FlightPlan

A VOLUNTEER NEWSLETTER BY VOLUNTEERS

EVERGREEN AVIATION & SPACE MUSEUM

VOLUME 12
ISSUE 11
NOVEMBER 2025

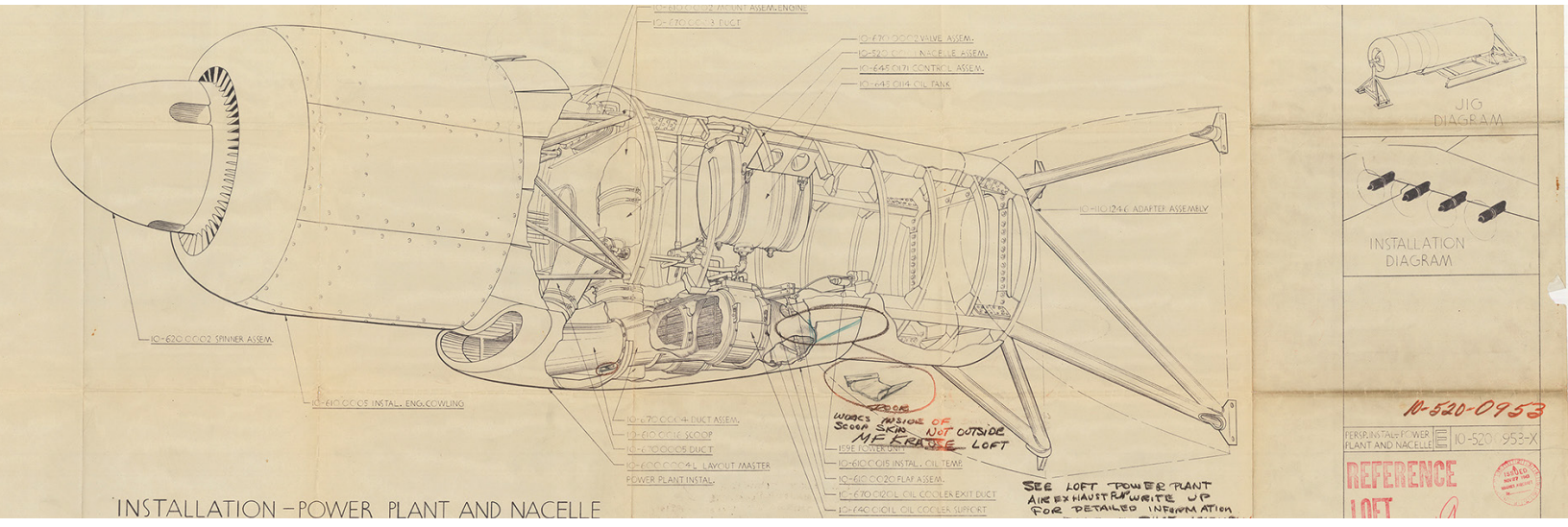
MONTHLY THEMES

We are assigning themes to each month of the FlightPlan. These are not exclusive of other topics, but perhaps they may motivate you to make a contribution.

NOVEMBER .....HOWARD HUGHES **DECEMBER.....THE DC-3**

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**



BILL KOLB
FLIGHTPLAN EDITOR, MONDAY DOCENT

Howard Hughes demonstrated engineering brilliance by blending aviation innovation with filmmaking. In the 1930s, he designed and flew the Hughes H-1 Racer, an all-metal monoplane that set a landplane speed record of 352 mph in 1935 and completed a nonstop transcontinental flight from Los Angeles to New York in seven hours in 1937, despite surviving a crash during testing.

His ambition culminated in the H-4 Hercules (*Spruce Goose*), the large plywood-like (Duramold) cargo plane designed to carry troops across the Atlantic during wartime.

Hughes also applied his skills to film, producing and directing *Hell's Angels* (1930), where he oversaw detailed aerial dogfight sequences, re-shot them for sound at great personal cost, and developed custom cameras and rigs for realistic footage.

Across the H-1's speed records, the H-4's massive scale, and his cinematic techniques, Hughes created practical advancements that pushed boundaries in both fields.

CAPTAINS CORNER

DAN OVEN
SUNDAY DAY CAPTAIN

October 1, 2025, BOC meeting was productive with many topics before the Board. Topics are presented below; to avoid a multi-page report, anyone with further questions regarding the discussions can contact their Day Captain.

Scot Laney – Chief Executive Officer

- An adjustment of the Museum's artifact organization will take place the first week after the holidays. The Museum may be closed for that week.
- Small special events are planned for each weekend in October, hoping to attract more visitors.
- There will be no change in the winter hours this year, and prices will stay the same.
- The Goose Lights (formerly Holidays at the Hangar) holiday evening openings are being arranged. Decorations within the Museums will be completed in one mass project rather than day-to-day as in previous years.
- The McMinnville Chamber of Commerce will erect their ice-skating rink as an additional attraction.

Scot Laney (for Terry Howell – Chief Operating Officer)

- The West Pavilion elevator has been repaired and is operating.
- The Spruce Goose elevator should be repaired in approximately 10 days.
- Thanks to everyone for their help over the Air Show weekend. With a more subdued approach, the Museum's receipts were about 78% of the previous year's.

Scott Malandrone – Exhibits Manager

- TV set and software issues in the East Pavilion have been addressed. Some have been withdrawn. Some have been upgraded with new TVs and/or software.
- Work is ongoing for a Vietnam memorial wall in the West Pavilion. Along with display panels, a section will be reserved to allow volunteers and visitors to post recollections and memorials.
- The new drone exhibit, including the new drones recently received, is being prepared and will be on display soon.
- The DC-3 exhibit area has been re-organized. A video display showing the aircraft's history will be placed in the entry area soon.

Old Business:

- Captains and Leads were reminded to use the new Artifact Change Form, copies of which are in the West and East Pavilion continuity manuals at the front desks. Please route your completed forms through your Day Captain and Barry Brown. These forms are also available electronically. Consult with your Day Captain/Lead.

New Business:

- Dan Oven suggested a new review of the Volunteer Manual to update sections as needed. He asked for volunteers for a committee which he will chair.

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CAPTAINS CORNER

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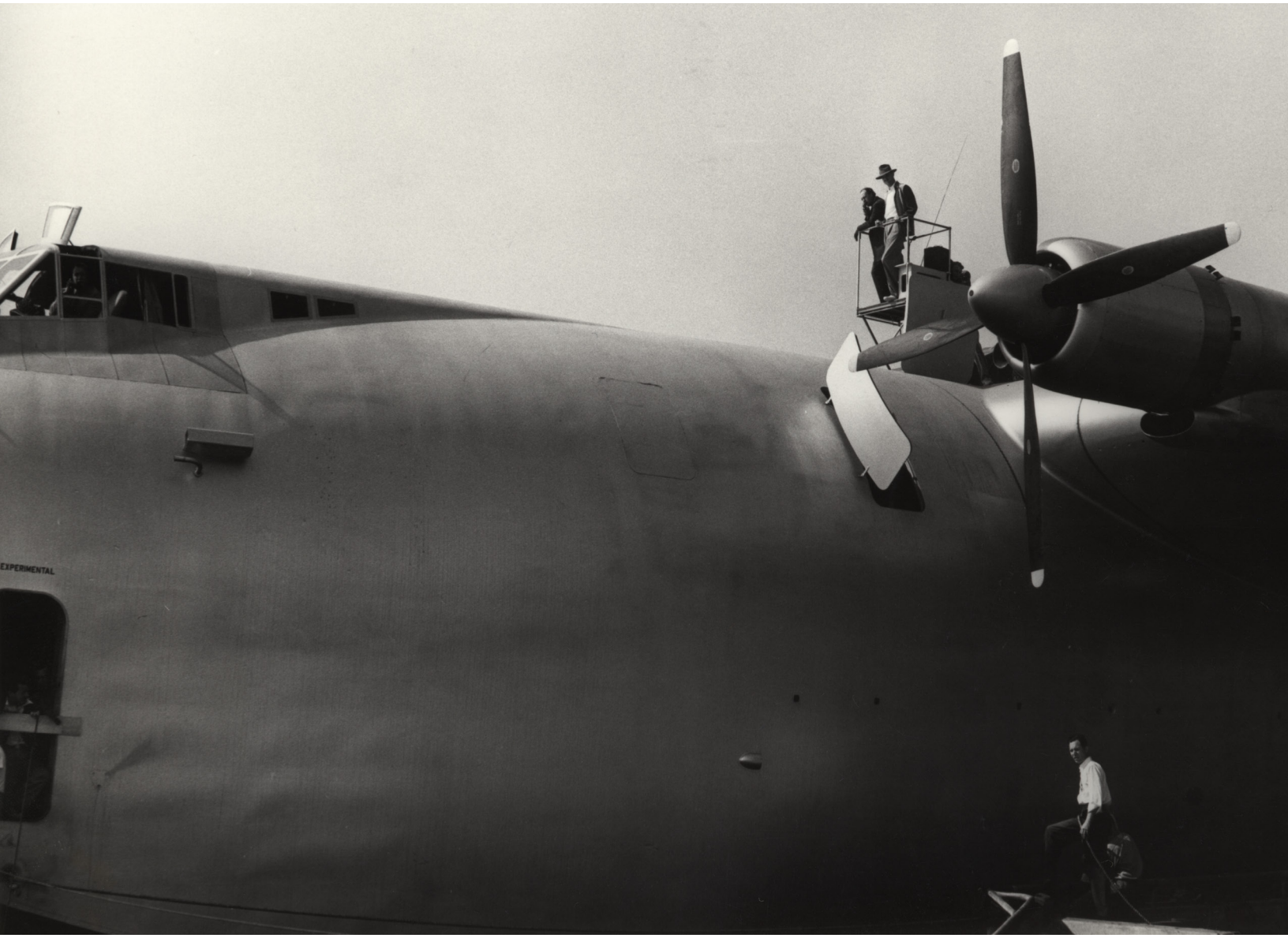
- It was proposed to rotate all new docent trainees through Restoration, and Collections during their training period, which may become standard policy.
- Nominees for the annual Rasmussen Award were discussed. Award narratives are due at the November meeting. Selection will be made at the December meeting.

The meeting was adjourned at 11:15 am.



SCOT LANEY
MUSEUM CEO

The funny thing about Howard Hughes is that it's difficult to really pin him down. I'm not sure that many of the facts associated with him are facts at all. He loved to toy with the press. At one point he was a replacement baby to the Hughes family when their son died soon after being born. In that rendition he was one of a set of triplets so at least the family he came from had a couple spares. He liked to tell that story. The trouble is that the story probably was far from the truth. Or was it? That's sort of the primordial stew associated with almost everything the man said or did. At the end of the day, he played his personal life very close to the vest and enjoyed perplexing anyone that tried to press him on it.

In Collections we have a memo he wrote about the proper procedure for his staff to use when he wanted to send flowers to someone. It's a page long. So sanitized is the process that a person may have received flowers from Howard Hughes and never realized that they did.

In the realm of organic chemistry Howard was what would be described as a complex carbohydrate, a veritable polysaccharide of feints, red herrings and abject mistruths all manufactured by him as a sort of game he loved to play.

All that leaves me wondering something about the H-4 that we don't talk about much. Specifically, what did he do all those long years after the one short but famous romp he took her out on? The general line is "he continued to work on her" or something like that. But nothing in the rest of his career seems to indicate that he ever did anything just for the heck of it. Generally, when he was done with something he just tossed it aside, be it a design, an idea, a person or even an entire corporation. RKO? He chucked that movie studio in the trash one afternoon, the details of which you can also read in a memo from him that we also have in Collections.

We do know that the Navy published a brief mention in 1952 that the H-4 was considered as a test bed aircraft for nuclear power, going so far as to calculate how much lead shielding would need to be installed to protect the flight crew from radiation while in flight. While a nuclear-powered aircraft seems a tad wishful, the Navy was dead serious about making one, so was the Air Force. Neither got very far down the road excepting a couple test flights that carried reactors that weren't actually powering the aircraft.

The other question that nags a little revolves around the Glomar Explorer and Project Azorian. Did Howard consider a role for the Hercules in the recovery of K-129 when that plan was hatched in 1971? Seems like a few of the more interesting baubles from the sub would have been pretty easy to fly away after the CIA stripped them from the hull. Not that many of those baubles were successfully recovered but it is interesting to picture Hughes late at night, sitting in the Goose, dreaming of a new life for the flying boat.

Like I said, he doesn't seem the type to futz around with something for no reason.

The Howard Hughes H-1 Racer: A Pinnacle of 1930s Aviation Innovation

BILL KOLB
MONDAY DOCENT

The Hughes H-1 Racer, also known as the H-1 or "Silver Bullet," was an innovative single-engine racing monoplane built by Howard Hughes's newly established Hughes Aircraft Company in 1934–1935. With registration NR258Y (later NX258Y), it was designed as a personal speed vehicle and a technology showcase, driven by Hughes's passion for pushing aviation limits. Built secretly in a Glendale, California hangar over 16 months at a cost of about $105,000 (around $2.3 million today), the H-1 only logged 40–42 flight hours but made a significant impact on aerodynamics and high-performance aircraft design. Flown solely by Hughes, it exemplified the craftsmanship of the pre-World War II aviation era and hinted at future fighter aircraft designs.

Key Innovations

The H-1 exemplified aerodynamic excellence, advancing materials, propulsion, and control systems through extensive wind tunnel tests at Caltech and precise craftsmanship.

- **Streamlining and Construction:** The fuselage was a sleek, 27-foot-long monocoque made from lightweight duralumin (95% aluminum, 4% copper), with flush-riveted aluminum skin where rivet heads were partially sheared off and countersunk, creating a drag-free surface—a technique later adopted in many aircraft. The wooden wings, initially spanning 24 feet 5 inches, were sanded, doped, varnished, and polished to a mirror finish, with gently curved fillets at the wing-fuselage junction to improve airflow and reduce buffeting. This meticulous detail significantly lowered drag and made the H-1 one of the most aerodynamically efficient planes of its era.
- **Powerplant and Cooling:** Powered by a Pratt & Whitney R-1535 Twin Wasp Junior 14-cylinder radial engine, which usually produced 700 hp but could be tuned to 850–1,000 hp with 100-octane fuel (later standard in aviation), the engine was housed in a distinctive bell-shaped NACA cowling that directed cooling air effectively while reducing drag—an innovative design for radial engines.
- **Landing Gear and Controls:** It featured hydraulically actuated retractable landing gear with flush doors, a wide track for improved ground handling (unlike narrower fighter aircraft like the Messerschmitt Bf 109), and an emergency backup system using engine oil pressure in case of hydraulic failure. Split flaps and drooping ailerons enhanced lift during takeoff and landing. The enclosed cockpit included a crank-forward windscreen, sliding canopy sections, and custom instrument layout typical of racing aircraft.
- **Range Enhancements:** For longer flights, it was modified with "long wings" spanning 31 feet 9

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The Howard Hughes H-1 Racer: A Pinnacle of 1930s Aviation Innovation

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inches, larger interspar fuel tanks increasing capacity to 280 gallons, along with an oxygen system, radio, and navigational aids, adding only 700 pounds but enabling transcontinental flights.

These features not only made the H-1 a speed demon but also influenced WWII fighters like the U.S. F6F *Hellcat*.

Problems Encountered During Flights

Despite its brilliance, the H-1's experimental nature led to several teething issues during its brief test and record flights, often resolved on the fly by Hughes and his team. Its short total airtime suggests underlying challenges that limited further use.

- **Propeller and Engine Glitches on Maiden Flight:** The initial flight on August 17, 1935, at Mines Field (today's LAX) lasted only 15 minutes because the constant-speed propeller became stuck in a low pitch position due to misaligned bevel gears from Hamilton-Standard, limiting the speed to 250 mph. Hughes promptly installed a larger counterweight to resolve the pitch control issue.
- **Hydraulic Failure on Second Flight:** On August 28, 1935, during a 1-hour and 15-minute flight to Burbank, a blown head gasket in the hydraulic pump prevented the landing gear from extending. The innovative emergency oil-valve system—designed by Chief Engineer Glenn Odekirk despite Hughes' initial objections—successfully pressurized the landing gear with engine oil, ensuring a safe landing.
- **Fuel Exhaustion During Record Attempt:** On September 13, 1935, during a speed record attempt at Santa Ana's Eddie Martin Field, Hughes's aircraft sputtered after seven low passes because of fuel starvation caused by a selector valve problem. Hughes performed a gear-up belly landing in a nearby beet field, suffering only minor bruises; the aircraft was minimally damaged and repaired on the spot. This incident underscored vulnerabilities in the fuel system.

- **Maneuverability and Military Rejection:** The stubby original wings made low-speed handling difficult, emphasizing its racing-focused design. In 1935, the U.S. Army Air Corps declined the proposed XP-2 fighter variant, citing Hughes Aircraft's limited experience, which hindered military developments. After 1937, Hughes never piloted it again, and it was stored for many years. Later attempts to create variants, such as the 1940 Timm "Gadfly" modification, were unsuccessful due to rapid technological progress.

Records Set by Howard Hughes

Hughes piloted the H-1 to etch his name in aviation history, setting benchmarks that stood for years and showcased American ingenuity amid European dominance.

- **World Landplane Speed Record (1935):** On September 13, 1935, at Santa Ana, Hughes completed a 3-km course with an average speed of 352.388

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The Howard Hughes H-1 Racer: A Pinnacle of 1930s Aviation Innovation

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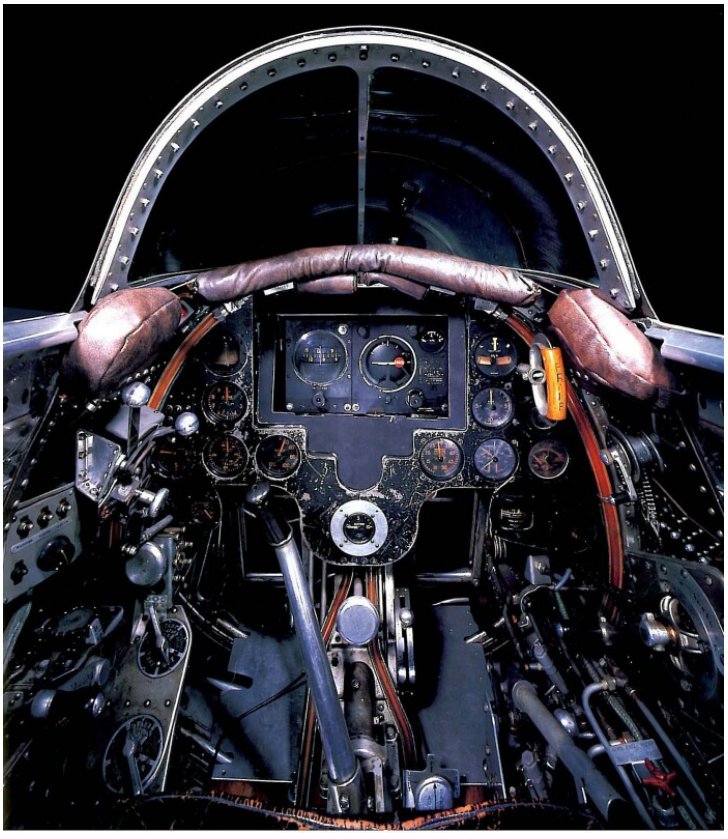
mph (567.155 km/h) during four qualifying runs. His individual speeds were 355, 351, 350, and 354 mph, surpassing the previous record of 314 mph held by France's Raymond Delmotte by 38 mph. Certified by the FAI on November 5, 1935, this achievement marked the last non-military aircraft to hold the absolute speed record until German racers surpassed it in 1939.

- **Transcontinental Speed Record (1937):** On January 19, 1937, Hughes flew nonstop from Burbank's Union Air Terminal to Newark Airport using the modified long-wing version. The flight took 7 hours, 28 minutes, and 25 seconds, with an average speed of 327–332 mph, breaking his previous record by 1 hour 58 minutes, which was set with a Northrop Gamma. This remarkable achievement, observed by crowds and broadcasted live on the radio, remained unbroken for ten years until 1947.
- **Other National Records:** En route in 1937, it also claimed Miami-to-New York and Chicago-to-LA marks, cementing its versatility.

Legacy

The H-1's bold design and Hughes' adventurous flying—often without extensive planning—embody the excitement of early speed racing and earned praise from figures like Amelia Earhart. Donated to the Smithsonian in 1975 and restored by 1976, shortly after Hughes' death, it now is displayed at the Udvar-Hazy Center, inspiring replicas and films such as The Aviator (2004). Although it never participated in combat, its advancements in drag reduction and system integration pushed aviation progress, showing how one individual's vision could surpass nations.



The Miniature Diorama of the Partially Constructed H-4 *Hercules* from *The Aviator*

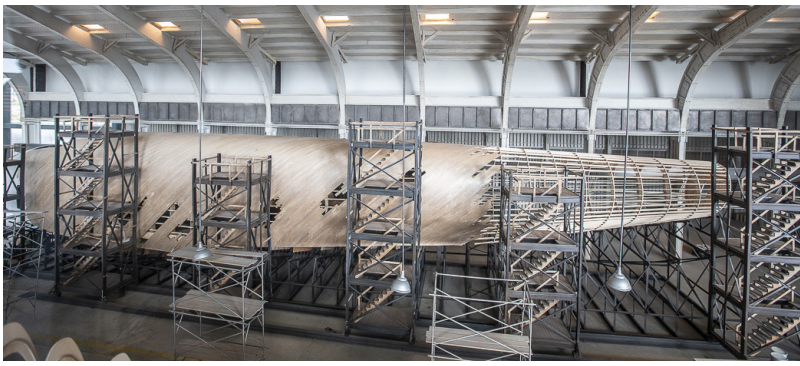
BILL KOLB
MONDAY DOCENT

In Martin Scorsese's *The Aviator* (2004), production designer Dante Ferretti's team didn't just build partial full-scale sections for close-up shots—they also crafted intricate miniature sets to capture the epic scale and obsessive atmosphere of Howard Hughes' secret assembly of the H-4 *Hercules* (*Spruce Goose*). The standout piece is a detailed diorama depicting the partially constructed aircraft inside its Culver City warehouse, designed to illustrate the plane's immense skeletal frame amid wartime secrecy. This compact yet evocative model was essential for establishing shots, blending practical effects with subtle VFX to convey Hughes' growing mania without overwhelming budgets on full CGI.

Background and Construction of the Model

- **Scale and Composition:** Built at approximately 1:24 scale (exact ratio unconfirmed but inferred from production notes to fit filming needs), the diorama measures about 4-6 feet in length, focusing on a cross-section of the H-4's forward fuselage and wing roots. It features the plane's iconic exposed wooden ribs—curved laminated beams up to 3 feet high in real scale—interwoven with incomplete plywood skinning, dangling cables, and makeshift scaffolding towers. Surrounding elements include scattered blueprints pinned to walls, welding torches casting a fiery glow, tool carts, and shadowy worker silhouettes, all evoking the dim, cavernous "Dante's Inferno" vibe Ferretti described. Materials included balsa wood for the frame (mimicking the real H-4's birch and spruce laminate), resin castings for details, and LED practical lights for the hellish red-orange ambiance seen in the film.
- **Artistic Intent:** Ferretti, drawing from archival photos of the actual 1940s Culver City Cargo Building (a 300,000 sq ft hangar), aimed to humanize the behemoth's birth. The model emphasizes isolation: Hughes (portrayed by Leonardo DiCaprio) appears tiny against the ribs in composited shots, underscoring his fixation. It was photographed from low angles to exaggerate height, with forced-perspective tricks to integrate live actors. This diorama wasn't just functional—it was a narrative tool, symbolizing Hughes' descent into eccentricity as the project ballooned from $2 million to $23 million (equivalent to over $300 million today).
- **Production Role:** Used for wide shots in the film's WWII sequence, where Hughes unveils the prototype amid congressional scrutiny. It complemented the 150-foot full-scale fuselage built in Montreal, allowing seamless transitions. VFX supervisor Rob Legato noted the model's precision enabled minimal digital augmentation, preserving the tactile, wooden authenticity central to Ferretti's Oscar-nominated vision (he shared the win with set decorator Francesca Lo Schiavo).

Journey to Evergreen Aviation & Space Museum



The model was donated by the film's production company, Initial Entertainment Group—just months after *The Aviator's* release—arriving at the Evergreen Aviation & Space Museum in early 2005. The grand unveiling came on Memorial Day weekend of the same year. You can find it in the West Pavilion, near the Yamamoto exhibit. It endures as a testament to Ferretti's meticulous craft, turning a prop into a museum gem that captivates aviation fans and cinephiles alike.

Duramold Construction of the Hughes H-4 Hercules

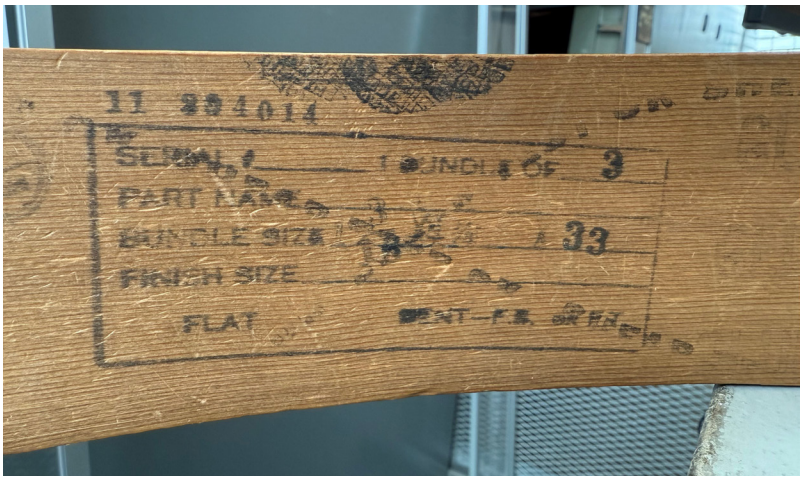
BILL KOLB
MONDAY DOCENT

The Hughes H-4 *Hercules*, commonly known as the "Spruce Goose," was a prototype flying boat developed during World War II, despite being mainly constructed from birch wood. Its purpose was to transport troops and equipment across the Atlantic, circumventing threats posed by German submarines. Designed by Howard Hughes in collaboration with Henry Kaiser under a government contract, the aircraft employed the innovative Duramold process— a molded plywood composite technology—to meet wartime restrictions on metals such as aluminum and steel.

This process, invented by Colonel Virginius E. Clark and initially sold to Fairchild Aircraft Company in 1936, involved laminating wood layers that were impregnated with resin under heat and pressure. This method created lightweight yet strong structural components. Hughes acquired the rights to Duramold for aircraft weighing over 20,000 pounds, with the H-4 being its most ambitious application. However, the material ultimately proved inadequate for mass production of heavy aircraft due to its high costs and time-consuming manufacturing process.

Procurement of Materials

Material shortages during World War II led to the selection of wood-based composites, with birch chosen as the primary material due to its strength and suitability for laminated forms. Poplar was used for specific components. Thin birch veneer strips, crucial for the Duramold layers, were sourced from the Roddis Manufacturing Company in Wisconsin. There, women workers ironed the veneer to ensure its flatness and quality before shipment. The Roddis Company supplied these materials specifically for the H-4 project, reverting to Wisconsin sources after initial design work. Phenolic



resin, a synthetic plastic similar to that used in billiard balls, was obtained for impregnation, while additional resins and adhesives were sourced to meet non-critical material requirements. Procurement focused on domestic suppliers to avoid disruptions, with mills like Goodyear-Nelson potentially providing birch, although records are incomplete. The emphasis on wood alternatives resulted from government priorities that allocated metals to other wartime efforts, ensuring the H-4 did not compete with essential production.

Manufacturing of Duramold

The Duramold manufacturing process began with thin sheets of birch, and occasionally poplar, veneer being impregnated with phenolic resin to enhance durability and moisture resistance. These layers were arranged in a crisscross pattern for added strength, with the grains laid perpendicular to each other and bonded using plastic glue or resin. The assembly was placed in molds and subjected to high heat—up to 280 degrees Fahrenheit—and pressure to cure, forming seamless, molded components that were lightweight and reportedly 80% stronger than aluminum. This lamination technique created a composite material ideal for large-scale aircraft

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Duramold Construction of the Hughes H-4 Hercules

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parts, serving as a precursor to modern composites like those used in the Boeing 787. Challenges included the time-intensive nature of the process, which contributed to delays, and the need for precise heating to prevent defects. The finished Duramold had a smooth, silver-grey finish, optimizing aerodynamics.

Overall Construction of the H-4

Construction began in 1942 as the HK-1 under the Hughes-Kaiser partnership. However, Kaiser withdrew due to escalating costs and delays, leaving Hughes to complete the single prototype at a total cost of $23 million (equivalent to about $287.5 million today). The aircraft was built at Hughes Airport in Playa Vista, Los Angeles, using Duramold for nearly all structural elements, including the frame, single hull with flight deck and cargo hold, fuel bays, a single vertical tail, fixed wingtip floats, and entire cantilever wings and tail surfaces. Primary control surfaces like elevators and rudders were covered with fabric, while flaps and other components incorporated Duramold laminates. Hughes's attention to detail slowed progress, and the plane was not completed until 1947, well after the war's end.

The assembly process was modular, fabricating large sections like the fuselage, each wing (spanning over 100 yards total), and tail assemblies, which were transported overland to a dry dock at Pier E in Long Beach for final integration in a custom hangar. The eight 3,000-horsepower engines and associated systems were installed last, along with a circular stairway connecting the flight deck to the cargo area. Challenges included material constraints, cost overruns that drew Senate scrutiny, and the project's obsolescence after the war, though it showcased innovative uses of wood composites. Despite these challenges, the H-4 Hercules remains a significant part of aviation history, illustrating the innovative use of wood-based composites and the ambitious vision of Howard Hughes.

Frank Calvin Mann

The Unsung Genius Behind Howard Hughes' Aviation Empire

ALLEN HERKAMP
COLLECTIONS DOCENT

The Hughes H-4 *Hercules*, commonly known as the "Spruce Goose," was a prototype flying boat developed during World War II, despite being mainly constructed from birch wood. Its purpose was to transport troops and equipment across the Atlantic, circumventing threats posed by German submarines. Designed by Howard Hughes in collaboration with Henry Kaiser under a government contract, the aircraft employed the innovative Duramold process— a molded plywood composite technology—to meet wartime restrictions on metals such as aluminum and steel.

It is most fitting to honor the profound impact of Frank Calvin Mann, whose 50-year friendship with Howard Hughes propelled both men's legacies in aviation and mechanics. Born in 1908 to an unwed mother in Houston, Texas, this Black prodigy overcame staggering racial barriers to become Hughes' top engineer, lifelong confidant, and a hidden force in American innovation.

At nine, Frank witnessed a World War I biplane make an emergency landing near his home, igniting a lifelong passion for flight. He haunted local airfields, crafting model planes and repairing neighbors' cars in his spare time. By 11, he ran his own mechanic shop; as a teen, he apprenticed on airplane engines. His breakthrough came at 14, when he met 19-year-old Howard Hughes at Houston's airfield—near Hughes Tool Company. During a chat, Hughes lamented issues with his biplane; Frank swiftly fixed it, forging an unbreakable bond. By 20, Frank had designed and built several custom Model-T cars, feats unimaginable for a Black man in Jim Crow-era America. Hughes, with his wealth and influence, shattered doors for Frank's brilliance.

Raised by teacher parents (his mother and stepfather), Frank initially pursued education, agreeing to teach. While studying, he tinkered relentlessly, even constructing a bespoke car. Yearning for formal training in automotive and aeronautical engineering, he faced rampant discrimination. After rejections, he enrolled at the University of Minnesota and graduated from UCLA with a mechanical engineering degree. Settling in Compton, California, as an independent engineer, Frank reconnected with Hughes, who promptly hired him for the nascent Hughes Aircraft Company in 1932.

Adventure called in 1935: Hearing of Mussolini's invasion of Ethiopia, Frank defied U.S. neutrality laws, shipping his personal plane abroad to fly reconnaissance for Emperor Haile Selassie's forces. Four years later, he joined Tuskegee Institute as one of the first Black civilian flight instructors, training the famed Tuskegee Airmen amid World War II's looming shadow. Racist U.S. policies supplied inferior aircraft to Black units, prompting Frank's brief exit. He enlisted Hughes' clout to secure better planes, though the program persisted with subpar gear. Remarkably, the all-Black 332nd Fighter Group—nicknamed the "Red Tails" for their crimson-painted tails—never lost a bomber or pilot under escort, compiling an impeccable record that defied expectations. Frank's

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Frank Calvin Mann

The Unsung Genius Behind Howard Hughes' Aviation Empire

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intermittent Hughes tenure spanned two decades, including his milestone as the first Black commercial pilot for American Airways (later American Airlines).

World War II amplified Frank's genius. In 1942, the government tapped him to lighten Mitchell B-25 bombers for Lt. Col. Jimmy Doolittle's daring Tokyo raid. From the USS Hornet, these modified birds—stripped of excess weight, refueled for extended range, and adapted for Chinese landings—struck Japan's heart, boosting Allied morale. Post-raid, Frank rejoined Hughes to redesign U.S. bombers and fighters, inventing flexible feed chutes for .50-caliber machine guns that surged firing rates from 50 to 500 rounds per minute. This wartime breakthrough transformed aerial combat. He also contributed to the colossal Hughes Flying Boat (H-4 *Hercules*, or "Spruce Goose"), the largest wooden aircraft ever built, though it flew only once in 1947.

Peacetime unleashed Frank's automotive flair. From 1948, he crafted aerodynamic sports cars for Hollywood elites like Mickey Rooney, bandleader David Rose, and actor Herb Jeffries. His debut, the Eldorado, set the tone. A fiberglass-bodied roadster for a Disney executive prefigured the Chevrolet Corvette. In 1950, his F-86 Sabre Jet-inspired "Baby LaSabre" clinched Motor Trend's Best Sports Car of the Year at the Los Angeles Motorama, blending speed and style in an era of finned behemoths.

The 1960s rocketed Frank back to aerospace at Hughes' Culver City labs. He engineered components for the Surveyor program, beaming humanity's first close-up Moon photos in 1966. His designs influenced early Space Shuttle concepts and fortified the Boeing 747 as a shuttle carrier, enabling piggyback flights of orbiters like Enterprise.

Beyond blueprints, Frank's passions shone personally. He meticulously built a miniature steam locomotive, now a Smithsonian treasure, evoking his boyhood dreams. He

even voiced a key role on the radio's "Amos 'n' Andy," infusing the show with authentic flair—thanks, in part, to Hughes' connections.

Retiring in 1972 at 64, Frank returned to Houston to care for his elderly parents, yet tinkered endlessly with planes and autos. He died on November 22, 1992, at 84, in the city that birthed his bond with Hughes, who had preceded him by 14 years.

You've likely never heard of Frank Calvin Mann—overshadowed by flashier names, his feats reshaped skies and roads for mankind. As Hughes' indispensable ally, this trailblazing engineer, pilot, and inventor embodied resilience against racism, proving one man's ingenuity, amplified by true friendship, can redefine history. In an age craving unsung heroes, Mann's story demands the spotlight he so richly earned.

Howard Hughes' Career in Motion Pictures
A Blend of Ambition, Innovation, and Spectacle

BILL KOLB
MONDAY DOCENT

Howard Hughes (1905–1976), the eccentric billionaire aviator and industrialist, entered Hollywood in 1926 at age 20, shortly after inheriting his father's tool company and amassing a fortune. Drawn by a passion for storytelling and technical experimentation, he founded Caddo Productions in Los Angeles to produce films that often intertwined his love of aviation with cinematic daring. Over two decades, Hughes produced or directed about a dozen films, pouring millions into projects that prioritized spectacle over narrative polish. His hands-on approach—fueled by perfectionism—led to groundbreaking technological advances in aerial filming and sound design, though it also resulted in notorious budget overruns, censorship battles, and production chaos. By 1948, he acquired RKO Pictures, influencing studio operations until exiting the industry in 1957 amid personal reclusiveness.

Early Productions: Building Momentum

Hughes' initial forays were modest but profitable, establishing him as a savvy financier before he embraced directing.

- ***Everybody's Acting*** (1927): His debut production, a silent comedy-drama, earned moderate critical acclaim and financial returns, signaling viability in the volatile industry. Hughes handled financing through Caddo, with limited creative input.
- ***Two Arabian Knights*** (1928): This World War I comedy, produced by Hughes, grossed over $500,000 in profit and won the first Academy Award for Best Director of a Comedy Picture (for Lewis Milestone). It marked his first major hit, blending humor with wartime themes and showcasing his eye for talent.

These early successes funded bolder ventures, but Hughes' obsession with authenticity soon elevated his role from producer to director.

The Pinnacle: *Hell's Angels* (1930) and Aerial Revolution

Hughes' directorial breakthrough, *Hell's Angels*, epitomized his fusion of film and flight. Conceived in 1927 as a silent epic about British pilots in World War I, produc-

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Howard Hughes' Career in Motion Pictures
A Blend of Ambition, Innovation, and Spectacle

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tion ballooned from $500,000 to nearly $4 million—the most expensive film of its era—due to Hughes' relentless pursuit of realism. He amassed 87 vintage aircraft, hired dozens of pilots, and shot over 500,000 feet of film, often working 24–36-hour shifts. The project claimed three lives in crashes, including a mechanic and two pilots, and Hughes himself suffered a near-fatal wreck when his plane stalled during a dogfight sequence, breaking his cheekbone and requiring weeks of recovery. Directors Luther Reed and Frank Lawrence quit amid clashes, leaving Hughes to helm the final cuts.

Released in 1930 after delays, the film grossed $8 million over time, praised as "the greatest air spectacle ever projected" despite a thin plot. It launched Jean Harlow as a star after reshoots replaced Greta Nissen for her thick accent.

Technological Innovations Introduced

Hughes transformed aerial cinematography, setting standards still echoed in modern blockbusters:

- **Three-Dimensional Scale Models for Choreography:** To orchestrate complex dogfights, he built intricate 3D models of aircraft formations and flight paths, allowing precise pre-planning of maneuvers. This innovation ensured thrilling, unprecedented realism in mass aerial battles, far surpassing prior films' static shots.
- **Onboard Camera Mounts and Live Filming:** Hughes pioneered stabilized cameras mounted directly in cockpits and on wing struts, capturing authentic in-flight footage during real dives and loops at speeds up to 200 mph. This "flying camera" technique minimized editing tricks, delivering visceral immersion but at great risk.
- **Sound Synchronization and Dubbing:** Starting as a silent film, production pivoted mid-way after *The Jazz Singer* (1927) popularized talkies. Hughes invested $1 million to reshoot dialogue and dub synchronized engine roars, gunfire, and pilot chatter—novel for the era. This created seamless audio-visual fusion, enhancing the chaos of battle scenes and influencing sound design in adventure films.
- **Color Tinting in Editing:** Experimenting in post-production, he applied selective color tints (e.g., amber for interiors, blue for night flights) to black-and-white prints, adding dramatic depth and emotional layering—a precursor to color grading techniques.

These advancements, born of Hughes' engineering mindset, redefined aviation epics, though they contributed to the film's financial strain during the Great Depression.

Later Films: Grit, Controversy, and Publicity

Hughes produced sporadically after 1930, closing Caddo in 1932 amid economic woes and a divorce settlement

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Howard Hughes' Career in Motion Pictures

A Blend of Ambition, Innovation, and Spectacle

(CONTINUED FROM PREVIOUS PAGE)

barring new films until 1939. His output shifted to edgier fare, leveraging scandal for buzz.

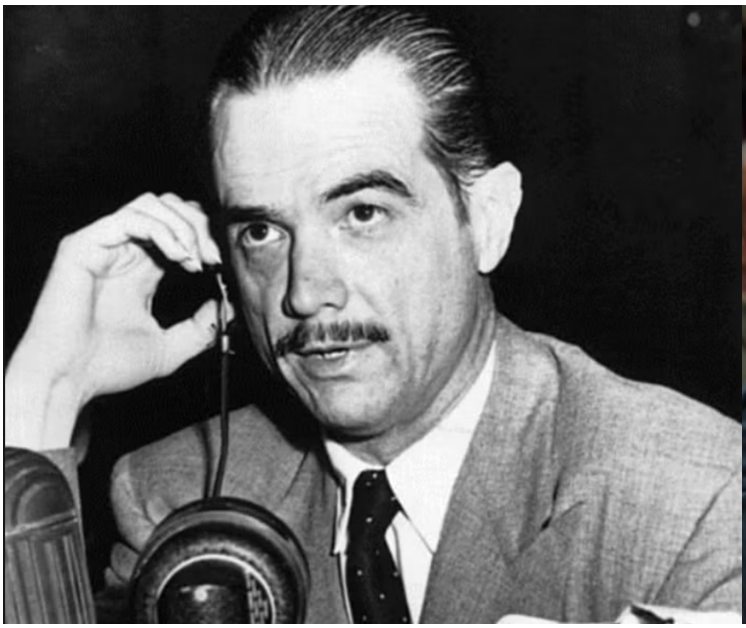
- ***Scarface*** (1932): Produced and co-written by Hughes, this gangster saga—directed by Howard Hawks and starring Paul Muni as a Capone-esque bootlegger—faced brutal censorship from the Hays Office over its graphic violence (e.g., machine-gun massacres). Hughes fought for months, adding a "shame of violence" prologue to appease regulators. Released after cuts, it became a massive hit, grossing millions and launching Muni's career, but strained Hughes' relationship with Hawks.
- ***The Outlaw*** (1943): Hughes' final directorial effort, a Western retelling the Billy the Kid legend with Doc Holliday (Victor Mature) and Pat Garrett (Thomas Mitchell), centered on provocative newcomer Jane Russell as a saloon girl. Production stalled for years due to World War II material shortages and Hughes' perfectionism. He personally designed a push-up brassiere to accentuate Russell's figure—though she claimed it was never worn on set—sparking a sensational Hays Code battle over "suggestive" cleavage. The film premiered in 1941 but was banned until 1946 after edits, generating massive free publicity and earning $3 million in profits upon wide release.

No major technological leaps marked these, but Hughes' marketing innovations—using controversy as promotion—anticipated modern hype strategies.

Legacy of Innovation and Impact

Hughes' film career, though brief (spanning ~20 films total), left an indelible mark through technical audacity rather than volume. His aerial innovations in *Hell's Angels* influenced WWII propaganda films and later classics like *Top Gun* (1986), while sound dubbing accelerated Hollywood's talkie transition. Challenges like overruns (e.g., *Hell's Angels* lost money initially) and censorship highlighted his disruptive style, often at personal cost—his obsessiveness alienated collaborators and foreshadowed his later isolation. By blending aviation expertise with cinema, Hughes proved films could be engineering feats, grossing tens of millions overall and funding his aviation pursuits. His RKO tenure (1948–1957) further shaped post-war production, though scandals like the 1955 payola probe hastened his exit. Today, Hughes endures as Hollywood's ultimate maverick innovator.

Howard Hughes and Tony Stark



BILL KOLB
MONDAY DOCENT

Tony Stark, the Marvel Comics character and centerpiece of the *Iron Man* franchise, is heavily inspired by Howard Hughes. Here's a concise breakdown of the connection:

- **Creator Intent:** Stan Lee, who co-created *Iron Man* with Larry Lieber, Don Heck, and Jack Kirby in 1963, explicitly stated that Howard Hughes was a key inspiration for Tony Stark. Lee described Hughes as a "billionaire industrialist, inventor, and playboy," qualities mirrored in Stark's persona (Lee & Mair, 2002).
- **Parallels Between Stark and Hughes:**
  - **Wealth and Innovation:** Hughes was a billionaire entrepreneur, aviator, and inventor, known for his work in aviation (e.g., Hughes Aircraft) and filmmaking. Similarly, Tony Stark is a billionaire genius running Stark Industries, a cutting-edge tech and weapons company (Genter, 2007).
  - **Playboy Lifestyle:** Hughes was infamous for his flamboyant lifestyle and relationships with Hollywood starlets, much like Stark's charming, womanizing persona in the comics and films (Barlett & Steele, 2004).
  - **Eccentric Genius:** Both are brilliant but flawed, with Hughes' obsessive tendencies and reclusive later years echoing Stark's struggles with ego, alcoholism (in the comics), and personal demons (Thomas & Sanderson, 2007).
  - **Aviation and Technology:** Hughes' passion for aviation (e.g., designing the H-4 Hercules) aligns with Stark's creation of the Iron Man suit, a technological marvel (Marrett, 2004).
- **Key Differences:** While Hughes' life spiraled into reclusion and mental health struggles, Stark's arc, especially in the Marvel Cinematic Universe, leans toward redemption and heroism. Stark is a fictionalized, superheroic spin on Hughes, amplified for comic book flair (Genter, 2007).
- **Cultural Impact:** The Hughes inspiration is most evident in early *Iron Man* comics and was carried into the MCU, where Robert Downey Jr.'s portrayal draws on Hughes' charisma and eccentricity, though modernized with a tech mogul vibe (some liken Stark to Elon Musk as well) (Vanity Fair, 2008).

Syncom's Skyward Leap:
Revolutionizing Geostationary Global Communications

BILL KOLB
MONDAY DOCENT

The Syncom (short for Synchronous Communications Satellite) series consisted of three experimental satellites developed in the early 1960s by the Hughes Aircraft Company under contract with NASA. These lightweight, spin-stabilized spacecraft were pioneering efforts to demonstrate satellite communications in geosynchronous orbits, where they could match Earth's rotation period for consistent visibility from ground stations. Hughes Aircraft, owned by industrialist Howard Hughes at the time, played a central role in their design and construction; engineer Harold Rosen, working at Hughes, led the team and is often credited as the "father of the geostationary satellite" for innovating the spin-stabilization technique that made the small satellites viable despite limited power and propulsion.

Syncom 1 was launched in February 1963 but failed due to a mid-course propulsion explosion, though it briefly reached synchronous altitude. Syncom 2, successfully launched on July 26, 1963, became the world's first geosynchronous communications satellite. It orbited at about 22,000 miles above Earth with a slight inclination that caused it to trace a figure-eight path in the sky. It enabled the first transatlantic satellite phone calls, including between the U.S. and Nigeria, and relayed a speech by President John F. Kennedy. Syncom 3, launched in August 1964, achieved the first truly geostationary orbit (directly over the equator with no inclination), providing stable coverage and transmitting live television coverage of the 1964 Summer Olympics in Tokyo to the United States—marking a milestone in global broadcasting.

The success of the Syncom program proved that geosynchronous orbits could be used for communications, overcoming early doubts about their feasibility due to the satellites' distance from Earth and the challenge of precise station-keeping. This established the foundation for the modern satellite telecommunications era, leading to the development of larger, more capable geostationary satellites that now number in the hundreds, supporting global TV distribution, internet access, telephony, and data services. Without Syncom's proof-of-concept, the rapid growth and commercialization of the satellite industry—including systems like Intelsat—might have been delayed, fundamentally shaping how information is transmitted worldwide today.

You can find a life-sized replica of the Syncom satellite hanging from the ceiling of the East Pavilion.

History of the Red Poppy

JOHN BURLESON
COLLECTIONS & SUNDAY DOCENT

Each year on Veterans Day, we pause to honor and thank the brave men and women who have served in the United States Armed Forces. Among the many symbols associated with this solemn occasion, the red poppy stands out as one of the most enduring and powerful. Have you ever wondered how this simple flower became a national symbol of remembrance?

The story of the red poppy begins on the battlefields of World War I, particularly in the war-ravaged regions of Flanders, Belgium. These areas, devastated by years of fighting, were often reduced to muddy, barren landscapes. Yet, amidst the destruction, the red poppy (*Papaver rhoeas*) was one of the first plants to bloom.

This powerful image inspired Lieutenant Colonel John McCrae, a Canadian soldier and physician, to write the now-famous poem "In Flanders Fields" in 1915.

In Flanders fields the poppies blow
Between the crosses, row on row,
That mark our place; and in the sky
The larks, still bravely singing, fly

Scarce heard amid the guns below.
We are the Dead. Short days ago
We lived, felt dawn, saw sunset glow,
Loved and were loved, and now we lie
In Flanders fields.

Take up our quarrel with the foe:
To you from failing hands we throw
The torch; be yours to hold it high.
If ye break faith with us who die
We shall not sleep, though poppies grow
In Flanders fields.

Inspired by McCrae's poem, Moina Michael, an American educator and humanitarian, made it her mission to promote the red poppy as a symbol of remembrance. In 1918, she began wearing a red poppy in honor of those who had died in war and encouraged others to do the same.

Her efforts gained traction, and by 1920, the American Legion adopted the red poppy as the official flower of remembrance in the United States. Around the same time, French humanitarian Anna Guérin began producing artificial poppies to sell in support of war widows and orphans. The idea quickly spread to other Allied nations, including the UK, Canada, Australia, and New Zealand.

While the red poppy originated as a symbol of remembrance for those who died in World War I, its significance has grown to honor all veterans, both living and deceased.

In the U.S., Veterans Day (originally known as Armistice Day) was established in 1919 to mark the end of World War I. Over time, the holiday evolved into a broader observance, recognizing all American veterans for their service and sacrifice.

The red poppy is not just an American tradition. Across the globe, it is worn to mark Remembrance Day (November 11) in countries like the UK, Canada, and Australia. While customs vary, the message remains universal: to honor those who have served and to remember the cost of freedom.

In many places, a moment of silence is observed at 11 a.m. on November 11—the exact time when the armistice ending World War I took effect in 1918.

The red poppy may be small, but its meaning is profound. It serves as a visual reminder of the sacrifices made by generations of veterans and as a call to continue supporting those who served.

This Veterans Day, as you see poppies worn with pride, take a moment to reflect on the courage, dedication, and sacrifice they represent. We wear the poppy not just to remember the fallen—but to honor all who have served.

Remembering Operation Homecoming

PETE BAUR
WEDNESDAY DOCENT

Editor's Note: *Below is a story of remembrance as told by docent Pete Baur. It is a memorialization of the 25th anniversary of Operation Homecoming, the mass repatriation of 591 American prisoners of war (POWs) from North Vietnam following the Paris Peace Accords of January 27, 1973. The event took place on Memorial Day weekend in 1998.*

In the story, Pete refers to "Fred", who is Fred Wilhelm, a Wednesday docent in the East Pavilion who flew over 100 missions in the F-105 Thunderchief, also known as Thud.

The SPAD 2-5 flight referenced in the story included four USAFR F-16s, four USMCR F/A-18s, two USNR F-14s, two USAFR F-4s, two USAF A-10s, and four USAF T-38s.

Several months before this particular Friday, Colonel Fred Flom USAF (ret), who was an old "Thud Driver" (like our Fred!), needed a favor. Col Flom called his old buddy, the 301st Fighter Wing Commander, BGen Effington, USAF, and explained the situation. General "Eff" was only too happy to oblige. The request was for the following:

"Navy Fort Worth ground, SPAD 2-5, flight of 18, taxi in elements with the numbers...SPAD 2-5-flight Navy ground, taxi in elements, your discretion, the airfield is yours...Attention all aircraft, Navy Carswell Airfield is closed..."

Fast forward to the Friday before Memorial Day 1998. Takeoff time for SPAD 2-5 flight was just before 19:00 local. Once airborne, the elements joined in a mile-long "daisy-chain" turning eastbound to a holding point 20 miles north of the "target."

The "target" was the threshold of Runway 1-5 at the Addison Airport (KADS) north of Dallas. On the northeast side of runway 1-5 was the Cavanaugh Air Museum, and there was a big party happening that evening.

Col Flom hosted the kickoff event, the first of several parties over the long holiday weekend. At around 19:10, Col Flom invited his "honored guests" and their friends and family (800+!) to charge their glasses and retire to the west side tarmac.

This invitation was for all to raise a toast to the setting sun to honor and remember their comrades who didn't come home. Who were these honored guests? We all know who they were as a group, because this weekend of celebrations was titled:

What happened next was Col Flom's surprise for his honored guests.

SPAD 2-5 flight pushed at 19:25, descending to 500' and accelerated to 300 knots. The elements were about one mile apart. As the F-16s in fingertip formation approached Runway 1-5, Dash-3 pitched up, creating the "missing man formation".

The F/A-18s formed into a tight diamond for their pass and looked totally "Sierra-Hotel..."! Behind the *Hornets*, and as the F-14 flight lead, I signaled my wingman "Wings-back and Hooks-down...!" Those Carrier Naval Aviators on the tarmac would have been proud of the memories of their carrier landings.

Next were the F-4s, those old Phantoms with GE J-79s screaming and smoking down the runway as so many of those guests remember. The A-10s were close to max-knots, but who doesn't love the "Hog"?

When the last element, the T-38s, flew by, their Dash-3 was rejoining the missing man formation, welcoming back those heroes. This was the same maneuver flown by the USAF Thunderbirds T-38 team in 1973 at Travis AFB, welcoming the POWs back to US soil.

It was a quick flight back to the Naval Air Station, and the frequency was very quiet. Total flight time was just 1.0 hour, and it was one of my most memorable flights.

Band of Brothers

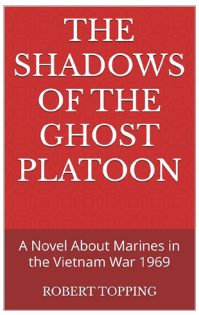
The McMinnville, Oregon Band of Brothers meets on the **first Thursday of each month** in the large glass-walled room to the left of the primary admissions desk in the West Pavilion (formerly the Aviation Museum). **Meetings run from 11:30 am to 12:30 pm,** with coffee and cookies served. More details can be found at the group's **Facebook page: https://www.facebook.com/groups/838928846550343**

JOHN BURLESON

COLLECTIONS & SUNDAY DOCENT

NOVEMBER 6

Our November program will feature Earl Kisler. On January 23, 1968, the U.S.S. *Pueblo* (AGER-2) was attacked by North Korean naval vessels and MiG jets. One man was killed and several were wounded. Communications Technician Third Class Earl M. Kisler, U.S. Navy, was captured when the *Pueblo* was boarded by North Korean forces in international waters and was held along with eighty-two surviving crew members as Prisoners of War in North Korea until their release on 23 December 1968.



DECEMBER 4

Our December program will feature Bob Topping. Bob is a is a U.S. Marine Corps veteran of the Vietnam War. He has written a book, "The Shadows of the Ghost Platoon."

Local Veterans Day 2025 Events

JOHN BURLESON

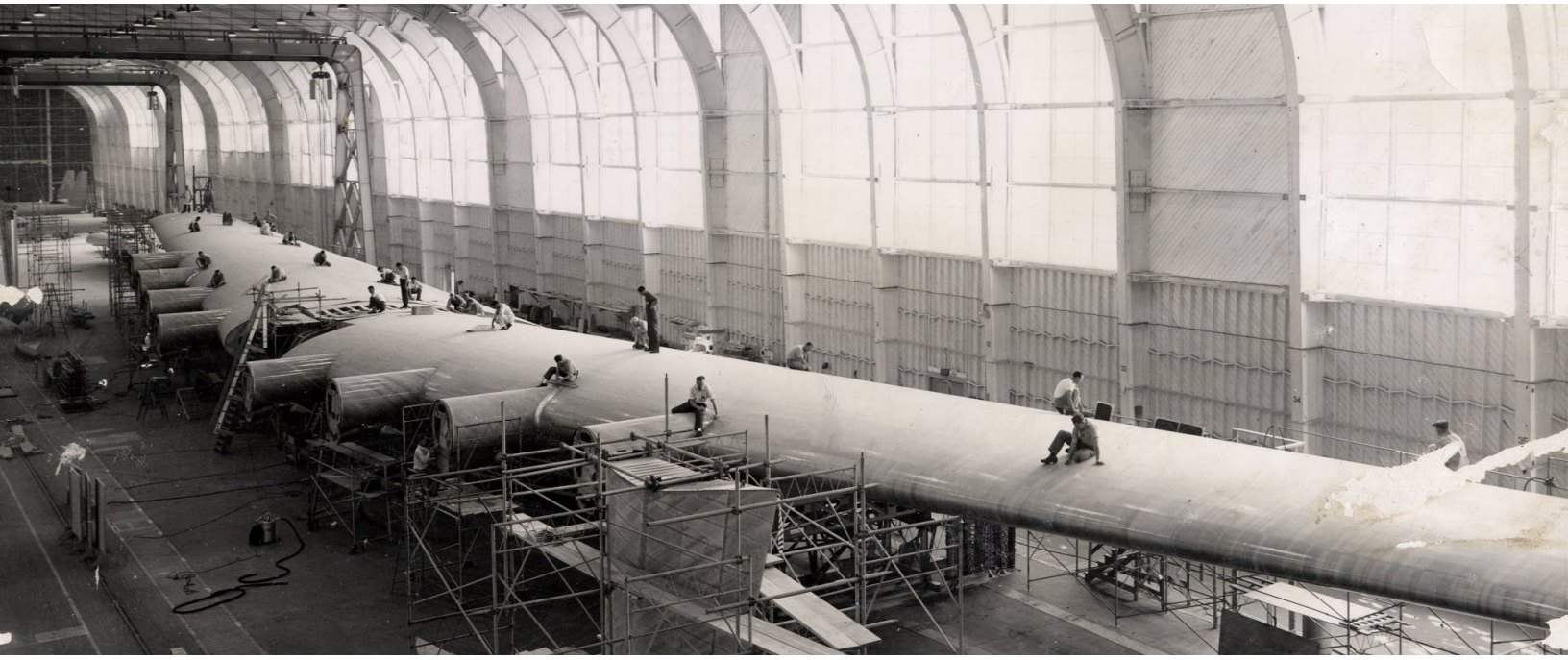
COLLECTIONS & SUNDAY DOCENT

FRIDAY, NOVEMBER 7 & MONDAY, NOVEMBER 10

As is their tradition, Duniway Middle School and Patton Middle School will honor all veterans with assemblies. Patton's is on Friday the 7th, and Duniway's is on Monday the 10th. Both assemblies start at 8:30 a.m.

SATURDAY, NOVEMBER 8

There will be a McMinnville Veterans Day parade on Saturday the 8th in downtown McMinnville. The parade starts on NE 3rd Street at 10:00 a.m. Groups can sign up to march or have a float in the parade—to participate, please register with a Google form at **https://forms.gle/rS5AFqD5h82beGMc8.**



MUSEUM MISSION

Evergreen Aviation & Space Museum is a force of curiosity and courage for kids of all ages to gain the confidence to take flight.

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