Fechet, Chief of the Air Corps. Spaatz was a respected airman who had scored three aerial victories in World War I and had loyally supported Brig. Gen. William Mitchell at his court-martial.

■ Eaker, then a captain, had been a pilot for three of the Air Service's top leaders—Maj. Gen. Mason M. Patrick, the Chief; Fechet; and F. Trubee Davison, assistant secretary of war for air. Eaker was an articu-

late speaker and excellent writer, with a deceptively modest, self-effacing personality.

■ Quesada, then a second lieutenant, had a golden first assignment: engineering officer at Bolling Field, D.C. Personable and competent, he had responsibility for maintaining the aircraft of Fechet, Spaatz, Eaker, and others.

Somebody (exactly who is a matter of debate) came up with the idea of putting together an in-flight refueling operation to allow an Air Corps aircraft to set an endurance record. It took all of Spaatz's reputation for competence, Quesada's charm, and Eaker's diplomacy to sell the idea. Davison at first opposed the project but changed his mind. Once he approved the idea, he gave it his wholehearted support.

Spaatz was given overall command and put in charge of planning. Eaker was to serve as chief pilot. Quesada was to back Eaker and relieve him as needed. The team then recruited a fourth, highly promising pilot, Halverson.

The Name Game

As they made their preparations, the four were often asked how long they planned to stay airborne. Their never-changing response: "That is the question." They planned to fly as long as they could keep the aircraft aloft. Such was the source of the aircraft's strange name, *Question Mark*.

For Spaatz, the first step in planning was to select the actual aircraft. He settled on a specially modified Fokker C-2A, built by the company's US branch, the Atlantic Aircraft Corp. Before modification, it had an empty weight of 6,507 pounds, a top speed of 112.8 mph, and a range of 296 miles.

The most impressive part of the airplane was its power. It sported three 220-hp radial engines. Reliable and fuel-efficient, these engines turned out to be the keys to success.

The addition of two 150-gallon tanks raised total fuel capacity to 580 gallons.

Hooe, selected to be part of the crew, oversaw the installation of the Fokker's refueling system. The receptacle was a rectangular bucket that had a sloping bottom with two



Lts. John Macready and Oakley Kelly pose with their Fokker T-2 aircraft and the barrels of fuel and oil they used in their record-setting 1923 transcontinental flight of 26 hours and 50 minutes.

outlets and was connected by hoses to the fuselage tanks. Hooe used a pump to transfer fuel from the fuselage tanks to the wing tanks.

He also installed an elaborate system that allowed him to change oil while airborne. The system would drain oil from the engine then refill it from an oil tank in the fuselage. Hooe also devised a system of long copper tubes that ran from the fuselage to key points on the engines; this allowed him to grease the rocker arms from a distance, using a standard grease gun. Finally, he built catwalks and platforms that allowed him to do minor midair maintenance while wearing a parachute and a lineman's belt.

Access to the airplane's fuel receptacle was gained through a trapdoor placed behind the wing, the



A ground crew prepares preheated oil in five-gallon cans that the refueling aircraft will lower through the hatch of *Question Mark*.



***Question Mark* was a specially modified Fokker C-2A sporting three powerful and fuel efficient 220-hp radial engines. Modifications included the addition of two 150-gallon fuel tanks as part of the new refueling system.**

better to keep the hose far away from the propellers. Supplies—from food to a portable bathtub—came in through the same trapdoor, via rope.

For the tanker airplane, the team chose a Douglas C-1C single-engine transport. It had a top speed of 121 mph. The pilot and copilot sat side by side in an open cockpit just forward of the upper wing. The metal-floored passenger cabin normally had seats for six but could carry cargo as large as a Liberty engine.

For this flight, the airplane carried a reel fitted with a 50-foot-

long, 2.5-inch-thick fire hose. The nozzle was tightly wrapped with copper wire, some of which extended down and was grounded to a copper plate on *Question Mark* before refueling began. The hose had only one shut-off valve—at the upper end. It caused some problems in flight.

To save weight, the crew installed no radio equipment. Spaatz instead relied on messages that the crew would drop to the ground.

The flight used two C-1C refuelers. One, stationed at Rockwell Field, was flown by Capt. Ross G. Hoyt. The second, stationed at Los Ange-

les Metropolitan Airport in Van Nuys, Calif., was flown by 1st. Lt. Odas Moon.

Capt. Hugh M. Elmendorf (whose name was bestowed on a major Air Force base in Alaska) was in charge of ground operations and logistics, which became quite complicated as the week passed.

Eaker was at the airplane's controls as *Question Mark* took off from the Los Angeles airport at 7:26 a.m. on New Year's Day 1929. Because of the large amount of installed equipment, the airplane was heavy, and it took off with only 100 gallons of fuel on board. Moon's tanker provided the first refueling at 8:15 a.m.

The Technique

The technique called for the refueling airplane to approach from the rear, then fly slightly ahead of *Question Mark*, maintaining vertical separation of about 30 feet. Both aircraft flew a straight course at a speed of 80 mph. The C-1C extended the hose, to Spaatz, the future Air Force Chief of Staff. Spaatz, dressed in a raincoat, face mask, goggles, and gloves, would grasp the hose, ground the copper wire against the copper plate, and then insert the hose into the receptacle. On his signal, the tanker crew would open the valve that allowed fuel to flow through the hose at the rate of 75 gallons per minute.

On that first day, Hoyt made three



Maj. Carl Spaatz stretches through the trapdoor at the top of Question Mark to grasp the refueling hose for a fuel transfer. The transfer was messy—Spaatz was sprayed by fuel on several occasions.

contacts, transferring 600 gallons. The process became more difficult as the tanker off-loaded fuel to *Question Mark*, which had to go into a slight descent to stay well above the stall speed.

At noon, over Van Nuys, officials sent their first message to *Question Mark*. It was chalked onto the black side of a PW-9D pursuit aircraft, and it read, “Don’t Forget Rose Bowl.” It was a reference to the classic football matchup then being played in Pasadena between Georgia Tech and California.

No one needed a reminder, least of all Eaker, who was well aware of the flight’s public relations value. In 1929, the Rose Bowl was the equivalent of today’s Super Bowl, a publicity gold mine not to be missed. In fact, Eaker spent much of his time each day writing pointed letters and telegrams to influential people, extolling the value of refueling and the Air Corps generally.

Shortly after midnight of that first day, on Jan. 2, Spaatz was drenched with fuel when the hose was jerked out of his hands by a bit of turbulence. Concerned that the 72 octane fuel that soaked his clothing might burn his skin so badly that he would have to leave, he ordered Eaker to carry on with the flight even if he, Spaatz, had to bail out for medical treatment.

On the next refueling attempt, Spaatz appeared in the hatch stark naked, except for a parachute har-



Question Mark’s left engine died Jan. 7 when a pushrod failed, so the crew decided to land. All told, Question Mark’s crew had hooked up with a refueling aircraft 43 times. Question Mark took on 5,660 gallons of fuel and 245 gallons of oil.

ness. During the entirety of the flight, Spaatz was sprayed with fuel on three occasions. After the first time, he just applied oil to his skin and zinc oxide to his eyes, with no ill effects.

“No Grouches Aboard”

To ease the strain on *Question Mark’s* engines, the crew maintained a low cruise speed, placidly traveling from San Diego to Los Angeles and back, hour after hour, day after day. The flight soon settled into a routine reflected in the offi-

cial log. They kept careful track of who was flying and the nature of the weather conditions.

In one notation, Spaatz wrote: “All is serene on the *Question Mark*. Eaker is relaxing prior to refueling in about 20 minutes. Halverson is piloting, Hooe pumping, Quesada writing letters to his sweethearts, and I, needless to say, am writing in the log. Everyone is taking it easy as possible today after last night’s long vigil. Hope to pass a normal night tonight to enable the crew to get a much needed rest.”

A little later he noted in the log: “This is a good bunch up here. All pleasant and willing. No grouches aboard.”

There were maintenance problems. A window blew out, and it took days to get a replacement. A gas leak occurred, which the in-

domitable Hooe fixed with the traditional red lead, soap, and shellac.

The engines gradually developed problems, and Eaker began keeping *Question Mark* within gliding distance of the Los Angeles airport. The Fédération Aéronautique Internationale had declared that, for a record to be valid, the airplane had to take off from and land at the same airport.

On Jan. 7, the left engine shuddered and died. The crew applied more power to the other two en-

gines while Hooe went out on a catwalk to attempt repairs. However, the strain on the other two engines, after so many hours of lazy cruising, was too great. It was time to descend.

They landed safely, and a post-flight analysis of the left engine showed that a pushrod had failed and that the rocker arms were badly worn.

Eaker had predicted a flood of good publicity for the Air Corps, and he was right. Newspapers and newsreels were filled with admiring commentary, none of which was lost on Congress. Each member of *Question Mark's* crew received the Distinguished Flying Cross. Eaker, having already received a DFC in 1927, got an oak leaf cluster. (Tanker crews were not similarly rewarded at the time; they received only letters of commendation.)

Both the publicity and the decorations were well-deserved. *Question Mark* had flown 11,000 miles and set numerous records in the process. It had hooked up with the tankers 43 times, 12 of these occurring at night.

The hardworking tankers had delivered 5,660 gallons of aviation fuel and 245 gallons of oil, not to mention comfort items such as turkey and chicken dinners, ice cream, and mail.

Spaatz was understandably upbeat in his report to Fechet. He stated: "The flight of the *Question Mark* demonstrates conclusively that one transport plane can safely refuel another transport in the air."

He extended the possibilities of aerial refueling to bombers, pursuit aircraft, attack aircraft, and observation airplanes, noting that it would extend their radius of action and improve safety. Spaatz believed that commercial aircraft could benefit from the technique as well, making transcontinental and transoceanic flight practical.

Question Mark inspired many imitators, and, by year's end, they had made more than 40 attempts to break



Sgt. Roy Hooe, 2nd Lt. Elwood Quesada, 1st Lt. Harry Halverson, Capt. Ira Eaker, and Maj. Carl Spaatz pose with their aircraft after a week in the air. All were awarded the Distinguished Flying Cross.

its record. Nine of them succeeded. These were all relatively low powered private aircraft, however, kept in the air by the guts and the drive of young pilots seeking to make a name for themselves.

Given the success of *Question Mark*, there arises the question of why aerial refueling did not come into practical use well before World War II. Eaker was often asked about this, and his usual response was that it was a matter of engine development. Engines had become larger and more reliable so that it was possible to solve the most pressing problems of range with larger airplanes.

For the most part, US aircraft during World War II had sufficient forward bases so that in-flight refueling was not an absolute necessity.

Return of Air Refueling

After World War II, the distant Soviet Union loomed as a potential enemy, and, once again, aerial refueling was seen to be a necessary part of airpower, all the more so with the introduction of fuel-guzzling jet-powered bombers. Spaatz, as Chief of Staff, approved devel-

opment of aerial refueling as a top priority.

All major participants in the *Question Mark* project went on to successful careers before, during, and after World War II.

Spaatz commanded US Strategic Air Forces in Europe. Gen. Dwight D. Eisenhower, the supreme allied commander, said Spaatz and Gen. Omar N. Bradley were the two officers most responsible for the Allied victory in Europe.

Eaker commanded Eighth Air Force, winning the hearts of the British people with his famous short speech: "We won't do much talking until we've done more fighting. After we've gone, we hope you'll be glad we came."

Quesada became commanding general of 9th Tactical Air Command. Bradley, asked to list the most important US generals, placed Quesada fourth, behind Walter Bedell Smith, Spaatz, and Courtney H. Hodges, and ahead of George S. Patton Jr., who was sixth.

Halverson gained fame leading aircraft in the first raid on the Ploesti, Romania, oil fields in World War II.

Hooe went on to become a master sergeant and was inducted into the Airlift Tanker Association Hall of Fame.

As Spaatz had noted in the log, they were "a good bunch," "pleasant and willing," and they were able, despite the many stresses of their service careers, to remain friends. ■

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