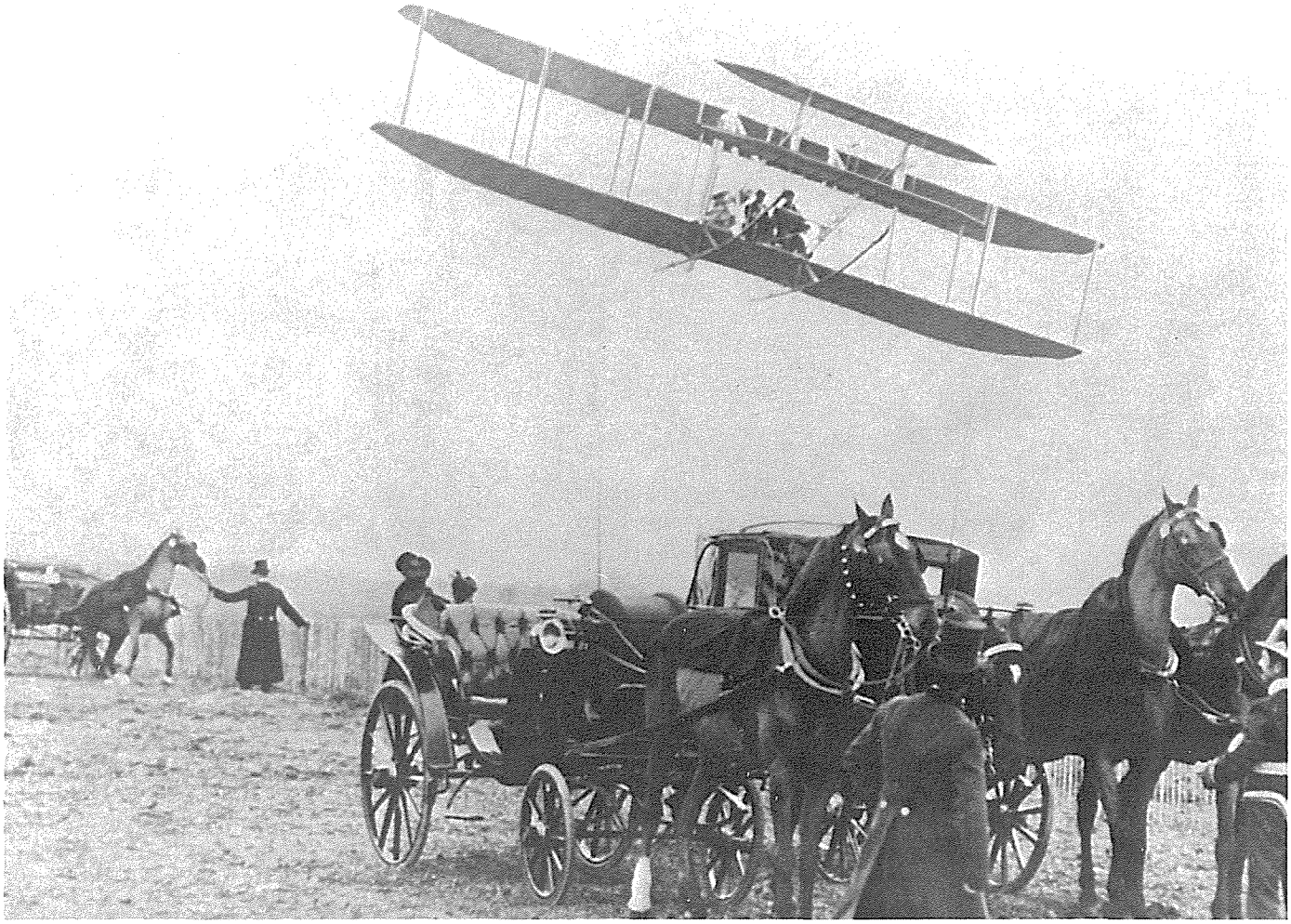


SIXTY YEARS OF AVIATION HISTORY

ONE MAN'S REMEMBRANCE

by Brig. Gen. Harold R. Harris, USAF (Ret.)

Any history is a combination of incidents, true, nearly true (and sometimes false) plus the spoken and written rumors and folk tales covering the many facets of that particular subject. Much of the history of civilization, wars, religions, geology, astronomy—are based upon centuries of investigations by experts, hopefully unbiased, of all available sources. Facts are set forth in written form for the information and guidance of present and future generations.

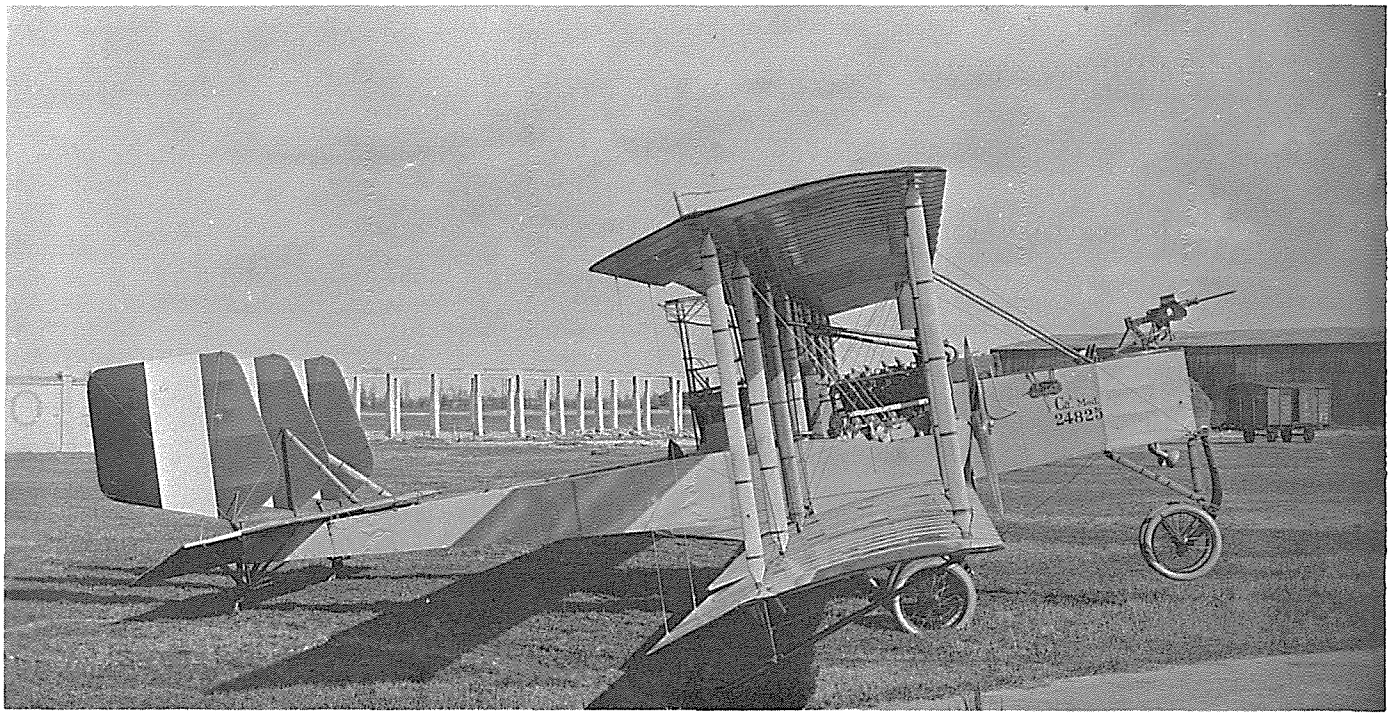
Aviation history, however, is yet too young to have had empirical yardsticks delineated and large or small details set into proper order. Distance, in time, will improve our perspective, but many accounts will be essential to the establishment of true values.

Aviation historical societies have undertaken a worthwhile task, that of organizing spoken and written recollections and remembrances of living experts and specialists in many facets of aviation, and preserving them for future research. Many men with unique and invaluable experience in aviation development have already died, leaving only sketchy, or no, record of their trials, failures and triumphs in quest of what aviation is all about, "Transportation above the surface of the earth."

The history of aviation is going to be composed of some facts—and many recollections, usually of those things which turned out well. Errors, mistakes and failures are easily forgotten, but they are frequently the giant steps toward new developments. Here I would like to tell you especially about some of these failures and errors which were milestones on the way to the great commercial air network which circles the earth today.

Let me skip lightly over the early years in which my interest in things mechanical developed, from the two-cylinder Maxwell runabout of my rich aunt whose chauffeur taught me to drive in 1909, to the first Aviation Meet in California in January 1910 at Long Beach.

Needless to say, the best flying was done by Roy Knabenshue in a lighter-than-air dirigible, but short takeoff and spot



Caproni bomber with three Isotta Fraschini water-cooled, 150-hp engines. (Peter M. Bowers Photo)

landings of the heavier-than-air machines were interesting.

At another meet held the following year at the same place, the world's altitude record was set at 4,300 feet! The most interesting flying was done by Hubert Latham in a French "Antoinette" monoplane. But my most vivid impression resulted when Arch Hoxie, in a "Wright Flyer," descended from an altitude attempt, went into a vertical dive, and was killed. I was horrified when the crowd rushed out to the crashed plane and tore the clothing off his body for souvenirs!

Since there were no aviation courses then, upon graduation from Manual Arts High School in Los Angeles, I enrolled in the College for Mechanical Engineering. My high school class was one year ahead of that of Jimmie Doolittle and Josephine Daniels, whom he later married.

But World War I began in Europe in 1914, and Washington set up in the summer of 1916 Citizens' Military Training Camps. I enrolled at the one at Monterey, Calif., where there was an aviation unit. Here I became "Engineering Officer of the First Provisional Aero Squadron." We had two biplanes and one monoplane loaned to the Army by their private owners. Whether one of these planes could fly was determined by tying a spring balance to a fencepost and the other side of the balance to the tail skid. At full throttle, if the balance showed 50-pound pull, the plane could take off!

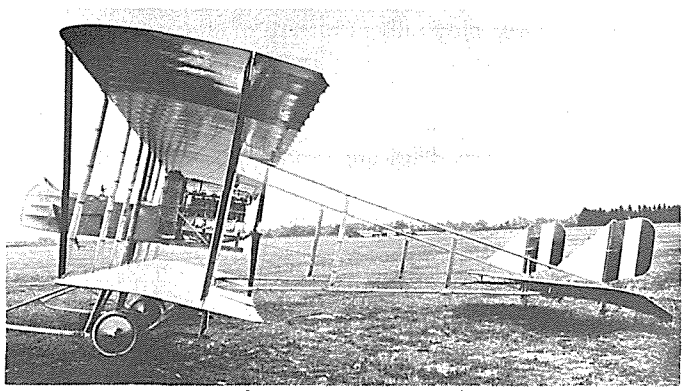
When the U.S. entered the war, I rushed to San Diego and enlisted in the Army Signal Reserve Corps and was sent to the first class in ground school at the University of California at Berkeley. Upon graduation, July 10, 1917, I was among those sent to Europe for flight training. At Foggia, Italy, we set up the 8th Aviation Instruction Center of the A.E.F. Maj. William Ord Ryan was our C.O. Shortly after our arrival, the second detachment, under the command of Capt. Fiorello LaGuardia, reached Foggia.

After 181 minutes of duel instruction from the Italian officers and petty officer pilots of the Italian-built Maurice Farman with a pusher 10-cylinder radial 80-hp air-cooled Anzani engine, I soloed. We early solo pilots gradually replaced the Italian instructors and in due course I was named "Chief Instructor."

The advanced planes were Caproni bombers with three Isotta Fraschini water-cooled 150-hp each, two tractors and one pusher.

Of the many interesting incidents, one comes to mind. It was an amusing but near-tragic occurrence which happened late in 1917. LaGuardia was getting instruction from an Italian pilot. We watched the plane come in for a landing, very slow and flat, and about to spin. It finally hit the ground flat, bounced several times and finally stopped. The two men jumped out screaming at each other in Italian. It turned out that each thought the other was making the landing. New York nearly lost a future mayor that day!

My own most intriguing, and educating, experience with a Farman occurred after I had heard that a pilot could not safely fly in a cloud. An overcast day tempted me to try and I flew through the solid cloud cover to the sunlight, collecting ice in a "Vee" on the front of all the brace wires. After half an hour above the clouds, I looked for a hole just where I knew the airfield should be. No cloud hole. So I flew toward a moun-



Maurice Farman pusher of WWI. (Peter M. Bowers Photo)

The Berliner helicopter of 1921. (Peter M. Bowers Photo)

taintop I had never seen before. The clouds were parted by the mountain and I could see a stream below. This was fine; I could follow the river to the sea and orient myself. However, I had not noted that the strong wind had blown me across Italy —and the river was flowing to the western sea. As I got into the lee of the mountain, the mountain wave turbulence took charge, turning the plane upside down. I knew it was the end for me!

Fortunately, I had my half-inch seat belt fastened and there was plenty of time in my descent from 12,000 feet to consider my situation—hands gripping the scissors control, stomach straining against the seat belt, heels locked against the rudder pedals—and my lower lip trembling with fright! Close to the ground I regained control and landed in a cultivated field.

In July 1918, I was in command of eight other U.S. pilots to deliver four Capronis from the factory at Milan to Paris. This was the first flight of U.S. Army personnel across the Alps.

Two other pilots and I were ordered back to the U.S. in September of 1918 as test pilots and instructors for the Capronis then being built in the U.S. But construction was delayed, so we were sent to the U.S. Army Test Center at Wright Field, Dayton, Ohio. This field was where the original Wright Brothers' hangar (barn) still stood, about three miles east of the present Wright Field.

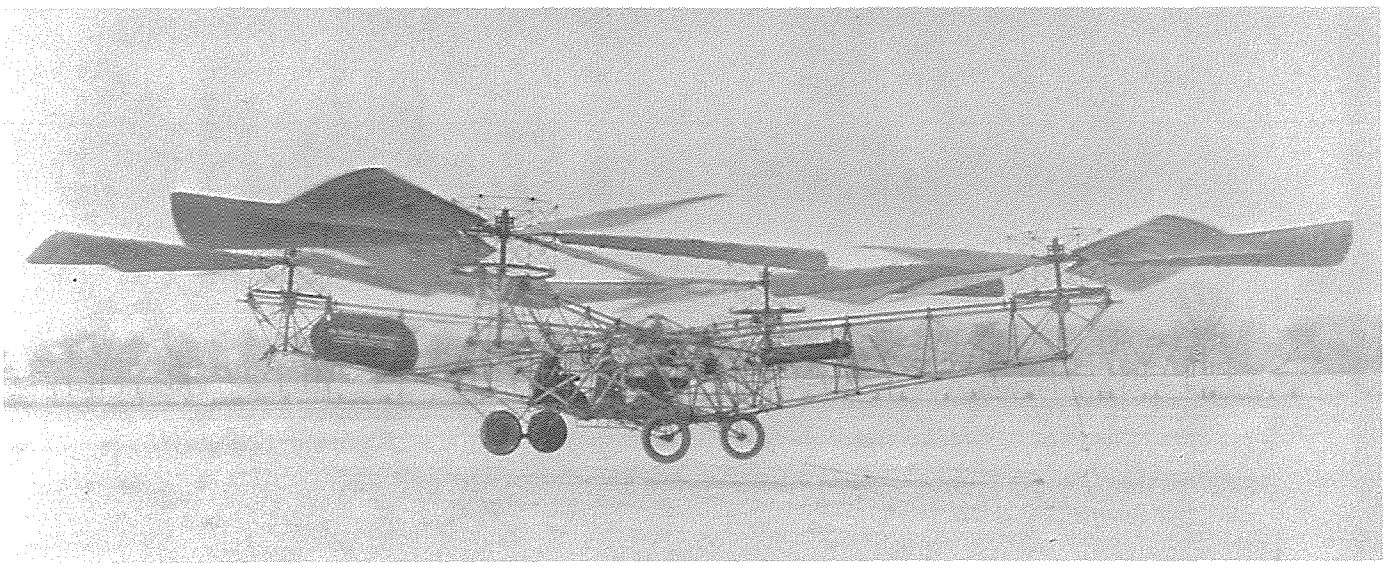
The flight test work was under the command of Maj. R.W. Schroeder, one of the greatest natural pilots I have ever known. All man, all heart, and a great leader in test work. His flight in a Le Pere biplane setting a new world's altitude record in 1919 was an outstanding incident—now unfortunately almost forgotten. Many planes were wrecked in this test work and Schroeder had a trophy made up—"The Cup of Good Beginnings and Bad Endings"—"We Crashed, Not Because We Ran Out of Gas, But Ran Out of Knowledge." Each crackup got your name on the cup.

But a "bad ending" wasn't necessarily a failure, for each of them contributed in some way to the perfection of flight which we know today, as aircraft of all nations knit the earth together with safe, frequent and dependable military, commercial and private services. Test work is just a series of "bad endings."

At the end of World War I, the Engineering Division of the Air Service was set up at McCook Field, at Dayton, and I remained stationed there until my resignation as an officer in 1926. In November 1920, I was appointed "Chief, Flight Test Branch, Engineering Division."

Along with other developmental work, I did considerable testing of Emil Berliner's, and later his son Henry's, helicopter at Washington. The U.S. Army had de Rothezat build a four lifting-screw (six blades each) helicopter and I did most of the flying (if you could call it flying) of this experiment. It was built with one 180-hp Gnome rotary set horizontally alongside the pilot. Later a 200-hp Bentley rotary replaced

de Rothezat helicopter of 1920. (Peter M. Bowers Photo)



the Gnome. One of my British friends said, "Yes, the Bentley Rotary is an interesting engine—but it has a bad habit of shedding cylinders!"

The de Rothezat helicopter had a unique, and at the time probably the most accurate, altimeter in the world—one end of a rope was tied to the frame, with markers at every foot. And it was adequate for the job. Those early helicopters could get about one-half rotor diameter above the ground. Until Sikorsky perfected the swiveling blade, no successful helicopter operation was attained. But again our "bad endings" helped to point the way.

In June 1921, I made what I believe to have been the first pressurized cabin flight in the world. We learned a great deal about that possibility in one short flight—and I lived to tell the tale!

The plane was the U.S. D-9A which was a single *Liberty*-engined observation plane built from the designs of the British de Havilland DH-9. It was a two-seater but for the purpose of this experiment the seats were removed and the area filled with an oval pressurized compartment made of steel. As I recall it (after 53 years), it was riveted and the joints were brazed. The minimum of controls were brought into this tank—the spark advance, throttle, mixture control, ignition switch, the control stick for elevator and ailerons, and the rudder cables. Packing glands surrounded all controls where they went through the sides of the tank. The only instrument inside the tank was an altimeter. All other instruments were on a special board just forward of the eight-inch porthole in front of the tank so that they would be readily visible to the pilot. No controls were furnished for the pressurizing unit.

There were five six-inch glass portholes in the tank, at the bottom, the top, one on the left side, one forward, and the fifth in the removable door on the right. The door was about two feet in diameter. In unpressurized flight the door was suspended on hooks on the right rear interior wall of the tank. This door was steel of considerable weight and had to be lifted off the suspending hooks and placed in the retaining tracks on the inside of the opening, then rotated about one-eighth of a turn to make a tight seal against a rubber gasket for pressurization. A normal pilot seat was installed in the tank. In the ceiling was a ¾-inch globe valve, with a manual control easily reached from the pilot's position, presumably to make pressure control easily available to the pilot through adjustment of the rate of exhaust of the pressurized air. A propeller-driven blower was installed in the leading edge of the lower left wing with a pressure line running from the blower to the lower forward part of the tank. Other than the above, no special changes were made in the standard U.S. D-9A airplane.

The pilot assigned to the first flight was Art Smith, a very well-known pre-World War I exhibition pilot who was employed as a civilian flight test pilot by the Air Corps. Smith was in my department. He was about 5 feet 3 inches, quite husky, but not as tall as the average pilot. He took the experimental plane up with the door mounted in the rack aft of the opening through which the pilot entered the tank. Smith climbed to 3,000 feet and tried to lift the door into place to pressurize. Because of his poor leverage he was unable to maneuver the heavy steel door into its closed position, so he brought the plane back.

Since I am taller than Smith and would have better leverage, I took the plane up myself. At 3,000 feet I lifted the door into place and rotated it to its locked position.

de Havilland D-9A, early experiment in pressurized cockpit, June 1921. (Peter M. Bowers Photo)

Immediately things began to happen. The cabin supercharger had been designed on the assumption that there would be a large leakage through all the packing glands carrying the cables for the control mechanisms, and that the regulation of pressurization would be easily taken care of by the manually operated globe-valve in the roof. For an effective test, the designers had increased the compressor capacity by 100%. Almost immediately after the door was closed pressure built up within the tank until the altimeter inside the tank registered 3,000 feet below sea level, although the altimeter outside the tank showed that the plane was flying at 3,000 feet above.

My first reaction was to make sure that the manually operated exhaust valve in the roof was wide open. It was, and I could feel the rush of air flow through the opening in the valve. Then I searched for something with which to break a window, but I had nothing, not even a pocket knife, and since I did most of my flight testing wearing tennis shoes (because of a better feel on the controls), I didn't even have a heel of a shoe. Opening the inward-opening door was impossible because of the tons of pressure inside the steel tank. There was no way to stop the wind-driven compressor from operating as long as the plane was flying, because it was being driven by its own propeller, separate and distinct from the engine propeller.

The only thing left to do then was to assume as slow speed a glide as I dared, and land as quickly as possible. At no time, from shortly after closing the door until the plane came to a stop, was the cabin pressure above 3,000 feet below sea level.

There was no possible escape from this ever-increasing pressure. I do not recall any particular area of discomfort although it has been reported that I complained of pain in my ears. The air in the tank was uncomfortably warm from the action of the compressor, and I was wringing wet from perspiration on landing. However, this was probably due in some degree to my anxiety about the outcome of this test, and irritation with myself for having gotten into such a situation without intelligently considering the possible difficulties and taking the necessary precautions.

Godfrey Cabot had a twin-engined plane built to carry out his experiments for picking up mail sacks from the ground by a plane in flight. I flew the first test August 11, 1921, with the grapnel hook on the end of a flexible cable. The hook hit the mailbag support and looped over the plane, jammed the elevator and ended up in the left engine, tearing it from its mount. Although the plane was destroyed, I emerged undamaged. Later when a rigid pole was substituted for the cable, everything went well as demonstrated so successfully for many years by All American Aviation.

General Billy Mitchell took on the U.S. Navy in 1921 and assembled all his planes and pilots at Langley Field for the bombardment of the surrendered German warships. As the world knows, airpower was proven by these tests. My glamorous personal part was bombing with 500-pound bombs. I missed!

Soon after, I was graduated from the Air Corps Engineering School at McCook Field and I was involved in another "first" which made me number one in the Caterpillar Club.

Several flying officers were gathered at McCook Field on October 20, 1922, when a visiting officer asked about the parachute. We explained the way the parachute worked, and the visitor seemed impressed. Several others expressed doubt of a pilot's being able to release himself from an airplane and operate the parachute in an emergency. Little thinking my words would so soon be put to the test, I remarked that it was surprising what a man could do when put to it. Although parachutes were being tested, and were worn, no pilot had yet used one to save his life.

I suggested to Muir Fairchild that he fly a machine for further testing of new tail surfaces while I took a monoplane up to test some new and experimental types of ailerons.

Lieutenant Fairchild got his parachute and went out to the ship. I had just had a new seat cushion installed on my parachute and after I took it out to my airplane, found that the harness was a trifle tight; I sent the timekeeper to get another parachute for me. The one he brought had an even smaller harness. After wasting considerable time, I almost yielded to the temptation to conduct my test flight without a parachute, but eventually decided to wear my own chute.

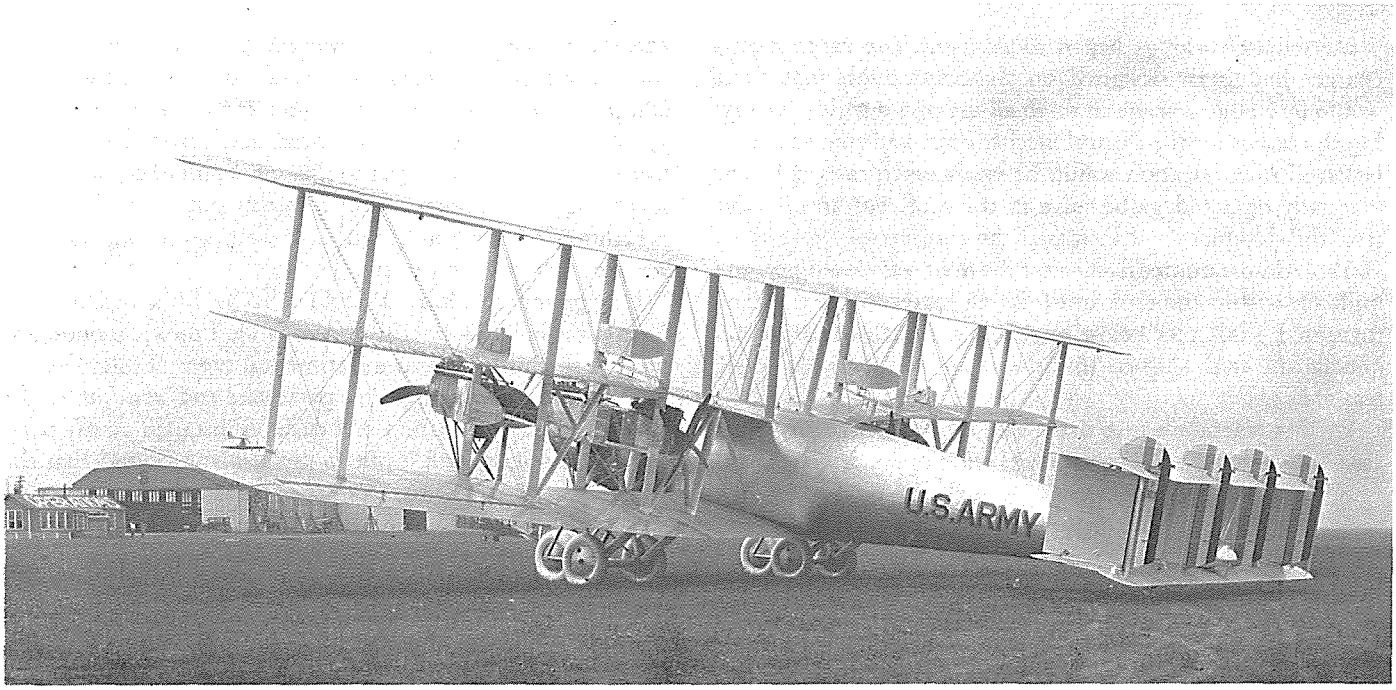
Fairchild meantime took off and I followed. At an altitude of about 2,500 feet the other machine was waiting for me. We had maneuverability tests to carry out on both airplanes, therefore it was logical for us to practice a little combat.

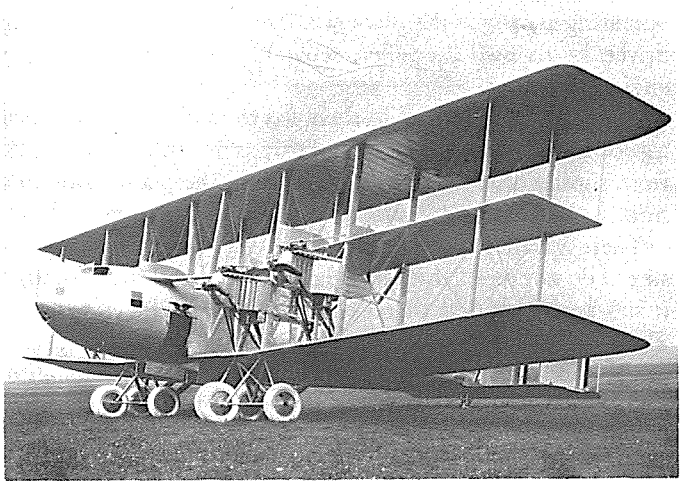
After some combat maneuvers, Fairchild began a slight left turn. Fairchild told me afterward that his indicator then showed slightly more than 150 miles an hour; I was therefore going about that speed when he began his turn. I also began a very gradual turn to the left. As soon as the turn started, all hell broke loose!

I do not know how many of my readers have ever felt a really severe earthquake, but the first vibrations of the airplane were exactly like the heavy tremors of a quake. The whole airplane shook violently laterally and the control stick began to oscillate rapidly from side to side. I knew immediately what the trouble was—the experimental ailerons. As soon as the motion of the ailerons at high speed was started they began to operate themselves, due to overbalance, making it impossible for the pilot to control their action. As the aileron on one wing goes up, the aileron on the other wing comes down; and that was exactly what was happening at an extremely high rate of reversal speed.

The only way I could control this oscillation was to slow the speed of the airplane, so I immediately closed the throttle and started to climb. By this time, however, the aileron whip had become so great that the wing structure had been torn apart internally. The control stick oscillations became extremely violent and were being stopped on each side by my legs. If you can imagine receiving terrific blows on the flesh part of your leg between the hip and the knee, at the rate of 1,000 a minute, you will realize why three days after the accident I could not walk and for days suffered from severe bruises. My right hand, with which I was trying to control the airplane, was also badly bruised by the lateral oscillations of the stick.

I knew it was impossible to regain control of the airplane. There was only one thing to do to save my life. I had seen a good many airplane crashes. I had helped pick up a good many pilots who had been killed. In a collapse of the sort I was experiencing, if I stayed in the airplane, I would undoubtedly be killed. The next thing for me to do was to leave





Witteman-Lewis XNBL-1 "Barling Bomber" first flown on August 16, 1923. (Above, Robert E. Williams Photo. Right, Peter M. Bowers Photo)

the airplane and trust my parachute.

This was not hard to do, because the airplane was falling at an angle of about 25 or 30 degrees with the horizontal, and portions of the wing structure were beginning to blow off. I had only to release my safety belt, climb on top of the fuselage. The tremendous wind pressure, probably 250 miles an hour, blew me clear of the airplane. Now to pull the ripcord of my parachute.

I had vowed that I would never, except in case of emergency, make a parachute jump; I had piloted airplanes for about 50 live parachute jumps and as I watched the expression on each man's face when he was about to jump, I decided that it looked like too much of a mental strain to suit me. A surprising thing about the jump that I made was that during the whole experience, I did not become fearful, nor feel any faintness or failure of my faculties.

After leaving the airplane, I looked down at my feet and realized that my feet were pointing to the sky! I located what I thought was my ring and pulled. Nothing happened. I was spinning like a top, head down and feet up. Three times I located what I thought was the release ring, but each time I was pulling on a leg strap. Finally I pulled the right ring.

As soon as the release cord was operated, I felt something snap within me and found that I was looking down at the ground. I then looked up at my parachute—not with any sense of relief because I had none. It all seemed part of the program that the parachute should open without argument, and I can remember admiring the beautiful silk. I could not understand how silk could be kept so white and clean around an airplane hangar.

I then looked down again to see just where I was going to land. I saw a grape arbor and was well satisfied. I knew the frail laths would easily give way and break my fall to the ground. This is exactly what happened. The only damage I suffered was a tear in the best pair of pants I owned and some cuts on my shoes as I went through the arbor. The brick sidewalk below the arbor was not particularly resilient, but I was not rendered unconscious by the fall although my physical condition was low on account of the terrific beating I had received on the legs from the control stick.

My first thought on finding that I was all right was the possibility of injury or death from the falling airplane. It was not until a couple of hours later that I learned that the airplane was completely demolished without injury to anyone and with little damage to the surrounding property.

Lieutenant Fairchild during all these exciting seconds had a considerably worse mental experience than I because he did not see me leave the airplane or see the parachute open. He had seen the beginning of the wing collapse.

He supposed until he landed at the airfield that I was in the wreck and that I was dead. This was a tremendous shock to him as we had known each other since May 1917 when we entered the University of California Ground School together. He arrived at the field hospital about 10 minutes after I was brought there and I'm sure he was whiter and more frightened than I was myself.

August 16, 1923, saw the first flight of the Barling bomber. This six-engined triplane was very large for its time. While it

did not "advance the art" in a positive sense, our experience with it certainly prevented additional efforts in a wrong direction; therefore it had beneficial negative results.

One of the problems of early flight testing showed up at the top of a Barling test climb to absolute ceiling with full load. Descending from the top, a stream of liquid was observed coming out the trailing edge of the top wing. All fuel was in the fuselage, so that wasn't it. Investigation on the ground showed that the wing had been full of rain water and the test was valueless since the actual total aircraft weight at takeoff was unknown. All testing had to be stopped until a hangar large enough to house the plane could be built.

Meanwhile the "art" advanced in many other directions. I set several world and American records with the Barling bomber. And speaking of records, any time the U.S. wants to spend the time and money, new records can be set. As we have recently seen, present international tensions notwithstanding, the Lockheed "spy plane" has just shaved two hours and 51 minutes from the transatlantic speed record. At any rate, the taxpayers paid for the 10 world and 16 American records I held at the end of 1925.

Early in 1923, the Post Office Department, which then operated the only U.S. airmail service, decided that it wanted to operate at night as well as in the day. We were requested to develop aircraft and ground lights suitable for regular night operations. An electrical engineer was assigned to develop the lights and beacons as we worked intensively on their application. We set up the world's first night scheduled cross-country operation between Dayton and Columbus, Ohio—sixty miles. The first flight was on July 16, 1923.

That date was little noted then, but will long be remembered as the date of the launch of the Saturn V for the world's first lunar landing, July 16, 1969, 46 years later. Surely no more dramatic contrast exists in all of aviation's spectacular history!

In our development of the night-flying service, each of the test pilots made scheduled round trips at night, reporting on the aircraft performance and the lighting conditions. (This experiment was written up by me and the electrical engineer on one of the early U.S. Air Service magazines.)

That was about the time of another important development. Donald Douglas and the U.S. Navy were responsible for the installation and rapid development of brakes on aircraft after 1923, although I doubt that they realize it. At McCook, we tested all service parachutes before they were issued to the air service pilots. The chute to be tested was strapped on a dummy and it was dropped at about 1,000 feet. Since the de Havillands used for this flying could not carry more than two dummies on each flight, we borrowed a Douglas Navy DT torpedo plane, which could carry four or more.

This was fine except that McCook Field was relatively narrow and on each flight two men on the field had to hold the wingtips for a taxi turn of this single-engine plane. This was because Douglas, at Navy insistence, had built a rigid tail skid. It occurred to me that a hard wood stick, properly leveraged and operated from the cockpit, could bear down on the top of the inboard tire as a drag, thus eliminating the wingtip men. I.M. Laddon, an aeronautical engineer at McCook, later a famous engineering vice president of Consolidated Aircraft Co., studied the problem and decided that brakes similar to auto brakes were the answer. These proved so successful that the tricycle landing gear with its many advantages could be safely introduced.

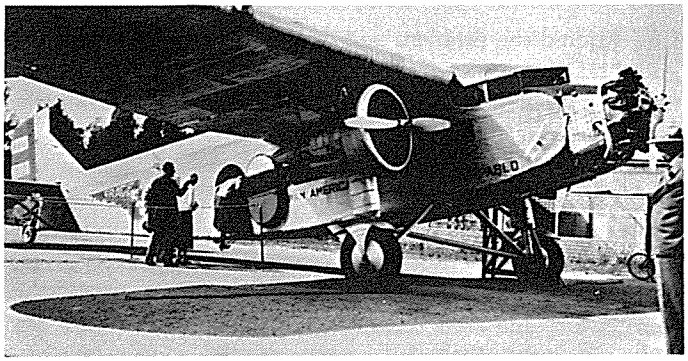
By 1925 we had come a long way toward our goal of safe and dependable flight—or at least in contrast to the state-of-the-art we had in 1918. It was early in 1925 that Tom Huff of Huff Daland, Ogdensburg, N.Y., who manufactured planes for the Navy, asked me to leave the Army. He wanted me to join an airplane crop dusting company he was setting up. This unique field appealed to me, and General Patrick, Chief of the Air Corps, gave me a year's leave of absence to see whether I liked it. I resigned my commission a year later.

Crop dusting was one of the earliest uses of aviation supporting an activity other than transportation and little was known of it. Naturally, one of the problems of this new outfit was to secure pilots, so I went to Kelly Field at graduation time, since graduates were not then retained on active duty with the Army. Among those I interviewed was a lad named Lindbergh. He listened carefully to my sales pitch and asked for time to think it over. When he returned he said, "No, I am not interested. I own a *Jenny* [Curtiss JN4D] and will barnstorm and make a lot of money." And so he did, as we all know. All of us who have known and loved aviation mourn his death.

Since crop dusting is necessarily seasonal, we did vegetable dusting in Mexico, and later, cotton in Peru. After the 1927 season was over in Peru, I had learned the hard way how long it took to get parts, mail and supplies from the U.S. by sea. I traveled overland from Peru to Bolivia, Argentina, Uruguay and Brazil looking, not only for more possible dusting markets, but also studying airmail route possibilities. Everywhere local embassies, bankers and businessmen were enthused with the idea. So I drew a map, showing how to get started and describing later expansion. Remember, planes then had only about a 600-mile range. That map, now truly historic as regards U.S. airmail service in Latin America, is in my possession today.

While I was in South America, Huff Daland was taken over by Hayden, Stone & Co., an important Wall Street brokerage firm. When I returned to New York from the 1927 South American tour, I reported to Richard Hoyt, the Hayden Stone partner in charge of aviation activities. I showed him my map

Huff Daland crop dusting aircraft. **(Delta Air Lines Photo)**



Ford trimotor of Pan American Grace Airways.

Fokker F-10 trimotor of Pan American Grace Airways.
(Pan American Photos via R.L. Kruse)

and my write-up of how to start an airline. He turned to his secretary and said, "Get Trippe on the phone." When Trippe came on, Hoyt said, "Come over here. There's someone here who's two years ahead of us." I had never heard Trippe's name before.

A small company, Peruvian Airways Corp., was set up with $50,000 capital. C.E. Woolman, chief entomologist of the dusting company, was a fantastically good salesman. He was sent to Peru to secure an airmail concession. Meanwhile, I ordered and watched over the construction of a Fairchild cabin plane with a 200-hp *Whirlwind* engine which could carry four passengers and a pilot. At my insistence, a toilet was installed, the first in any U.S. commercial airplane. This historic plane is now in the Smithsonian Museum.

In those early days cruising altitude was about 2,000 feet above the ground. The air can be very rough at that altitude, particularly over the desert which comprises much of the Peruvian coast. Anachronistic though it seems the side windows of this plane could be lowered in flight. One day a lady passenger became airsick and made a real mess of the cabin (we hadn't graduated to airsick bags yet). On landing, the pilot asked her why she hadn't used the toilet? She'd forgotten about it. And why hadn't she lowered the window? "I was afraid I would lose my false teeth."

September 13, 1928, saw the first commercial U.S. airline in South America in operation. Peruvian Airways flew one round trip per week—Lima to Talara, Peru—600 miles north. The flight was scheduled to meet the Grace steamers at each end to pick up and deliver late mail and passengers.

President-elect Hoover made a trip via U.S. Navy cruiser down the west coast of South America before his inauguration. He assured me that he would give us full support in our efforts to grow and expand internationally. So we bought several larger Fairchilds—400-hp engines carrying six passengers plus pilot.

I took one of the first of these larger planes to Ecuador, our first expansion goal, and piloted the first round trip by air ever made between Guayaquil and Quito. Since the next-door neighbor is not usually well thought of, no concession for Peruvian Airways was possible in Ecuador, so the first concession was granted to me personally, with the right to transfer to a corporation.

Richard Hoyt learned that W.R. Grace & Co., then a business power on the west coast of South America, was interested in the possibility of an airline there. They joined forces on a 50-50 basis.

Thus, Pan American Grace Airways (Panagra) was founded in 1929, taking over the Peruvian Airways activity and owned 50% by Grace and 50% by Pan American, Juan Trippe's company. Later purchases of Ford trimotors, Sikorsky amphibians and DC-2s and DC-3s made possible expansion north from Ecuador (across Colombia) to the Canal Zone, south to Chile and across the Andes to Buenos Aires and Montevideo.

Since the Upsallata Pass, the direct route between Santiago, Chile, and Buenos Aires, Argentina, is very weather prone, I surveyed the northern pass between Antofagasta and Salta. This was the first flight ever made over this route—and it turned out to be quite a problem. As I climbed above the clouds after takeoff from Antofagasta, bubbles began to form in the compass liquid and the compass card spun as each bubble hit it. No compass! In those days no radio, no direction finder, and no aviation maps. So I estimated my progress by time and sun direction. Gingerly, I let down through the clouds on what I hoped was the east slope of the Andes. I was lucky—it was, but I was far south of my goal so headed north to Salta.

As we expanded across Bolivia, from Peru to Argentina, we encountered difficult, but solvable problems, for the airports at La Paz, Oruro and Uyuni are all over 12,000 feet above sea level.

Our Bolivian concession had a time limit before which we had to start service. All landing fields, radio installations and passenger stations were for our account and had to be constructed and installed by us. Uyuni is the junction of the railroads to Chile and Argentina from Bolivia. The field at Uyuni and the station and radio had to be built and operational before the deadline. The Chaco War was in progress between Bolivia and Paraguay and no manpower was available; however, one of our airport engineers was assigned the job.

Nerves were getting a bit frayed as we heard nothing from him until the day before the deadline. Then his radio station went on the air advising us to proceed with the planned flight schedule for the next day.

When he returned to Lima, I asked how much the Uyuni job had cost. "Two bottles of Scotch," he replied. When he arrived he had sought out the chief of police, handed him a bottle of Scotch, and outlined his airport problem. The chief got out his truck and started across the pampas, lassoing every Indian man he saw. He brought them back to a barbed-wire enclosure—the site of the new airport. Indian women followed their men with all necessary cooking gear. The women parked outside the wire and fed their men through the wire. All day the men picked up rocks from the airport surface,

piled them into the truck, and picked more rocks as an empty truck arrived. Within a few days the field was cleared and the Indians turned loose. Whereupon the chief of police received the second bottle of Scotch! Try that for an airport construction job today.

Doing business in foreign countries is not always easy, even if some of the wars and revolutions are not really well organized. Arequipa is some 600 miles south of Lima. The military garrison at Arequipa decided to rebel against the Lima government, so when our southbound Ford carrying the U.S. mail landed at Arequipa to refuel, the pilot, Byron Rickard, found a company of soldiers with guns, lining the landing area. They seized him and his plane. The telegraph line to Lima was functioning, and we learned that our plane and pilot were in the hands of the revolutionaries.

We made a vigorous protest about the seizure and the delay of the U.S. mail and they finally agreed that we could send a single-engine plane, a Lockheed, to pick up the mail for onward flight, but the revolutionary forces retained the Ford and its crew for the few days that the revolution lasted. The leaders of the unsuccessful coup then boarded our plane and in what was surely one of the earliest political hijackings had themselves flown to Arica, Chile, where they would be safe from reprisal. All ended well, as we got our plane and crew back unharmed.

Just as some people are accident prone, Rickard must be hijack prone. A few years ago, piloting a Continental Airlines jet, he was hijacked again. He came out of that experience unharmed too.

The United States cut its international aviation teeth in South America, and it is singularly unfortunate that no comprehensive history of that activity has been compiled. My own notes and memorabilia provide a great deal of the background. For we learned in so many areas at the same time. It was not only important to be able to take off from a hot airport at 12,000 feet above sea level—it was just as important to be able to deal well and fairly with the officials of the various countries—so that we could fly again tomorrow—and into the years ahead. That we did learn is attested by the fact that service continues after 46 years.

In 1939, as Operations Manager of the airline, I moved from the Lima office to the New York office, but in 1941 was sent to Bolivia to take over the local German airline, Lloyd Aero Boliviano, for the U.S. Returning to Washington, I set up, as a civilian, the Plans Section of the U.S. Army Air Transport Command. Soon in uniform as a colonel, I was later made a Brig. Gen. with the ATC and at the end of the war was Chief of Staff of that command.

The history of the ATC and its fine work in WWII has been well documented so I need not add to that story. The command was most fortunate in being under Lt. Gen. H.L. George, who handled the Army problems, and C.R. Smith of American Airlines who handled the operating problems.

I consider myself one of the most privileged people in this great industry since I have, over the years, been fortunate to participate along the leading edge of the technology, in the early learning and experimental work, in administrative and entrepreneurial activity in South America, in the management of major international carriers, in the formulation of U.S. policy, and finally in providing essential finance at the outset of the jet age.

Douglas DC-2 of Pan American Grace Airways.

Douglas DC-3 of Pan American Grace Airways.
(Pan American Airways Photos via R.L. Kruse)

My own history has paralleled the history of commercial aviation. But the history of the airlines is only slowly being recorded. And much of the writing is slanted to glorify some individual or company, although most of the information is valuable.

There are those who say that aviation is no longer an adventure—that airlines are a business. Somehow I don't agree. While most of the major companies were begun by pilots, the majority of the companies are today headed by accountants, lawyers, salesmen and administrators. But these are the people who are still adventuring—not at the risk of life and limb—but at the risk of goods and reputation. They are also treading new ground as they innovate and experiment with new systems, new procedures, to continue that essential service which is what aviation is all about—to provide the most rapid, safe, economical transfer of goods and people from Point A to Point B.

Can we say that there is no more adventure when supersonic flight can carry men from New York to London in one hour, 55 minutes, as the Lockheed SR-71 did recently, or the space shuttle, now under initial construction, which could fly from New York to Tokyo—or anyplace else on the earth's surface—in 45 minutes?

I don't think the adventure is over—I think it's just beginning.

Speaking of adventures, try this. All the astronaut launchings have been eastward toward the rising sun. What happens if you launch westward into yesterday's setting sun? You continue orbiting westward into last week, last year, etc. How many orbits must be made westbound to be your own grandfather?

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