

FlightPlan

A VOLUNTEER NEWSLETTER BY VOLUNTEERS



The Golden Age of Aviation

Page 4

From Jenny to Stearman; Training Evolution

Page 16

The Airplane That Made Airlines Profitable

Page 39

EVERGREEN
AVIATION & SPACE
MUSEUM



VOLUME 13
ISSUE 8
AUGUST 2026

The Golden Age of Aviation

BILL KOLB

FLIGHTPLAN EDITOR, MONDAY DOCENT

The years between the Armistice of 1918 and the outbreak of the Second World War form one of the most dynamic chapters in aviation history. In just over two decades, the airplane evolved from a fragile, open-cockpit biplane of wood, wire, and fabric into the sleek, all-metal monoplanes that would dominate the skies of the 1940s. This period is called the Golden Age of Aviation, and more broadly, the Interwar Years. Engines grew more powerful and reliable; propellers became adjustable and then constant-speed; retractable landing gear and enclosed cockpits appeared; and stressed-skin aluminum construction replaced older methods. Speed records climbed dramatically, long-distance flights proved the airplane's global reach, and perhaps most importantly, commercial aviation became economically viable. The Douglas DC-3, which entered service in 1936, was the first airliner that could earn a profit carrying passengers alone. By 1940, the technological foundations of modern air power and air transport were firmly in place.

The August 2026 issue of *FlightPlan* explores that remarkable transformation. This edition is organized into sections. We open with **History & Technology**, a broad overview of the period's major advances and milestones. That sets the table for our immersion into **Training**. Barry Brown presents a series of articles examining how the United States trained the pilots who would soon be needed in unprecedented numbers. He traces the evolution of the training pipeline and the aircraft that made it possible, from primary trainers to the basic and advanced types that prepared cadets for combat.

The final section is about the **Individual Airplanes** that defined the interwar years. Most of these airplanes are represented in the Museum's collection, allowing readers to connect the historical narrative with machines they can see and study firsthand. Together, these stories illustrate how a generation of designers, builders, instructors, and pilots turned the lessons of one war into the tools that would shape the next. ✈

GUIDELINES FOR SUBMITTING ARTICLES TO FLIGHTPLAN

1. The FlightPlan (FP) is published on the 1st of each month
2. Stories for the next issue can be filed up to the 10th of the prior month
3. Articles should be associated with an artifact at the Museum
4. Sources for specific information in the article should be provided
5. Stories should be approximately 500 words long
6. If appropriate, include one or two photos for publication with the article
7. Include name, day, and title at the bottom of each article submitted
8. Email articles to: flightplan@evergreenmuseum.org
9. Feedback is encouraged; submit to flightplan@evergreenmuseum.org

HISTORY & TECHNOLOGY



Between the wars, aviation transformed from fragile biplanes to powerful monoplanes that redefined speed, range, and capability.



The Golden Age of Aviation: 1919–1940

From Fabric and Wire to Metal and Speed

BILL KOLB

MONDAY DOCENT

Summary

Between 1919 and 1940, aviation transformed from fragile open-cockpit biplanes of wood, wire, and fabric into powerful all-metal monoplanes. Engines rose from 400 to over 1,000 horsepower, constant-speed propellers improved efficiency, and stressed-skin construction with retractable gear became standard. Landmark achievements included Lindbergh's 1927 Atlantic crossing, Hughes' 352-mph H-1 record, and the DC-3, the first airliner profitable on passengers alone.

When the guns of World War I fell silent in November 1918, the airplane was still a fragile and relatively primitive machine. Most combat aircraft were open-cockpit biplanes built of wood, wire, and doped fabric. Pilots sat exposed to the wind, rain, and cold. Engines rarely produced more than 250 to 400 horsepower, and speeds above 120 to 130 miles per hour were exceptional. Navigation depended on a map, compass, and dead reckoning. The airplane had proved itself as a weapon, but it remained a short-range, fair-weather instrument of limited reliability. In the twenty-one years that followed, the period now remembered as the Golden Age of Aviation, that wartime novelty was transformed into the powerful, reliable, and increasingly sophisticated monoplanes that would fight and carry the world through the next great conflict.

The transformation began with a mixture of necessity, opportunity, and restless ambition. The end of the war left thousands of surplus military aircraft and a generation of trained pilots suddenly without a mission. Barnstormers

(CONTINUED NEXT PAGE)

The Golden Age of Aviation: 1919–1940

From Fabric and Wire to Metal and Speed

(CONTINUED FROM PREVIOUS PAGE)

took to the skies, entertaining crowds and giving countless Americans their first airplane ride. The U.S. Post Office launched scheduled airmail service, forcing pilots and airplanes to fly in weather that would have grounded earlier machines. Early airlines struggled to find a profitable formula. At the same time, a smaller community of designers, engineers, and manufacturers began to rethink the airplane from first principles, determined to make it faster, safer, more efficient, and more useful.

Engine technology advanced steadily and then rapidly. The wartime Liberty V-12 and its British counterparts gave way to a new generation of air-cooled radial engines, Wright Whirlwinds and Cyclones, Pratt & Whitney Wasps and Hornets, that delivered greater power with improved reliability and lower weight. By the mid-1930s, engines of 750 to 1,000 horsepower or more were becoming common on transport and military aircraft. Liquid-cooled inline engines also matured, laying the groundwork for the high-performance engines of the coming war. Fuel quality improved, supercharging began to address the problems of high-altitude flight, and engine accessories grew more sophisticated.



Propellers underwent an equally important revolution. The fixed-pitch wooden propeller of the World War I era was efficient only at one particular combination of speed and power. Adjustable-pitch and then constant-speed metal propellers allowed pilots to optimize blade angle for takeoff, climb, cruise, and high-speed flight. The result was better performance across the entire flight envelope, improved fuel efficiency, and a noticeable increase in practical operating speeds and payloads.

The airframe itself changed more dramatically still. Designers abandoned the biplane's dense thicket of struts, braces, and bracing wires in favor of the clean cantilever monoplane wing. Structural design

shifted from wire-braced wood-and-fabric construction to aluminum-alloy stressed-skin structures in which the metal skin itself carried significant loads. Retractable landing gear reduced drag in cruise. Wing flaps improved low-speed handling and shortened takeoff and landing runs. Enclosed cockpits and cabins protected crews and passengers from the elements and made longer flights practical. The airplane that had once been an assemblage of parts held together by wire became a smooth, integrated, and far more efficient flying machine.

Speed records provided the most visible measure of progress. Racing aircraft of the Schneider Trophy contests and the National Air Races pushed streamlining and power to extremes. On September 13, 1935, Howard Hughes flew his H-1 Racer to a world landplane speed record of 352 miles per hour at Santa Ana, California, an achievement that showcased the benefits of careful streamlining, stressed-skin construction, and refined engineering. Long-distance flights captured public imagination and proved the airplane's growing reach. Charles



(CONTINUED NEXT PAGE)

The Golden Age of Aviation: 1919–1940

From Fabric and Wire to Metal and Speed

(CONTINUED FROM PREVIOUS PAGE)

Lindbergh's 1927 solo nonstop crossing of the Atlantic demonstrated what a well-designed, reliable airplane and a determined pilot could achieve. Subsequent record flights by Wiley Post, Amelia Earhart, and others extended the frontiers of range, endurance, and navigation.

Perhaps the single most important practical milestone of the era was the Douglas DC-3. When it entered airline service in 1936, the DC-3 became the first transport airplane that could make money carrying passengers alone, without relying on airmail subsidies. American Airlines president C. R. Smith later described it as "the first airplane in the world that could make money just by hauling passengers." Its combination of speed, range, payload, ruggedness, and relatively economical operating costs made scheduled airline service commercially viable on a large scale.

Military aviation followed a parallel path. The open-cockpit biplane fighters and bombers of the early 1920s gradually gave way to faster monoplanes with enclosed cockpits, retractable gear, and heavier armament. Training aircraft evolved as well. Primary trainers such as the Fairchild PT-19 and Ryan PT-22 introduced cadets to low-wing monoplane handling, while basic and advanced trainers prepared them for the higher-performance combat aircraft already on the drawing boards or entering service.

By 1940 the open-cockpit, fabric-covered biplane of 1919 had been largely relegated to primary training, sport flying, and secondary roles. The leading edge of aviation was the all-metal monoplane with retractable landing gear, constant-speed propeller, flaps, and an engine of 1,000 horsepower or more. These airplanes, the DC-3s and their rivals, the early fighters and bombers already in production or advanced development, the record-setting racers, carried the technological DNA of the air forces and airlines that would dominate the 1940s.

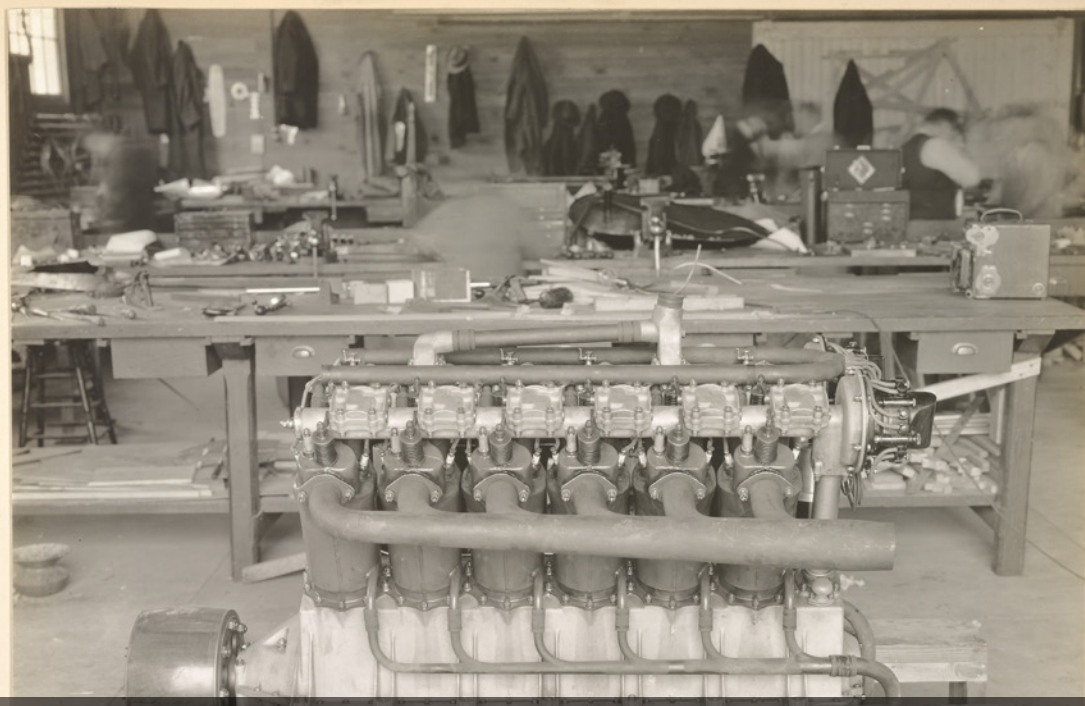


The Golden Age of Aviation was more than a romantic interlude of barnstormers, record flights, and elegant racing planes. It was a period of intense, practical engineering progress driven by competition, commercial pressure, military requirement, and individual ambition. In just over two decades, aviation grew from a wartime novelty into a mature system of transportation and national power. The lessons learned, the technologies perfected, and the pilots trained between 1919 and 1940 would shape the air war that followed and the global air-transport network that emerged after it. The journey from fabric and wire to metal and speed remains one of the most consequential technological transformations of the twentieth century. ➤

Milestones of the Golden Age

Year	Accomplishment	Significance
1919	First sustained commercial airline services begin in Europe	Early experiments in scheduled air transport
1919-1920	U.S. Air Mail Service expands with surplus DH-4s	Proves airplanes can operate on fixed schedules
1925	Kelly Act allows private contractors to carry U.S. airmail	Birth of the modern American airline industry
1926	Ford Tri-Motor enters service	First successful all-metal American airliner
1927	Charles Lindbergh's solo nonstop New York-Paris flight	Global proof of long-range reliability
1927-1930	Radial engines (Wright Whirlwind, Pratt & Whitney Wasp) mature	Greater power, reliability, and simplicity
1929-1930s	Adjustable- and constant-speed propellers appear	Better efficiency across all flight regimes
1930s	Stressed-skin aluminum monoplane construction becomes practical	Cleaner, stronger, faster airframes
1931-1932	Gee Bee and other racers dominate National Air Races	Extreme streamlining and power experiments
1933	Boeing 247 enters service	First modern American all-metal monoplane airliner
1934	de Havilland DH.88 Comet wins MacRobertson Race	Demonstrates advanced monoplane features together
1935	Howard Hughes- H-1 Racer sets world landplane speed record (352 mph)	Peak of pure aerodynamic refinement
1935-1936	Douglas DC-3 first flight and entry into service	First airliner profitable on passengers alone
1936-1939	Retractable landing gear, flaps, and enclosed cockpits become standard	Modern high-performance configuration established
1939	Fairchild PT-19 and Ryan PT-22 selected as primary trainers	Low-wing monoplanes enter large-scale training
1939-1940	First-line military aircraft are all-metal monoplanes with 1,000+ hp engines	Technological foundation for WWII air power set

SUBJECT:	19862	NUMBER	A
Rec'd. from Chief Signal Officer of Army			
PHOTOGRAPHER			
REC'D Apr. 20/18	TAKEN		
DESCRIPTION:			
LIBERTY MOTOR			
<u>CONFIDENTIAL</u>			



Powering the Golden Age

Aircraft Engine Advancement

BILL KOLB

MONDAY DOCENT

Summary

Between 1919 and 1940, aircraft engines advanced from the 200–400 horsepower designs of the First World War to reliable powerplants producing 1,000 horsepower or more. Air-cooled radials became dominant in many roles, liquid-cooled V-12s were steadily refined, supercharging improved high-altitude performance, and supporting technologies—better fuels and constant-speed propellers—allowed designers to extract far more useful power from each engine.

At the end of the First World War, a typical high-performance aircraft engine produced roughly 200 to 400 horsepower. The American Liberty V-12, the most important U.S. wartime design, delivered about 400 horsepower. Many engines still relied on water cooling, exposed valve gear, and relatively short times between overhauls. Reliability over long distances remained uncertain. By 1940 the best production engines delivered 1,000 horsepower or more, with far greater durability and markedly better high-altitude performance. That leap in both power and dependability stands as one of the central technical achievements of the Golden Age.

The first major postwar breakthrough came in air-cooled radial engines. Charles Lawrance's early designs, refined after Wright Aeronautical acquired his company, produced the well-known Whirlwind series. The Wright J-5 Whirlwind of 1925, rated at about 220 horsepower, earned a reputation as the first truly reliable engine of its class. It powered Charles Lindbergh's *Spirit of St. Louis* on the 1927 solo transatlantic flight and many other record and commercial flights, proving that an air-cooled radial could be trusted for long over-water journeys.

(CONTINUED NEXT PAGE)

Powering the Golden Age

Aircraft Engine Advancement

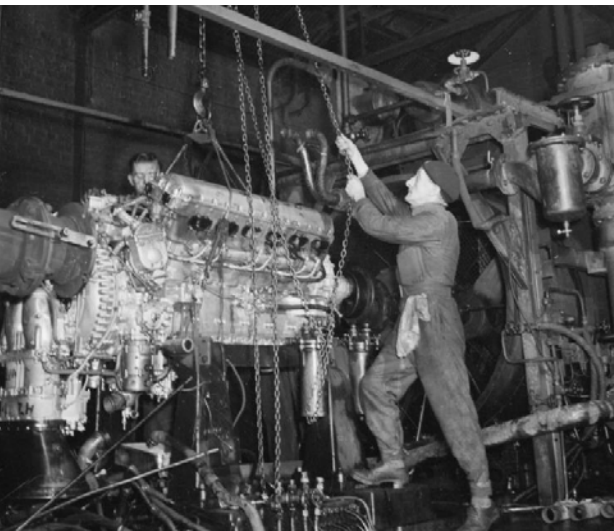
(CONTINUED FROM PREVIOUS PAGE)

In 1925, a group of engineers left Wright to form Pratt & Whitney. Their first product, the R-1340 Wasp, first ran at the end of that year and quickly set a new standard. The Wasp combined a forged crankcase, fully enclosed valve gear, and a built-in supercharger. Early versions produced around 425 horsepower; later models reached 600 horsepower or more. The engine powered a wide range of naval, military, and commercial aircraft and remained in production for decades. Pratt & Whitney followed with the larger Hornet, while Wright answered with the increasingly powerful Cyclone series. By the mid-1930s the nine-cylinder Wright R-1820 Cyclone was delivering 750 to more than 1,000 horsepower depending on the version, and twin-row radials such as the Pratt & Whitney R-1830 Twin Wasp and Wright R-2600 were entering service with still higher outputs.



Liquid-cooled engines followed a parallel path. The wartime V-12 layout was refined into smoother, more powerful designs. In Britain, Rolls-Royce developed the Kestrel and then the Merlin, which by the late 1930s approached or exceeded 1,000 horsepower. In the United States, the Allison V-1710 emerged as the principal liquid-cooled V-12 and also reached the 1,000-horsepower class by the end of the decade. Supercharging—both gear-driven and turbo—grew increasingly important as designers sought performance at higher altitudes.

Supporting technologies advanced alongside the engines themselves. Fuels rose from the low-octane mixtures of the early 1920s to 87-octane and higher grades that permitted greater compression ratios and boost. Constant-speed propellers allowed pilots to extract more useful power across the full range of flight conditions. Better metallurgy, improved cooling fins, fully enclosed valve trains, and more sophisticated carburetion or fuel injection all contributed to longer engine life and higher output.



By 1940, the best engines of the Golden Age had roughly tripled or quadrupled the power available in 1919 while dramatically improving reliability. These powerplants made possible the fast monoplane fighters, long-range bombers, and profitable airliners that defined the end of the interwar period and the opening years of the Second World War. ➤

Engines of the Golden Age

Engine	Type	Approx. Year	Typical Power	Notes / Significance
Liberty L-12	Liquid-cooled V-12	1918-1920s	400 hp	Standard U.S. wartime engine; postwar baseline
Wright J-5 Whirlwind	Air-cooled 9-cyl radial	1925	220 hp	First widely trusted reliable radial; Lindbergh
Pratt & Whitney R-1340 Wasp	Air-cooled 9-cyl radial	1925-26	425-600 hp	Modern radial design; Navy and commercial use
Pratt & Whitney R-1690 Hornet	Air-cooled 9-cyl radial	1927	525-750 hp	Larger companion to the Wasp
Wright R-1750 / early Cyclone	Air-cooled 9-cyl radial	late 1920s	500-525 hp	Early member of the Cyclone family
Wright R-1820 Cyclone	Air-cooled 9-cyl radial	1931-32	575-1,000+ hp	Major transport and military engine
Pratt & Whitney R-1830 Twin Wasp	Air-cooled 14-cyl radial	mid-1930s	1,000-1,200 hp	Twin-row design; very widely produced
Wright R-2600 Twin Cyclone	Air-cooled 14-cyl radial	late 1930s	1,400-1,600 hp	High-power twin-row radial
Rolls-Royce Kestrel	Liquid-cooled V-12	1927-30s	450-700 hp	Important British interwar engine
Rolls-Royce Merlin (early)	Liquid-cooled V-12	late 1930s	1,000+ hp	Foundation of later wartime Merlins
Allison V-1710 (early)	Liquid-cooled V-12	late 1930s	1,000-1,150 hp	Principal U.S. liquid-cooled V-12
Hispano-Suiza 12Y	Liquid-cooled V-12	1930s	800-1,000 hp	Widely used European V-12

The Constant-Speed Propeller

Keeping the Engine in the Sweet Spot



BILL KOLB

MONDAY DOCENT

Summary

One of the most important yet often overlooked advances of the Golden Age was the constant-speed propeller. By automatically adjusting blade pitch to hold a selected engine speed, it allowed pilots to extract far more useful performance from the powerful new engines of the 1930s and became a defining feature of modern high-performance aircraft by the end of the decade.

A fixed-pitch propeller is always a compromise. A blade angle optimized for takeoff and climb is inefficient in high-speed cruise; a cruise setting makes the airplane sluggish on takeoff. As engines grew more powerful and airframes cleaner in the late 1920s and 1930s, this limitation became a serious barrier to performance. Designers first responded with ground-adjustable propellers and then with two-position controllable-pitch designs that let the pilot select a low-pitch setting for climb or a high-pitch setting for cruise. These were valuable steps, but they still required manual management and did not automatically keep the engine at its most efficient speed.

The constant-speed propeller solved the problem. A governor senses engine rpm and continuously varies blade pitch so the engine runs at the speed the pilot has selected, regardless of airspeed or power setting. The result is strong takeoff and climb performance, efficient high-speed cruise, better fuel economy, and reduced pilot workload. In multi-engine aircraft, the ability to feather a failed engine's propeller, turning the blades edge-on to the airflow, greatly improved safety by reducing drag and preventing damaging windmilling.

Practical development in the United States was led by Frank W. Caldwell at Hamilton Standard. The company's two-position controllable-pitch propeller was production-ready by the end of 1932 and earned Caldwell and Hamilton Standard the 1933 Collier Trophy, presented by President Franklin D. Roosevelt. True constant-speed ver-

(CONTINUED NEXT PAGE)

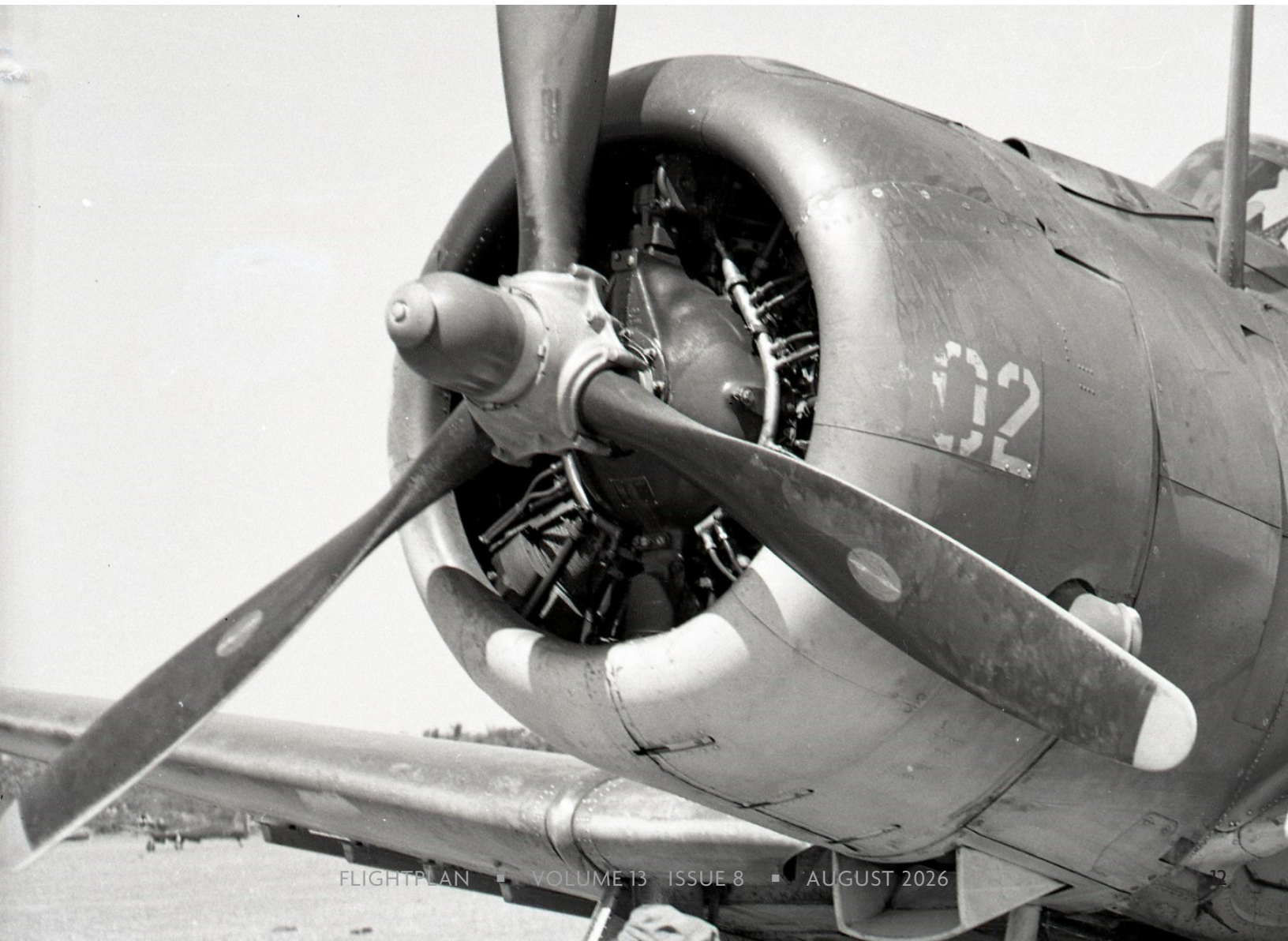
The Constant-Speed Propeller

Keeping the Engine in the Sweet Spot

(CONTINUED FROM PREVIOUS PAGE)

sions followed in the mid-1930s, with Hamilton Standard's design entering production around late 1935. In 1938, the company introduced the Hydromatic propeller, which used double-acting hydraulics for faster pitch change over a wider range and added reliable full-feathering capability. A public demonstration was flown on a United Air Lines DC-3 over New York City on 6 April 1938. The Hydromatic became one of the most important propeller designs of the Second World War.

Earlier theoretical work, including a 1924 British concept by H. S. Hele-Shaw and T. E. Beacham, had pointed the way toward automatic pitch control. It was the American engineering and production effort of the 1930s, however, that turned the idea into everyday equipment on advanced airliners and combat aircraft. By the end of the Golden Age the constant-speed propeller had joined retractable landing gear, flaps, stressed-skin construction, and high-output engines as one of the essential technologies that transformed the airplane from a World War I biplane into the modern monoplane of 1940. ➤



TRAINING

Faster, more complex airplanes of the Golden Age demanded skilled pilots, the following pages provide insight into that process.



Building Military Aviators

Primary Flight Training in U.S. Aviation, 1919–1940



BARRY BROWN

MONDAY DOCENT

Summary

In the two decades after World War I, American military aviation modernized under tight budgets, even as aircraft, engines, and instruments grew steadily more demanding. The Army Air Corps and Navy responded by creating progressive training systems that moved student pilots step by step from the basics of flight toward the discipline required by modern combat aircraft.

After the 1918 Armistice, the United States possessed a promising but underfunded air arm. Public fascination with flying continued to build through air races, endurance records, and Charles Lindbergh's 1927 Atlantic crossing, yet military aviation had to advance under constrained appropriations. Army planners refined ideas about bombardment, pursuit, and cooperation with ground forces. Naval officers pushed carrier operations, reconnaissance, and maritime strike from experiments toward doctrine, work that would prove vital once the nation entered World War II.

The airplanes themselves were changing just as quickly. Metal structures displaced wood and fabric. Cantilever wings, enclosed cockpits, cleaner fuselages, and retractable landing gear gave aircraft greater speed, range, and altitude capability. Instruments and radios became central to military flying, making poor-weather operations, cross-country navigation, formation work, and coordination with units on the ground safer and more precise. These advances raised the standard for every student pilot.

Powerplants advanced in parallel. Engines from Wright, Pratt & Whitney, Ranger, and Allison delivered more dependable power, better climb, higher useful loads, and improved speed. Radial and inline designs each served particular missions, while controllable-pitch and constant-speed metal propellers made careful engine handling a skill students had to master before they reached front-line aircraft. Takeoffs, landings, and simple maneuvers were no longer enough. Future military aviators needed to manage engines, use radios confidently, navigate over distance, fly on instruments, hold formation, and understand aircraft systems that were becoming less forgiving.

Because no single elementary trainer could teach all of these skills, both services built progressive programs that advanced students step by step as their judgment and technique improved. By the late 1930s, training had become

(CONTINUED NEXT PAGE)

Building Military Aviators

Primary Flight Training in U.S. Aviation, 1919–1940

(CONTINUED FROM PREVIOUS PAGE)

a structured system. The Army Air Corps and the Navy each adopted staged instruction tailored to their respective future battlefields. The Army prepared pilots for land-based operations across wide theaters. The Navy emphasized over-water navigation, fleet coordination, and the exacting habits required for carrier aviation.

For the Army, expansion centered on fields such as Randolph Field, Texas, known as the “West Point of the Air,” and Kelly Field. Instruction was divided into primary, basic, and advanced phases. Students moved forward only after proving they could handle the habits, procedures, and aircraft of the stage they were leaving behind. The Navy followed a comparable progression at Naval Air Station Pensacola, the historic center of naval aviation training. Students learned not only how to fly but how to operate as part of a fleet: navigating over water, communicating with ships, landing with precision, and maintaining formation discipline before moving toward carrier qualification.

As war clouds gathered over Europe and Asia, both services recognized that existing schools could not produce pilots fast enough. Congress funded a broader aviation buildup, and in 1939 the federal government launched the Civilian Pilot Training Program. By using colleges and civilian flight schools, the program introduced thousands of young Americans to flying and enlarged the pool from which the armed services could draw future pilots.

By the end of the pipeline, Army and Navy pilots had moved from forgiving primary trainers into heavier basic aircraft and finally into advanced trainers such as the North American AT-6 and SNJ. The sequence did more than teach flying; it built confidence, procedural discipline, and adaptability. That foundation helped the United States expand its airpower at an extraordinary pace once World War II began. ➤





From Jenny to Stearman

The Evolution of the Primary Trainer

BARRY BROWN

MONDAY DOCENT

Summary

In the years after World War I, American military flight training relied heavily on the Curtiss JN-4 “Jenny.” As aircraft performance and training demands increased, the services turned to more durable designs. The Stearman family of biplane trainers, culminating in the Boeing-Stearman Model 75, became the rugged workhorses that prepared thousands of pilots for the next stage of instruction.

The Curtiss JN-4 “Jenny” formed the foundation of American military flight instruction in the early 1920s. Developed originally as a wartime trainer, it remained in large numbers in government inventories after the Armistice. Powered by the modest 90-horsepower Curtiss OX-5 liquid-cooled engine, the Jenny was valued for stability, forgiving handling, and good visibility rather than speed or power. It taught the essentials: takeoffs, landings, coordinated turns, stalls, spins, and elementary aerobatics, while introducing students to the discipline of military flying and basic aircraft care.

Although the Navy operated the Jenny on a smaller scale than the Army, the aircraft still contributed to the early training of naval aviators before they advanced to floatplanes and carrier-based types. By the mid-1920s, however, the Jenny’s wood-and-fabric construction, modest performance, and limited growth potential no longer met the needs of a modernizing air arm. Both services required primary trainers capable of withstanding heavier use, absorbing the hard landings of inexperienced students, and better preparing cadets for the faster, more powerful aircraft already in operational units.

The Stearman Aircraft Company met that requirement with a series of robust biplane trainers. Welded steel-tube fuselages, fabric-covered surfaces, and reliable air-cooled radial engines gave these aircraft greater durability and easier maintenance than earlier types. Students could practice precision flying, emergency procedures, stalls, spins, crosswind landings, and aerobatics under conditions closer to those they would later encounter in military service. The structural resilience of the Stearman designs reduced the consequences of hard student landings and allowed the airplanes to remain in intensive use on busy training fields.

The culmination of this line was the Boeing-Stearman Model 75, introduced in the late 1930s. The Army operated versions designated PT-13, PT-17, and PT-18; the Navy flew it as the N2S. Powered by Lycoming R-680 or Continental

(CONTINUED NEXT PAGE)

From Jenny to Stearman

The Evolution of the Primary Trainer

(CONTINUED FROM PREVIOUS PAGE)

R-670 radials, the Model 75 combined favorable handling with structural toughness. It became one of the most important primary trainers of the expansion years just before and during World War II. Thousands of Army and Navy pilots received their first formal flight instruction in these aircraft before advancing to basic and advanced trainers and, ultimately, to operational fighters, bombers, and patrol aircraft.

The progression from the Jenny to the Stearman family illustrates how interwar training adapted to rising aircraft performance and growing institutional needs. The Jenny preserved and extended the instructional methods used in World War I aviation. The Stearman designs carried those methods into a new era of higher standards, greater durability, and much larger pilot production requirements. Together they formed a critical link between the modest air arm of the early 1920s and the massive training system that supported American airpower in the Second World War. ➤





Army and Navy Primary Trainers on the Eve of War

Fairchild PT-19B, N2S Kaydet & N3N Canary

BARRY BROWN

MONDAY DOCENT

Summary

By the late 1930s, the Army and Navy employed different primary trainers that reflected their operational priorities. The Army adopted the low-wing Fairchild PT-19B Cornell to introduce cadets to modern monoplane handling and basic instrument flying. The Navy continued to rely on rugged biplanes, the Boeing-Stearman N2S Kaydet and the Naval Aircraft Factory N3N Canary, well suited to high-volume instruction and the demands of naval aviation.

As the United States expanded its pilot-training capacity in the late 1930s, the services selected primary trainers that aligned with their doctrines and the aircraft students would soon fly. Although the Army and Navy followed parallel progressive systems, their choice of primary aircraft revealed different priorities.

The Army Air Corps selected the Fairchild PT-19 Cornell. First flown in 1939, the clean low-wing monoplane represented a deliberate step away from the traditional biplane trainer. Powered by a 200-horsepower Ranger inverted inline engine, the PT-19B variant added full instrumentation and a collapsible hood over the front cockpit. Instructors could thereby introduce students to basic instrument flying under simulated blind conditions, an important preparation for later stages of training and for the poor-weather operations that modern air forces increasingly required. Cornell's higher wing loading and monoplane handling demanded greater precision than the older biplanes, especially near the stall and during landings. Army training authorities accepted this characteristic so that cadets

(CONTINUED NEXT PAGE)

Army and Navy Primary Trainers on the Eve of War

Fairchild PT-19B, N2S Kaydet & N3N Canary

(CONTINUED FROM PREVIOUS PAGE)



would develop the control and judgment needed for the faster, heavier aircraft awaiting them.

The Navy took a different path. It continued to rely on sturdy biplane trainers that prioritized durability, manageable low-speed handling, and the ability to withstand the hard use of high-volume training fields. The Boeing-Stearman N2S Kaydet, the naval version of the widely used Model 75, became one of the era's most recognizable primary trainers. Its steel-tube fuselage, fabric covering, and reliable radial engine made it well suited to repeated student landings and the demanding schedules of wartime expansion. Students learned coordination, energy management, and precise landings in an airplane that forgave many early mistakes while still teaching essential skills.

Alongside the Stearman, the Navy operated the Naval Aircraft Factory N3N Canary. Designed and built by the Navy's own factory in Philadelphia, the N3N featured a rugged structure, good maintenance access, and the ability to operate on either wheels or floats. Painted bright yellow for high visibility, it earned the nicknames "Canary" and, more commonly among students, "Yellow Peril." The Canary served at nearly every major naval training field and remained in limited service longer than any other U.S. military biplane, with some examples continuing at the Naval Academy into the late 1950s and early 1960s.

Although the Army and Navy chose different aircraft, their fundamental goal remained the same: to turn civilians with little or no flying experience into disciplined student pilots ready for the next phase of instruction. The PT-19B, N2S, and N3N each taught the fundamentals of flight in a controlled but demanding environment. In doing so, they established the habits, judgment, and confidence that supported the rapid expansion of American airpower in World War II. ➤



INDIVIDUAL AIRPLANES

**The following aircraft tell the story of interwar innovation,
most of which are displayed in our Museum.**



The de Havilland DH-4



Liberty Plane of Two Eras

BILL KOLB

MONDAY DOCENT

Summary

Designed in Britain as a World War I day bomber, the de Havilland DH-4 became the only U.S.-built combat aircraft to see action in that conflict. American factories produced nearly 4,850 “Liberty Planes.” After the war, the type served the U.S. Air Service and Post Office for more than a decade in observation, airmail, forest patrol, and air-ambulance roles, making it a vital bridge between wartime combat and interwar utility aviation.

The Airco DH-4 was designed by Geoffrey de Havilland in 1916 as a fast two-seat biplane day bomber for British forces. It featured a clean layout, good speed for its era, and the ability to carry a useful bomb load. When the United States entered the war in 1917, the design was selected for large-scale American production and adapted to the new Liberty 12-cylinder engine. The resulting aircraft became widely known as the “Liberty Plane.”

Three principal American manufacturers, Dayton-Wright, Fisher Body, and Standard Aircraft, completed 4,846 DH-4s before the Armistice. Although early production suffered from quality problems and delays, the type reached combat squadrons in France in 1918 and flew bombing, reconnaissance, and artillery-spotting missions. It remains the only U.S.-manufactured combat

airplane to see front-line service in World War I.

After 1918, with large numbers of airframes available and limited budgets for new designs, the U.S. Army Air Service kept the DH-4 in service well into the early 1930s. Many were rebuilt to the improved DH-4B standard, which moved the pilot's cockpit aft of the fuel tank for better crew communication and safety. The versatile biplane performed observation, photographic survey, target-towing, forest-fire patrol, and light transport duties.

One of the most important postwar roles was airmail. The Post Office Department acquired surplus DH-4s, modified them with a watertight mail compartment in place of the forward cockpit, and standardized the DH-4B as the workhorse of the early U.S. Air Mail Service. These aircraft carried hundreds of millions of letters and helped establish the first coast-to-coast airmail routes, including night flying.

The DH-4 also contributed to early aeromedical evacuation. Some airframes were converted into air ambulances. A documented 1920 ambulance version, the DH-4AMB-2, could carry litters. Navy and Marine Corps examples of the later Boeing-built DH-4M (O2B) series were likewise modified to carry a single stretcher casu-

(CONTINUED NEXT PAGE)

The de Havilland DH-4

Liberty Plane of Two Eras

(CONTINUED FROM PREVIOUS PAGE)

ality in an enclosed compartment behind the pilot. In an era before dedicated air-ambulance fleets existed, these conversions provided a practical means of moving injured personnel from remote or difficult locations.

By the early 1930s, newer aircraft finally replaced the Liberty Plane, yet its long second career had already shaped interwar aviation practice. The DH-4 demonstrated that a proven wartime design could be adapted for mail, observation, survey, and medical transport, helping establish the operational patterns later refined by purpose-built interwar types.

About Our Artifact

This DH-4 was built in 1916. It is one of the very few airplanes converted to the DH-4M at Boeing's historic Red Barn, with the M designation denoting "modernized."

The U.S. Air Service owned all new DH-4Ms, and later transferred them to the Agricultural Department, who converted them to crop dusters. Paramount Pictures purchased the aircraft in 1938, and Paul Mantz, the famous stunt pilot, flew it in several films including *Men with Wings*, *Task Force*, *Court Martial of Billy Mitchell*, and *The Spirit of St. Louis*, starring Jimmy Stewart.

This aircraft was restored to its mail plane configuration in 1982. It has been on display in McMinnville since 1990.





The Ford 5-AT-B Tri-Motor

The Tin Goose That Built an Industry

BILL KOLB

MONDAY DOCENT

Summary

First flown in 1926 and refined as the more powerful 5-AT in 1928, the Ford Tri-Motor became the workhorse of early American commercial aviation. Its all-metal construction, three-engine safety, and ability to carry a dozen passengers helped prove that scheduled air travel could be practical and reliable. Nicknamed the “Tin Goose,” the Tri-Motor also served in cargo, military, and utility roles, including medical evacuation flights.

When Henry Ford entered the aircraft business in the mid-1920s, he applied the same principles of rugged simplicity and mass production that had made the Model T successful. After acquiring the Stout Aircraft Company, Ford's engineers developed an all-metal, three-engine monoplane designed from the start to carry passengers rather than just mail. The first Ford Tri-Motor flew on 11 June 1926. The later 5-AT variant, introduced in 1928, featured more powerful Pratt & Whitney Wasp radial engines of about 420 horsepower each, a larger cabin seating up to thirteen to seventeen passengers, and improved performance.

The Tri-Motor's corrugated aluminum skin earned it the affectionate nickname “Tin Goose.” More important than appearance was its safety philosophy: three engines meant the airplane could continue flying if one failed—a critical reassurance for a public still wary of air travel. Cruise speeds were modest (around 120 mph), but the combination of metal construction, multiple engines, and reasonable range made the type ideal for the expanding network of U.S. airlines. By the late 1920s, nearly every major American carrier operated Tri-Motors, and the aircraft helped establish many of the domestic routes that later formed the backbone of the national air system.

Approximately 199 Tri-Motors were built between 1926 and 1933, of which about 117 were 5-AT models. Production ended during the Great Depression, but the airplanes continued flying for decades in passenger, cargo, sightseeing, and utility roles. Military versions served the U.S. Army Air Corps (as C-3 and C-4) and other services. Beyond

(CONTINUED NEXT PAGE)

The Ford 5-AT-B Tri-Motor

The Tin Goose That Built an Industry

(CONTINUED FROM PREVIOUS PAGE)

scheduled airline work, Tri-Motors performed cargo hauling, aerial survey, and emergency transport, demonstrating the value of a reliable multi-engine transport when surface travel was impractical.

One of the Tri-Motor's most distinctive later roles was flying the local post to Rattlesnake Island in Lake Erie. For decades, a Ford Tri-Motor carried mail between the mainland and the small private island when surface boats were impractical. The island operated its own local post and issued distinctive stamps—many triangular and featuring images of the Tri-Motor itself—to cover the cost of the air service. Collectors worldwide still seek these colorful “Rattlesnake Island Local Post” stamps, a tangible reminder of the Tin Goose's long second career as a reliable island-hopper and mail plane. *Your editor had the privilege of flying in the Rattlesnake Island Tri-Motor in 1970.*

The Ford Tri-Motor never achieved the speed or efficiency of the later Boeing 247 or Douglas DC-2, yet it performed an essential transitional role. By proving that an all-metal, multi-engine airliner could operate day after day on scheduled routes, it built public confidence and operational experience that later generations of faster, more sophisticated aircraft would inherit.

About Our Aircraft

The Museum previously displayed a Ford Tri-Motor 5-AT-B (construction number 8, registered NC9645). That aircraft has long since left the collection. We retain a scale model of the airframe. ➤





The Curtiss Robin C-1

The Practical Cabin Plane

BILL KOLB

MONDAY DOCENT

Summary

Introduced in 1928 to meet the surge of public interest after Lindbergh's flight, the Curtiss Robin became the most successful Curtiss civil aircraft of the interwar years. A simple high-wing cabin monoplane seating a pilot and two passengers, it proved reliable in training, newspaper delivery, endurance flying, and general utility work. Its toughness and economy helped bring practical aviation to rural America at a time when reliable aircraft were still rare.

Curtiss designed the Robin to capitalize on the sudden popularity of aviation that followed Charles Lindbergh's 1927 transatlantic flight. The company created a straightforward high-wing monoplane with a fabric-covered steel-tube fuselage, wooden wings, and an enclosed cabin that seated the pilot in front and two passengers behind. Early examples used surplus World War I Curtiss OX-5 engines, which were still plentiful and inexpensive nearly a decade after the war. Later production models, including the C-1, received more modern power plants such as the Curtiss Challenger radial of approximately 185 horsepower.

Between 1928 and 1930, Curtiss-Robertson built 769 Robins, making the type the most-produced Curtiss aircraft of the interwar period. The design was practical rather than glamorous: cruise speeds hovered near 100 mph, range was modest, and construction was deliberately simple so that operators could maintain the airplanes with limited facilities. These qualities made the Robin ideal for flight schools, small charter services, and private owners who needed a dependable three-place cabin aircraft.

The Robin is best remembered for a series of spectacular endurance flights that demonstrated both the airplane's reliability and the growing maturity of American aviation. In 1935 the brothers Fred and Al Key, flying a Robin nicknamed Ole Miss, stayed airborne for more than 27 continuous days (653 hours), receiving fuel through a hose from a second aircraft and supplies lowered by rope. Douglas "Wrong-Way" Corrigan later crossed the Atlantic to Ireland in a Robin after filing a flight plan for Los Angeles, further cementing the type's reputation for rugged dependability.

(CONTINUED NEXT PAGE)

The Curtiss Robin C-1

The Practical Cabin Plane

(CONTINUED FROM PREVIOUS PAGE)

Beyond the headlines, the Robin performed everyday work that quietly expanded the reach of aviation. One of the best-documented examples is The Newsboy, a 1929 Robin purchased by the Daily Gazette of McCook, Nebraska. Each morning the airplane flew a 380-mile circuit, dropping bundles of newspapers through a hole in the fuselage to roughly forty towns across rural Nebraska and Kansas, among the first regular aerial newspaper-delivery services in the United States. Similar utility roles, passenger hops, flight training, and light cargo took Robins into communities that had never enjoyed reliable air service.

By proving that a simple cabin monoplane could operate day after day from modest fields, the Robin helped normalize the idea that aircraft could serve isolated towns when roads were poor or weather closed surface routes.

With its high wing, enclosed cabin, and no-nonsense engineering, the Curtiss Robin C-1 stands as one of the most successful civil airplanes of the late 1920s, a machine that turned the excitement of the Lindbergh era into everyday utility.

About Our Aircraft

C.R. Putman of Pontiac, Michigan took delivery of the Robin in late July 1929. Putman operated a flight school and offered flight instruction and sightseeing flights for as little as \$2.50.

As originally complete, a 90-hp Curtiss OX-5 inline engine powered this aircraft. A later owner converted the aircraft to utilize a 185 horsepower Curtiss Challenger radial engine. Keith Aakre of Seattle, Washington, purchased the aircraft in the 1990s and fitted it with a Continental R-670 radial rated at 220 horsepower. Mr. Aakre donated the aircraft to the Evergreen Aviation & Space Museum in 2004. ✈



A high-wing, strut-braced monoplane with a single radial engine, suspended in a museum. The fuselage is covered in various sponsor logos and the words "Spirit of St. Louis". The wingspan is large, and the landing gear is visible. The background shows other exhibits and museum signage.

The Ryan NYP “Spirit of St. Louis”

The Airplane that Conquered the Atlantic

BILL KOLB

MONDAY DOCENT

Summary

Built in just sixty days in 1927, the Ryan NYP “Spirit of St. Louis” carried Charles Lindbergh on the first solo nonstop flight from New York to Paris. Designed by Donald Hall under Lindbergh’s close supervision, the single-engine monoplane proved that long-range ocean flight was possible. Its success transformed public confidence in aviation and accelerated the development of reliable long-range aircraft.

In early 1927, Charles Lindbergh sought an aircraft capable of winning the \$25,000 Orteig Prize for the first nonstop flight between New York and Paris. Several earlier attempts had ended in tragedy, underscoring the extreme risks of transoceanic flying with the technology of the day. Lindbergh turned to Ryan Airlines in San Diego, where chief engineer Donald A. Hall redesigned the company’s existing M-2 mail plane into a specialized long-range monoplane. Working under intense pressure, Hall and the Ryan team completed the aircraft in sixty days.

Officially designated the Ryan NYP (New York to Paris), the airplane was a high-wing, strut-braced monoplane powered by a single 223-horsepower Wright J-5C Whirlwind radial engine. To maximize range, large fuel tanks were placed ahead of the cockpit, blocking forward visibility. Lindbergh relied on a small periscope on the left side of the fuselage and side windows to see ahead. Unnecessary equipment, radio, parachute, and even conventional instruments in some cases, was eliminated to save weight. The finished aircraft had a wingspan of 46 feet, an empty weight of approximately 2,150 pounds, and a maximum takeoff weight of more than 5,000 pounds when fully fueled.

On May 20–21, 1927, Lindbergh flew the Spirit of St. Louis from Roosevelt Field, New York, to Le Bourget Field near Paris in 33 hours and 30 minutes. The flight captured worldwide attention and demonstrated that a carefully designed single-engine airplane could safely cross the Atlantic. The achievement dramatically increased public and commercial interest in aviation, encouraging investment in more reliable engines, better navigation, and longer-range aircraft.

(CONTINUED NEXT PAGE)

The Ryan NYP “Spirit of St. Louis”

The Airplane that Conquered the Atlantic

(CONTINUED FROM PREVIOUS PAGE)

Although the Spirit of St. Louis itself was never employed in formal search-and-rescue service, the risks of the era made the need for such capabilities clear. Multiple competing crews had already been lost at sea attempting the same crossing. Lindbergh’s success helped shift aviation from a hazardous novelty toward a dependable form of transportation. The improved aircraft and operational practices that followed his flight eventually made possible the reliable long-range flying of later decades.

The original Spirit of St. Louis made its final flight in 1928 and was presented to the Smithsonian Institution. Accurate replicas, including the example displayed in our Museum, allow visitors to appreciate the engineering compromises and bold vision that defined the aircraft. The Ryan NYP remains one of the most recognizable symbols of the interwar leap from short-range biplanes to purposeful long-distance monoplanes.

About Our Aircraft

This full-scale replica represents Charles Lindbergh’s *Spirit of St. Louis* as it appeared at the time of its record nonstop transatlantic flight. The exterior is complete with all markings and placards, and the airframe is covered with synthetic fabric to ensure longevity. The interior of the fuselage is very basic, with only those items necessary to keep the flight control surfaces in flight attitudes while on display. It was built by Century Aviation of Wenatchee, Washington. ✈



The Curtiss Model 51 Fledgling

Teaching the Golden Age to Fly



BILL KOLB

MONDAY DOCENT

Summary

Designed in 1927 as a U.S. Navy primary trainer and produced in civil form as the Model 51, the Curtiss Fledgling helped transition American aviation from World War I biplanes to the more modern aircraft of the interwar years. Powered by Curtiss's own Challenger radial engine, the open-cockpit biplane served as both a flight-school trainer and an air taxi.

In 1927 the U.S. Navy issued a requirement for a new primary trainer to replace the aging Curtiss N-9, a naval version of the World War I Jenny still in widespread use. Curtiss responded with a conventional two-bay biplane featuring staggered wings of equal span, tandem open cockpits, and a steel-tube fuselage with wood-framed wings and an aluminum-framed tail. The design won a competition against fourteen other submissions and entered Navy service as the N2C Fledgling, with more than fifty examples built. The aircraft could be fitted with either conventional landing gear or a large central pontoon and wingtip floats for seaplane training.

Recognizing commercial potential, Curtiss developed a civil version in 1929 as the Model 51. Instead of the Wright Whirlwind engines used on most Navy N2Cs, the Model 51 received the company's own Curtiss Challenger, a six-cylinder, twin-row radial whose cylinders were staggered fore and aft. The Challenger gave the civil Fledgling reliable power for the dual roles Curtiss envisioned: flight training and air-taxi service. Approximately 109 Model 51s were completed before the Great Depression sharply reduced demand.

Most of the civil Fledglings served with the Curtiss Flying Service, often painted in the company's distinctive orange-and-yellow scheme. They carried passengers and packages on short routes and provided dual-control instruction at Curtiss flying schools. A smaller number were exported to countries including Brazil, Canada, Colombia, Czechoslovakia, Turkey, and Iran.

With its long wings, open cockpits, and bright period colors, the Curtiss Model 51 Fledgling remains a tangible link to the Golden Age of American aviation—the era when open-cockpit biplanes still served as both classrooms and commercial workhorses. It trained the generation of pilots who would expand the reach of aviation into remote regions and, eventually, into organized rescue and medical-evacuation operations.

(CONTINUED NEXT PAGE)

The Curtiss Model 51 Fledgling

Teaching the Golden Age to Fly

(CONTINUED FROM PREVIOUS PAGE)

About Our Aircraft

We suspect that the Curtiss Flying Service principally used the Museum's Curtiss Fledgling as an air taxi in the early 1930s. The Curtiss Flying Service colors were orange and yellow, so when the Museum's Restoration department began restoring the plane in 2009, the colors seemed to be a natural fit. ➤





The Pietenpol Air Camper

Affordable Wings for the Common Man

BILL KOLB

MONDAY DOCENT

Summary

Designed by Bernard H. Pietenpol and first flown with a Ford Model A engine in May 1929, the Air Camper is a simple, plans-built, two-seat parasol-wing monoplane that became an icon of the American homebuilt movement. Intended to be affordable and constructible by ordinary people using readily available materials and automotive engines, it helped democratize personal flying during the interwar years and remains popular among amateur builders today.

Bernard H. Pietenpol, a self-taught mechanic and aviator from Cherry Grove, Minnesota, set out in the late 1920s to create an airplane that ordinary people could afford to build and fly. At a time when most factory aircraft were expensive and beyond the reach of average citizens, Pietenpol focused on simplicity, low cost, and the use of widely available components. The result was the Air Camper, a high-wing parasol monoplane with tandem open cockpits, wooden structure, and fabric covering. The design first flew successfully with a converted Ford Model A automobile engine in May 1929.

The Air Camper's defining feature was its powerplant. Rather than relying on costly aircraft engines, Pietenpol adapted the reliable four-cylinder Ford Model A engine, a choice that dramatically lowered both purchase and operating costs. Later builders have flown Air Campers with a variety of engines, including Continental, Corvair, and other conversions, but the Model A remains the classic and historically significant choice. Typical performance with the Ford engine includes a cruise speed around 70–85 mph, a landing speed near 35–40 mph, and modest takeoff and landing runs suitable for small fields.

(CONTINUED NEXT PAGE)

The Pietenpol Air Camper

Affordable Wings for the Common Man

(CONTINUED FROM PREVIOUS PAGE)

Construction was deliberately straightforward. The airframe used spruce, plywood, and steel fittings that could be worked with basic woodworking and metalworking skills. Pietenpol sold plans rather than completed airplanes, following a business model that emphasized enabling others to build. Plans were published and popularized in the early 1930s through magazines such as *Modern Mechanics* and *Inventions*, helping spread the design nationwide during the Depression years when factory aircraft sales collapsed.

Today the Pietenpol Air Camper remains one of the longest-lived and most respected homebuilt designs. Original plans are still available through the designer's family, and numerous examples continue to fly.

About Our Aircraft

The Museum's Air Camper was built by C. Vernon Snider of Tangent, Oregon. He completed the fuselage frame and wing structure before passing away in 2010. His widow, Gloria, donated the aircraft to the museum, never to be flown. This aircraft was originally scheduled to be equipped with a Chevrolet Corvair engine, but when restoration volunteers completed it in 2012, a vintage Ford Model A engine was installed to reflect the original power plant to the early models. ➤



The Granville Brothers Model E

Sportster of the Golden Age



BILL KOLB

MONDAY DOCENT

Summary

Built by the Granville Brothers of Springfield, Massachusetts, the Model E Sportster was the definitive member of their light sport-plane family of the early 1930s. Powered by a Warner Scarab radial engine and fitted with a Townend ring, only four examples were produced. The type combined the brothers' emerging design philosophy with practical sport flying and served as a stepping-stone toward their more famous, and more dangerous, racing aircraft. None of the four original planes survived; the Museum's Model E is a replica that was once airworthy.

The Granville Brothers, Zantford ("Granny"), Thomas, Robert, Mark, and Edward, established their aircraft company in Springfield, Massachusetts, in 1929. Working from modest facilities, they quickly gained a reputation for innovative, high-performance designs. Their early work centered on a series of small, low-wing monoplanes known as the Sportsters. The line began with the Model X in 1930 and evolved through several variants before reaching its most refined form in the Model E.

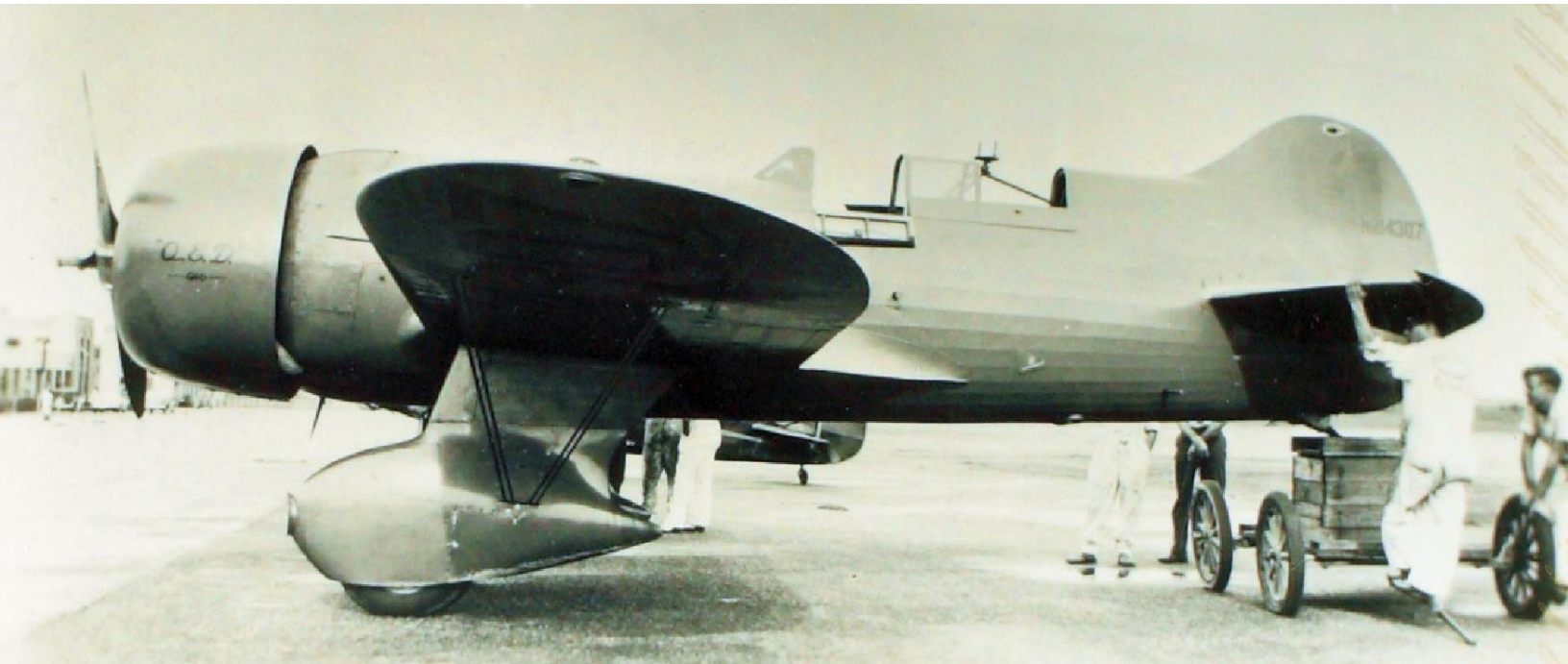
The Model E replaced the inline engines of earlier Sportsters with a seven-cylinder Warner Scarab radial of approximately 110 horsepower, enclosed by a distinctive Townend ring intended to reduce drag while improving cooling. Like its predecessors, it was a single-seat (or occasionally two-seat in related models), open-cockpit, low-wing monoplane with fixed undercarriage. The design emphasized clean lines, light weight, and lively performance suited to sport flying and limited racing. Only four Model E aircraft were completed, making the type rare even in its own day.

The Sportster series occupied an important place in the Granville story. While the later Model Z and Model R Super Sportsters became legendary and infamous for their extreme speed and challenging handling in the National Air Races, the earlier Sportsters were more approachable airplanes intended for private owners and sporting pilots. They allowed the brothers to refine construction techniques, aerodynamic ideas, and engine installations that would later be pushed to the limit in pure racing designs.

(CONTINUED NEXT PAGE)

The Granville Brothers Model E Sportster of the Golden Age

(CONTINUED FROM PREVIOUS PAGE)



Tragedy marked the Model E's brief history. All four examples were ultimately destroyed in accidents. Most notably, company founder Zantford "Granny" Granville was killed on February 11, 1934, while flying a Model E. After an engine failure, he attempted to land while deliberately avoiding construction workers on the runway at Spartanburg, South Carolina, and crashed. His death was a severe blow to the already struggling firm, which had closed its doors the previous year amid the Depression and a string of racing tragedies.

Although the Model E itself played no significant military role, it contributed to the broader culture of interwar aviation. The Sportsters helped popularize the low-wing monoplane configuration among civilian pilots and demonstrated that small, carefully streamlined airplanes could deliver exciting performance on modest power. In that sense, they formed part of the experimental ferment that characterized American aviation between the wars.

About Our Aircraft

The Museum displays a full-scale Gee Bee Model E Sportster replica (registration NC11044 / N11044). Scott Crosby of Antelope, California, built this replica in 1987 using copies of the original construction drawings obtained from the National Air and Space Museum. After surviving several crashes, it was sold to Jim Teel, who had Crosby's help in rebuilding it before donating it to the Museum. After extensive checking, it appears the Museum holds the only full-sized Model E replica currently known. ➤



BILL KOLB

MONDAY DOCENT

Summary

Designed in 1936 as a luxurious amphibious “flying yacht” for Long Island businessmen, the Grumman G-21 Goose first flew on May 29, 1937. Its rugged all-metal construction and ability to operate from land or water quickly earned it military and civilian roles far beyond its original purpose. During and after World War II, the Goose performed vital search-and-rescue and utility missions with the U.S. Coast Guard, Royal Canadian Air Force, and civilian operators in remote coastal regions.

The Grumman G-21 Goose began life as a private commission. In 1936, a group of wealthy Long Island businessmen approached the Grumman Aircraft Engineering Corporation seeking a reliable amphibious aircraft that could ferry them between their estates and Manhattan. The resulting design was Grumman’s first monoplane, its first twin-engine aircraft, and its first commercial success. The high-wing amphibian featured nearly all-metal construction, retractable landing gear, and a spacious fuselage that could accommodate passengers in comfort—complete with amenities that earned it the nickname “flying yacht.” Powered by a pair of 450-horsepower Pratt & Whitney R-985 Wasp Junior radial engines, the prototype made its first flight on 29 May 1937. Approximately 345 examples were ultimately produced between 1937 and 1945.

The aircraft’s combination of range, payload, and amphibious capability soon attracted military attention. The U.S. Navy adopted it as the JRF, while the U.S. Coast Guard recognized its potential as a search-and-rescue platform. Between 1939 and 1941, the Coast Guard acquired seven JRF-2s, three JRF-3s, and twenty-four JRF-5Gs. Many were fitted with de-icing boots for northern operations and cameras for aerial mapping. Pre-war Coast Guard Gooses conducted search-and-rescue missions, aerial survey work, and Neutrality Patrol flights. During World War II they

(CONTINUED NEXT PAGE)

Grumman G-21 Goose

The Flying Yacht That Became a Workhorse

(CONTINUED FROM PREVIOUS PAGE)

continued rescue duties, carried depth charges for anti-submarine work, and transported personnel and supplies. By August 1944 the Coast Guard had sixteen Grumman JRFs assigned to air-sea rescue duties along both coasts.

The Royal Canadian Air Force was among the earliest military operators, acquiring Gooses beginning in 1938 for transport, reconnaissance, training, and rescue work. One notable example, a 1944 G-21A later registered CF-MPG, served the RCAF before transfer to the Royal Canadian Mounted Police in 1946. For nearly five decades, the aircraft performed missing-person searches, boat and vehicle recoveries, and general transportation across Canada, particularly along the British Columbia coast. When it retired in 1994, it held the distinction of the longest continuous public service of any Canadian civil aircraft.

After the war, the Goose found a second career in the rugged coastal and island environments of Alaska and British Columbia. Its ability to land on water or rough airstrips made it ideal for serving isolated communities. Civilian operators used the type for passenger and freight service, as well as search-and-rescue work when larger aircraft or helicopters were unavailable. The same qualities that had made it attractive as a private flying yacht—reliability, payload, and amphibious versatility—proved equally valuable in remote operations.

The Grumman Goose never achieved the fame of larger flying boats, yet its record of service in rescue and utility roles is substantial. From Coast Guard air-sea rescue stations during World War II to decades of RCMP operations and remote Canadian utility flights, the aircraft repeatedly demonstrated that a design born for comfort could also deliver dependable capability in some of the world's most challenging environments.

About Our Aircraft

This Goose was in service with the US Navy until it was released as surplus in 1952 to the US Fish & Wildlife Service. When it was transferred to Alaska's Department of Fish & Game in Juneau, it flew all over Alaska from the Aleutian Islands to the Arctic Ocean. After 12 years, it was transferred to the Department of Public Safety and State Troopers and subsequently sold to Peninsula Airways. After an unfortunate gust of wind blew the plane off a runway in Anchorage, the Museum purchased the aircraft in 2012. ➤



The Howard Hughes H-1 Racer

A Pinnacle of 1930s Aviation Innovation



BILL KOLB

MONDAY DOCENT

Summary

The Hughes H-1 Racer, built in 1935, was a highly refined monoplane that showcased advanced streamlining, flush-riveted construction, an efficient NACA-style cowling, and retractable landing gear. Powered by a tuned Pratt & Whitney radial, it set a world landplane speed record of 352 mph in 1935 and a transcontinental record in 1937, influencing later high-performance aircraft design.

The Hughes H-1 Racer, built in 1934–1935 by Howard Hughes’s newly formed Hughes Aircraft Company, stands as one of the most refined expressions of Golden Age aerodynamics. Registered NR258Y (later NX258Y) and constructed in secrecy over 16 months at a cost of roughly \$105,000, the sleek monoplane logged only about 40 flight hours yet left a lasting mark on high-performance aircraft design.

Technological refinement defined every aspect of the H-1. Its 27-foot fuselage was a smooth monocoque of lightweight duralumin, finished with flush-riveted aluminum skin whose rivet heads were carefully countersunk to eliminate drag. The wooden wings, initially spanning 24 feet 5 inches, were sanded, doped, varnished, and polished to a mirror finish, with carefully shaped fillets at the wing-fuselage junction to smooth airflow. These details made the H-1 one of the cleanest airframes of its era.

Power came from a Pratt & Whitney R-1535 Twin Wasp Junior radial, normally rated at 700 horsepower but capable of 850–1,000 horsepower when run on 100-octane fuel. The engine was enclosed in an advanced NACA-style cowling that directed cooling air efficiently while minimizing drag—an important demonstration of how radial engines could be made aerodynamically competitive. Hydraulically actuated retractable landing gear with flush doors further reduced resistance in flight, and an emergency system using engine oil pressure provided a backup if hydraulic pressure failed. Split flaps and drooping ailerons improved low-speed lift for takeoff and landing.

(CONTINUED NEXT PAGE)

The Howard Hughes H-1 Racer

A Pinnacle of 1930s Aviation Innovation

(CONTINUED FROM PREVIOUS PAGE)

For long-distance work the aircraft received “long wings” of 31 feet 9 inches, larger fuel tanks holding 280 gallons, and added equipment including oxygen, radio, and navigation aids. These changes increased weight by only about 700 pounds yet transformed the pure racer into a transcontinental machine.

The H-1's brief flying career produced two landmark records. On 13 September 1935 at Santa Ana, California, Hughes averaged 352.388 mph over a 3-kilometer course, setting a world landplane speed record that stood until 1939. In January 1937, flying the long-wing version, he completed a nonstop flight from Burbank to Newark in 7 hours 28 minutes 25 seconds at an average of roughly 330 mph, establishing a new transcontinental record that lasted a decade.

Although the Army declined a proposed fighter derivative and Hughes himself stopped flying the aircraft after 1937, its design lessons—flush riveting, careful streamlining, efficient radial-engine cowling, and retractable gear—influenced later high-performance monoplanes. Donated to the Smithsonian in 1975 and now displayed at the Udvar-Hazy Center, the H-1 remains a clear demonstration of how focused engineering and aerodynamic refinement could push aviation forward in the years just before World War II. ✈



The Douglas DC-3

The Airplane That Made Airlines Profitable



BILL KOLB

MONDAY DOCENT

Summary

First flown on December 17, 1935, the Douglas DC-3 transformed commercial aviation. Evolving from the DC-2 at the request of American Airlines, it combined advanced all-metal construction, reliable twin engines, and efficient design to become the first airliner that could generate profits from passenger fares alone. By making air travel faster, safer, more comfortable, and economically viable, the DC-3 established the foundation of the modern airline industry.

The story of the Douglas DC-3 begins with a telephone call. In the mid-1930s, American Airlines president C. R. Smith needed a better airplane than the Curtiss Condor biplanes then flying overnight routes. He asked Donald Douglas to enlarge and improve the successful DC-2 into a true sleeper transport capable of profitable transcontinental service. Douglas initially hesitated, but Smith's commitment to order twenty aircraft persuaded him. The result was the Douglas Sleeper Transport (DST), which first flew on 17 December 1935, the thirty-second anniversary of the Wright brothers' first flight, with chief test pilot Carl Cover at the controls. A day-plane version with more seats soon followed and received the designation DC-3. American Airlines placed the type in service in June 1936.

Technologically, the DC-3 represented a mature synthesis of interwar advances. It was an all-metal, low-wing monoplane with cantilever wings, a semi-monocoque fuselage, and retractable landing gear. Powered by two radial engines, either Wright Cyclones or Pratt & Whitney Twin Wasps producing roughly 1,000 to 1,200 horsepower each, the aircraft featured variable-pitch propellers and wing flaps that improved takeoff and landing performance. Cruising speeds of approximately 180–210 mph, a practical range near 1,500 miles, and the ability to operate from relatively short fields gave airlines new flexibility. Most important, the twin-engine layout provided a crucial safety margin: the DC-3 could maintain altitude and continue flight on one engine under many conditions.

Capacity was the key to economics. The DST version offered sleeping berths for overnight passengers; the standard DC-3 carried 21 passengers in daytime configuration, with later variants accommodating more. Earlier airliners had struggled to cover costs with passenger revenue alone and relied heavily on government airmail contracts. The DC-3 changed that equation. Its higher passenger load, greater speed, and lower operating costs per seat-mile allowed airlines to earn profits from fares. C. R. Smith later observed that it was "the first airplane in the world that

(CONTINUED NEXT PAGE)

The Douglas DC-3

The Airplane That Made Airlines Profitable

(CONTINUED FROM PREVIOUS PAGE)

could make money just by hauling passengers.” Within a few years of its introduction, passenger revenues began to exceed mail revenues for the first time on many routes.

The DC-3 also made commercial flying more desirable to the traveling public. Passengers experienced a smoother, quieter, and more reliable ride than on the fabric-covered biplanes or early monoplanes of the late 1920s. Schedules became more predictable. Transcontinental trips that once required multiple stops and uncomfortable overnight legs could be completed faster and with greater comfort. By the late 1930s, the DC-3 and its variants carried the large majority of U.S. airline traffic and were ordered by operators around the world.

Safety improvements were equally important. All-metal construction offered greater structural integrity. Redundant engines reduced the risk of forced landings. Better performance and handling characteristics gave pilots more options in adverse weather or mechanical trouble. That reputation for toughness carried into World War II, when the military C-47 Skytrain (and related variants) was produced in enormous numbers, more than 10,000 military versions alone, serving as troop transports, cargo haulers, glider tugs, and medical evacuation aircraft. Postwar surplus C-47s flooded the civilian market, ensuring that the basic design continued flying for decades on every continent.

The economic and operational success of the DC-3 reshaped the airline business itself. Companies that adopted the type gained a decisive competitive advantage. Routes that had been marginal became viable. Airlines could plan expansion on the basis of passenger demand rather than solely on mail contracts. Later designs, the DC-4, Constellation, and the first generation of pressurized airliners, built upon the operational and economic lessons first proven by the DC-3.

Few aircraft have influenced their industry so profoundly. The Douglas DC-3 did not invent air travel, but it made modern commercial aviation practical, attractive, and self-sustaining. By combining advanced yet proven technology with the right capacity and economics, it turned passenger flight from a subsidized novelty into a genuine business.

About Our Artifact

The following section comes from a December 2025 Flight Plan article by Bud Varty.

The Mainliner Reno

That silver icon resting in the Hercules Pavilion near the roll-up doors represents passenger aviation in its late infancy and blazed the trail for many of the air routes used today. The Mainliner Reno was the first DC-3A manufactured and the first DC-3 purchased by United Airlines. It is the second-oldest surviving DC-3 and the 33rd airframe of the DC-3 to come off the production line.

Aside from being the first DC-3A, the Reno had other firsts:

- First DC-3 to use Pratt & Whitney supercharged engines.
- First DC-3 to fly 52 years with the same registration number: N (originally NC) 16070.
- First DC-3 to be flown by the same captain for 50 years.

“Mainliner” wasn’t just a nickname. Early on, United Airlines launched its “Main Line”, an air route running from New

(CONTINUED NEXT PAGE)

The Douglas DC-3

The Airplane That Made Airlines Profitable

(CONTINUED FROM PREVIOUS PAGE)

York City to San Francisco, with spur routes branching off along the way. As United's first DC-3, our aircraft pioneered many air routes along that main line that are still standard today. The initial cost of a flight from San Francisco to New York was \$149.50, or about \$3,400 in today's dollars.

The Mainliner Reno, also the first United Airlines aircraft to be named after a city, rolled off the Douglas Santa Monica production line on November 8, 1936. It was delivered to United on November 25, 1936, for \$107,338.18. On December 20, 1936, the Reno launched its first passenger flight, a three-stop route from Oakland, California, to Los Angeles. United leased the aircraft to Eastern Air Lines in 1937, took it back in 1939, and flew it until 1953. Continental Airlines then operated the aircraft for 17 years.

After its usefulness to Continental ended, the Reno languished for several years. In the early 1980s, Larry Ray, an aircraft enthusiast, recognized its historical significance and bought it. He took it to Tucson, Arizona, where he completely restored it to original condition in 1987. In 1990, Evergreen International Airlines bought the Mainliner Reno at auction for \$165,000 and stored it at its facility in Marana, Arizona. The Reno became part of the Michael King Smith Foundation in 2007 and has been in the Museum's collection since then. ✈





The Naval Aircraft Factory N3N Canary

Yellow Peril of the Training Fields

BILL KOLB

MONDAY DOCENT

Summary

Designed and built by the U.S. Navy's own Naval Aircraft Factory, the N3N Canary (also known as the Yellow Peril) was the primary trainer that introduced thousands of naval aviators to flight in the late 1930s and World War II. A rugged open-cockpit biplane painted bright yellow for visibility, it served as both a landplane and seaplane trainer and remained in limited Navy use longer than any other biplane.

In the mid-1930s, the U.S. Navy needed a modern primary trainer to replace aging types still in service. Rather than relying solely on private industry, the Navy's Naval Aircraft Factory in Philadelphia designed and produced the N3N. The prototype first flew in 1935, and production aircraft began reaching training units in 1936. Ultimately, nearly 1,000 examples were built before production ended in early 1942.

The N3N was a conventional tandem-seat, open-cockpit biplane with a steel-tube and aluminum structure covered in fabric. Power came from a Wright R-760 Whirlwind radial of about 235–240 horsepower. The airplane could be fitted with either wheeled landing gear or floats, allowing dual-purpose training for both landplane and seaplane operations. Its most distinctive feature was the high-visibility yellow paint scheme that earned it the nicknames “Canary” and, more commonly among students, “Yellow Peril.”

As a primary trainer, the N3N proved rugged, reliable, and reasonably forgiving, qualities essential for teaching the fundamentals of flight to new naval aviators. It served at nearly every major Navy training field during the rapid expansion of naval aviation. Student pilots learned basic handling, takeoffs and landings, spins, and formation flying in the Canary before progressing to more advanced types. The seaplane version continued in use at the U.S. Naval Academy for aviation familiarization well after the war; the last N3Ns were not retired until the late 1950s or early 1960s, making the type the last biplane in regular U.S. military service.

Although never intended as a combat aircraft, the N3N's role in pilot training had direct downstream effects on operational readiness. The large number of naval aviators who first soloed or received primary instruction at Yellow Perils went on to fly fighters, bombers, and patrol aircraft that performed combat and anti-submarine missions throughout the war.

About Our Artifact

The Museum's N3N was restored in the 1970s and purchased by Museum board member Ernest McCall in 1975. McCall donated it in 2008. ➤

The Beech D17S Staggerwing



Elegant Speedster of the Golden Age

BILL KOLB

MONDAY DOCENT

Summary

First flown in 1932 and refined as the D17S in the mid-1930s, the Beechcraft Staggerwing combined biplane elegance with modern performance. Its distinctive negative-stagger wings, retractable landing gear, and enclosed cabin made it a fast, luxurious executive transport. During World War II it served in liaison and utility roles, including military versions that supported command and transport needs.

Walter Beech founded Beech Aircraft Corporation in 1932 and set out to build a high-performance airplane for business executives. Working with designer Ted Wells, he produced the Model 17, which first flew on 4 November 1932. The design featured an unusual negative wing stagger, the lower wing set farther forward than the upper, which improved visibility and handling while giving the airplane its distinctive appearance. An enclosed cabin, retractable landing gear, and refined aerodynamics set it apart from most biplanes of the era.

The most successful and numerous variant was the D17S,

introduced after a mid-1930s redesign that lengthened the fuselage and relocated the ailerons to the upper wings. Powered by a Pratt & Whitney R-985 Wasp Junior of approximately 450 horsepower, the D17S could cruise near 200 mph and reach a top speed of about 212 mph. With a service ceiling around 25,000 feet and a strong climb rate, it offered performance that rivaled many contemporary monoplanes while retaining the structural strength and short-field capability of a biplane.

In civilian hands the Staggerwing served primarily as an executive transport and personal airplane, essentially the private jet of its day. Its speed and comfort also made it competitive in air racing. Production continued into the late 1940s, with roughly 785 Model 17s of all variants completed.

When the United States entered World War II, many Staggerwings were pressed into military service. The U.S. Army Air Forces designated them UC-43; the Navy called them GB-2. These versions performed liaison, light transport, and utility duties, moving personnel and

(CONTINUED NEXT PAGE)

The Beech D17S Staggerwing

Elegant Speedster of the Golden Age

(CONTINUED FROM PREVIOUS PAGE)

messages between bases and headquarters. Although not designed as a dedicated medical-evacuation aircraft, the Staggerwing's speed, range, and ability to operate from modest fields made it useful for urgent transport in support of broader command networks.

About Our Artifact

This 1939 Beechcraft D17A Staggerwing is the last known surviving example of the model and the first of only eight D17As built. It was the only D17A impressed into

U.S. Army Air Force service in World War II, designated UC-43F, and used for personnel transport stateside. After the war, it passed through several owners before being donated to the Museum in 2001 by Alan DeBoer, then mayor of Ashland, Oregon. ➤



Piper J-3 Cub

The Airplane That Taught America to Fly



BILL KOLB

MONDAY DOCENT

Summary

Introduced in 1938, the Piper J-3 Cub became the definitive light airplane of its era. Simple, affordable, and forgiving, it trained thousands of pilots and made personal flying accessible to ordinary Americans. Its military version, the L-4 Grasshopper, served extensively in World War II as a liaison and observation aircraft, often operating from improvised fields close to the front.

The Piper J-3 Cub evolved from the earlier Taylor Cub designs of the 1930s. After William T. Piper gained control of the company, the refined J-3 appeared in 1938 with a stronger steel-tube fuselage, improved seating, and a distinctive open cowl that exposed the cylinder heads of its Continental engine. Priced around \$1,300, roughly half the cost of a typical house at the time, it deliberately made aircraft ownership realistic for a much wider group of people.

The Cub's design prioritized simplicity and low-speed handling. Lightweight, high-lift wings and excellent short-field performance allowed it to operate from small pastures and rough strips. Early models used 40-horsepower Continentals; later versions received more powerful engines up to 65 horsepower. Production rose rapidly. By the early 1940s the Cub had become the most recognizable light airplane in America and a primary trainer for both civilian and military pilots.

World War II transformed the Cub's role. The military version, designated L-4 and nicknamed "Grasshopper," served as a liaison and observation airplane. Flying low and slow, L-4s directed artillery fire, carried messages, and spotted enemy movements. Their ability to land almost anywhere made them invaluable for battlefield support. Thousands of L-4s were built, and many wartime pilots received their first flight training in Cubs before progressing to more advanced types.

(CONTINUED NEXT PAGE)

Piper J-3 Cub

The Airplane That Taught America to Fly

After the war, surplus L-4s and continued civilian production kept the Cub flying in large numbers. It became an icon of general aviation, comparable in cultural impact to the Ford Model T. Generations of pilots learned to fly in yellow Cubs, and the type's forgiving nature and low operating costs ensured its longevity. Even today, restored and original J-3s remain popular for recreational flying and flight training.

About Our Aircraft

This Cub began life as one of 253 Piper training gliders built during World War II and designated TG-8. It had an elongated nose, shorter gear, spoilers, and no engine. After the war, many TG-8s were converted into powered Cubs, including this one. It is most likely the only "glider" Cub still in existence. ✈



The Fairchild PT-19B Cornell



Primary Trainer for a Generation

BILL KOLB

MONDAY DOCENT

Summary

First flown in May 1939, the Fairchild PT-19 Cornell became one of the principal primary trainers of World War II. The PT-19B variant was specifically equipped for instrument training with a collapsible hood over the front cockpit. Its low-wing monoplane design and more demanding handling characteristics better prepared student pilots for the higher-performance aircraft they would later fly in combat.

In 1939 the U.S. Army Air Corps sought a new primary trainer that would more closely approximate the flying qualities of contemporary combat airplanes. Fairchild Aircraft's M-62 design, a clean low-wing monoplane with fixed landing gear and an inverted inline Ranger engine, won a competitive evaluation. The prototype first flew on 15 May 1939, and production orders followed quickly as the PT-19.

The basic PT-19 and the improved PT-19A used Ranger L-440 engines of 175 to 200 horsepower. The PT-19B added full instrumentation and a collapsible hood that could be fitted over the front cockpit. This allowed instructors to train students in basic instrument flying under simulated "blind" conditions, an important step beyond pure visual primary training.

Unlike the more forgiving biplane trainers such as the Stearman Kaydet, the Cornell's higher wing loading and monoplane handling demanded greater precision from

students, especially near the stall and during landings. Army training authorities deliberately chose this characteristic so that cadets would develop the skills needed for the faster, heavier fighters and bombers awaiting them. By the end of 1944, more Allied airmen had taken primary training in Fairchild trainers than in any other single type.

Production was substantial. Fairchild built most of the aircraft, while Aeronca and the St. Louis Aircraft Corporation also manufactured versions under license. Canadian-built related models served under the British Commonwealth Air Training Plan. Overall, more than 6,000 aircraft of the PT-19/PT-23/PT-26 family were completed.

Simple, rugged, and produced in quantity, the Fairchild PT-19B Cornell represents the final evolution of interwar primary-trainer design and the opening chapter of the massive pilot-training programs of World War II. Its low-wing configuration and instrument-training capability marked a clear step toward the more complex aircraft that would dominate the skies of the 1940s.

About Our Artifact

This PT-19 was first delivered to the U.S. Army Air Corps for use during World War II. After being declared surplus, it passed through several owners in the Pacific Northwest before it was purchased by Don Carnes. Throughout the 1950s, 1960s, and 1970s, the aircraft made short local flights with periodic storage and engine run-ups for inspection. ➤



The Vultee BT-13A Valiant

BILL KOLB

MONDAY DOCENT

Summary

First flown in 1939 and ordered in large numbers beginning in 1940, the Vultee BT-13A Valiant became the standard basic trainer of the U.S. Army Air Forces during World War II. Powered by a 450-horsepower Pratt & Whitney R-985 radial engine, it bridged the gap between primary trainers and advanced aircraft. Cadets knew it affectionately, or not so affectionately, as the “Vultee Vibrator.”

In the late 1930s, Vultee Aircraft developed a family of trainer designs. One of these, a fixed-gear basic trainer powered by a Pratt & Whitney R-985 Wasp Junior, was selected by the U.S. Army Air Corps and designated BT-13. Production of the improved BT-13A began in volume in 1940–41 as the United States expanded its pilot-training pipeline. The type quickly became the standard aircraft for the second phase of flight training, basic, following primary instruction in biplanes or lighter monoplanes such as the PT-19 or PT-22.

The BT-13A was a low-wing, all-metal monoplane with fabric-covered control surfaces, fixed landing gear, flaps, and a two-position propeller. It seated student and instructor in tandem under a long greenhouse canopy and was equipped with dual controls, an intercom, radio, and instruments for basic instrument flying. Powered by the reliable 450-horsepower R-985, it offered substantially more performance than primary trainers: higher speed, greater range, and the ability to practice formation flying, cross-country navigation, aerobatics, and instrument work.

More than 9,500 BT-13s and closely related variants (including the Wright-powered BT-15) were built, making the Valiant one of the most-produced American trainers of the war. Cadets typically spent about ten weeks and sixty flying hours in the BT-13 before progressing to advanced trainers such as the AT-6 Texan.

The airplane’s most enduring nickname, “Vultee Vibrator,” arose from noticeable airframe vibration near the stall, canopy rattling during vigorous maneuvers, and the tendency of the powerful radial engine and propeller to shake windows and structures on the ground during takeoff. Whatever the exact origin, the name stuck and remains the most common way veterans and enthusiasts refer to the type.

After the war, large numbers of BT-13s entered the civilian market. Many were converted for agricultural use or flown as warbirds; others were scrapped. Surviving examples are now prized by museums and collectors as tangible links to the massive training effort that made American air power possible.

About Our Aircraft

Ron and Sue Salvo purchased this aircraft with the intent to restore it. They dedicated many hours of work to bring this World War II veteran to its original configuration before the Museum purchased the aircraft in 2012. ➤

July Mystery Corner Answer

BILL KOLB

MONDAY DOCENT

Editor's Note: Last month, the Mystery Corner item was the F-117 photo shown below. The question was, "Why are the wheel well doors on the F-117A Nighthawk different colors? One is silver-metallic, and the other is dull black." Answer is below:



The F-117A Nighthawk's airframe was constructed primarily of aluminum alloy (with titanium used in high-temperature areas such as the engines and exhaust), formed as flat faceted panels fastened to a complex skeletal subframe to achieve the precise geometry needed for low radar cross-section.

Later in the program, Lockheed introduced graphite thermoplastic composite (carbon-fiber-reinforced thermoplastic, consistent with high-performance materials such as PEEK/graphite systems) for the V-tail ruddervators. This change followed structural problems with the original metallic tails, including an in-flight fin loss during a 1987 test flight; the composite versions offered greater strength and stiffness that eliminated prior flutter-related speed restrictions. The new tails first flew in July 1989, were fitted to the final production aircraft, and were retrofitted fleet-wide beginning in mid-1990 (with the program delayed by the Gulf War deployment, so most Desert Storm aircraft retained the metal tails; full retrofit was completed by about 1994).

Similar thermoplastic composite material was applied to certain replacement panels and secondary covers later in the program, including landing-gear door covers. This produced mixed configurations on individual aircraft—one aluminum panel and one thermoplastic panel on the same door set—as original metal parts were repaired or replaced. The composite versions provided advantages in weight, toughness, and formability while still accepting the radar-absorbent material (RAM) coatings and serrated-edge treatments required for stealth. ➤

August Mystery Corner

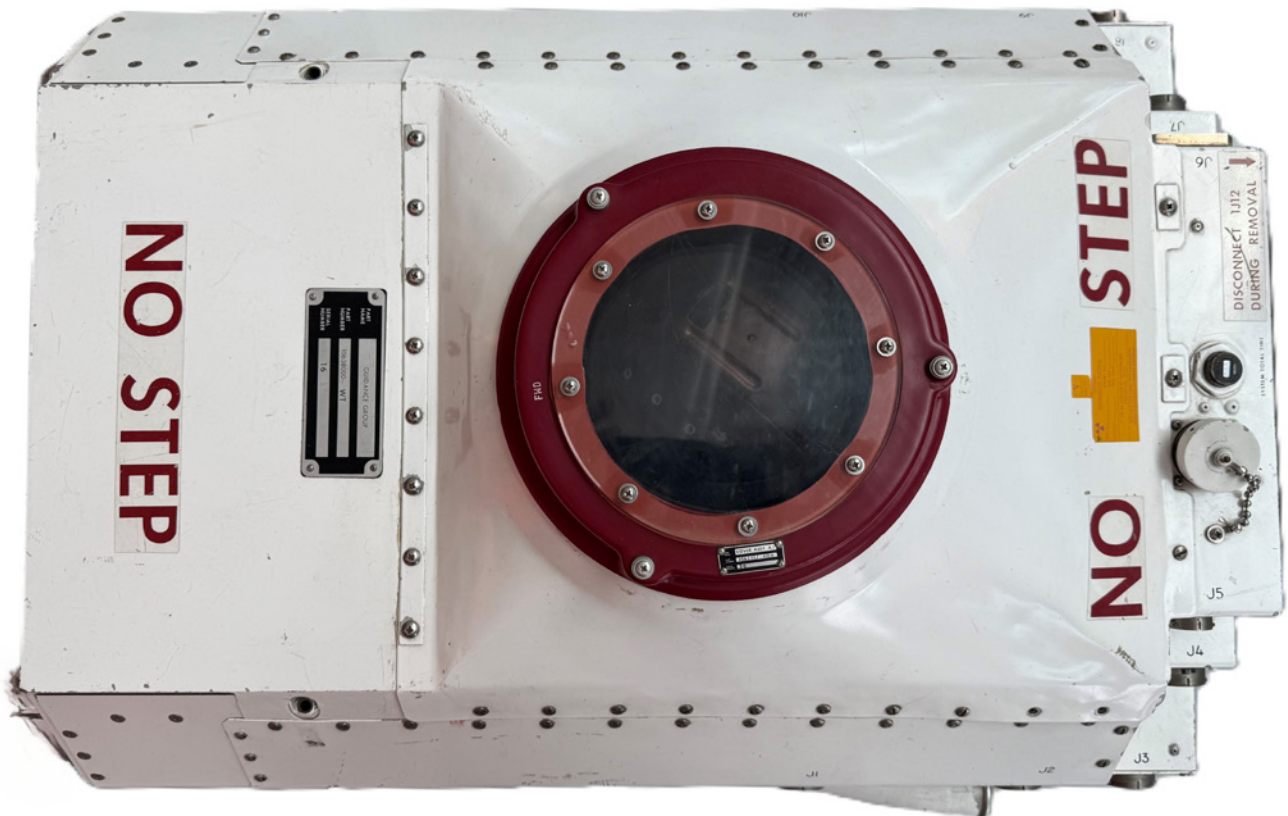
BILL KOLB

MONDAY DOCENT

In this and future editions of the FlightPlan, Archives will provide a picture of an artifact/item for which they have no idea what it is, how it came about, or where it originated.

The following month, Archives will provide the answer or the best-guess submissions, if any. ➤

THIS MONTH'S MYSTERY: What the heck is this?



Answer to be revealed in the September edition.

Readers are encouraged to provide Archives with their best answer/guess by responding to Jean Herkamp at: jean.herkamp@evergreenmuseum.org.

Band of Brothers



The McMinnville, Oregon Band of Brothers meets on the **first Thursday of each month**. Because of changes, we are not sure of the location at the Museum. The **meetings start at 11:30 am** and run about an hour, with coffee and cookies served. More details can be found at the group's **Facebook page**: <https://www.facebook.com/groups/838928846550343>

We are currently looking for speakers. If you would like to become one of the monthly speakers, please contact **Al Arguedas** at aja@onlinemac.com.

MONTHLY THEMES

AUGUST AVIATION: INTERWAR PERIOD

SEPTEMBER.....SPACE FLIGHT: EARLY MERCURY
THROUGH GEMINI

OCTOBER.....AVIATION: WWII

NOVEMBER.....AVIATION: POST-WWII
THROUGH KOREA

DECEMBER SPACE FLIGHT: APOLLO

AUGUST FLIGHTPLAN NEWSLETTER CONTRIBUTORS

EDITOR: BILL KOLB BILL@KOLBVINEYARDS.COM

FEATURE WRITERS: BARRY BROWN, JEAN HERKAMP, BILL KOLB

LAYOUT: ROB ZEH

.....

EMAIL SUBMISSIONS TO: FLIGHTPLAN@EVERGREENMUSEUM.ORG