

THE WORLD'S FASTEST AIRPLANE



The Hughes H-1
The Man, The Airplane and The Flight
Version 3
Alive Again in Flight Simulation

By
David W. Carroll

THE WORLD'S FASTEST AIRPLANE



THE WORLD'S FASTEST AIRPLANE

The Man

Howard Robard Hughes, Jr. was born on December 24, 1905, in Houston. He attended private school in Boston and later, while attending Thacher School in California in 1922, his mother died. Also while in California, his uncle Rupert inspired an interest in film making. He did not graduate from high school, but did audit courses at Cal Tech. He returned to Houston, enrolled at Rice Institute but then in 1924, his father, inventor of the rotary drill bit and founder of the extremely profitable Hughes Tool Company, died. Howard left Rice to run the company.

He married Ella Rice in 1925 and moved to California to establish a motion picture subsidiary and pursue his film making interests. His first attempt, *Swell Hogan*, was so bad he never released it. However, with his new team of Noah Dietrich as head of the movie subsidiary and Lewis Mileston as director, his third film, *Two Arabian Nights*, won an academy award (best comedy director) in 1928.

Howard earned his pilot's license while filming *Hell's Angels*, which he wrote and directed. The film starred Greta Nissen and a fleet of 45 WW1 aircraft and was ready for release when Al Jolson and *The Jazz Singer* arrived on theater marquees. Also in 1929, Ella divorced him and, of course, the stock market crashed. Unperturbed, Howard found a budding new leading lady, Jean Harlow (Greta's Norwegian accent wouldn't work), and re-shot the movie in sound. By the time of release in 1930, Howard had invested nearly \$4M in it; however, while all this was going on, Hughes Tool Company was producing more money than Howard needed. Then, in 1932, after producing a dozen movies more or less, including *Scarface* and *The Front Page*, Howard turned his attention to aviation.

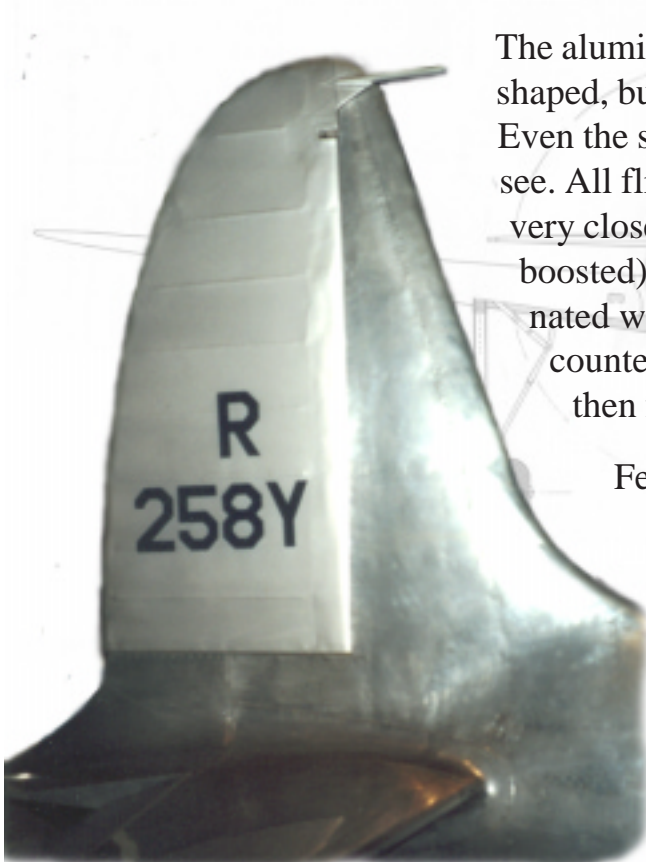
He formed the Hughes Aircraft Company subsidiary of Hughes Tool Company and worked for a time as a copilot (at that time, the copilot was also the baggage handler) for American Airways under the assumed name of Charles W. Howard. In 1934, he entered the All-America Air Meet in Miami with an Air Corps pursuit plane he had acquired - and won. Now, he wanted to build **the world's fastest airplane**. He was not a graduate engineer; but, he had an eye for design and he knew how to hire the people he needed to help him do the job. Richard Palmer, design engineer and Glenn Odekirk, aircraft fabricator, were his choices among many available in the depression era.

Do you get the idea - that this man knew how to get things done?!

THE WORLD'S FASTEST AIRPLANE

The Airplane

The product of the Hughes/Palmer/Odekirk effort, the Hughes H-1, is a masterpiece of 1934-1935 aviation art, innovation and accomplishment - and was Howard Hughes' first major contribution to modern aviation. The aircraft was modeled and flown in the Guggenheim Aeronautical Laboratory wind tunnel at Cal Tech. No funding was withheld or effort spared to match the aircraft to the wind tunnel performance.



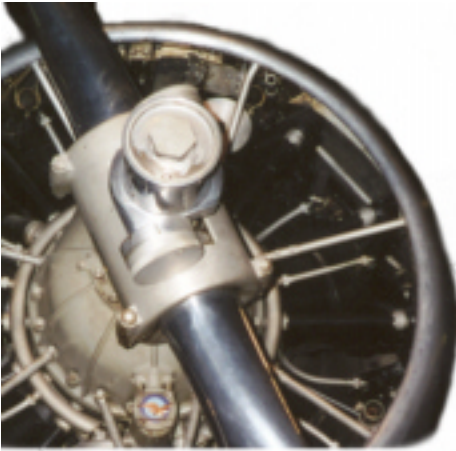
The aluminum fuselage, fin and stabilizer skins are carefully shaped, butted seamlessly over the frames and flush riveted. Even the spring loaded steps on the wing fillet are difficult to see. All flight surfaces are smoothly faired to reduce drag. A very close fitting cowling encloses the 700HP (1000HP boosted) 14 cylinder P&W Twin Wasp, Jr. engine. The laminated wood wing structure and surfaces feature the use of countersunk flat head screws and fabric covering which is then filled and buffed to a smooth glistening finish.

Features pioneered on the H-1 were incorporated in both the Allied and Axis aircraft of WW2 and can be found on aircraft produced even today. Indeed, some have yet to be reproduced as well.

The retractable main landing gear strut structure is integrated with the gear well cover and an attached wheel cover completes closure when the gear is retracted so that joints are almost invisible. Even the tool steel tail skid retracts flush into its well.



THE WORLD'S FASTEST AIRPLANE



The cockpit is fully enclosed. The sectioned canopy slides on rails on the aft cockpit bulkhead and windscreen to retract into the fuselage. The windscreen is then pushed forward to provide easy entry and exit.

Split flaps are fitted which, when extending, are joined by drooped ailerons to improve slow speed performance.

The H-1 was first built with a short wing (24 ft - 11 in span) and on September 13, 1935, Hughes flew it over an officially approved instrumented course. The H-1's world record speed was 352.322 mph.

Howard attempted another much faster pass but fuel was exhausted and, with insufficient time to lower the manually operated gear, a belly landing was forced.

The aircraft was returned to the barn for repair and modification. New wings with greater span (31 ft - 9 in), a hydraulic gear retraction system (a first at that time), new tail surfaces, 280 gal fuel capacity and oxygen equipment were all fitted to enable high altitude flight with extended range. A further benefit of the larger wing was decreased angle of attack and thus lower drag with consequent retention of speed performance. Provision for a prototype Sperry Mark III Autopilot was included but it was not installed. A communications radio was not installed.



THE WORLD'S FASTEST AIRPLANE

The Transcontinental Flight

At 1014:00 UTC on 19 January 1937, at Union Air Depot at Burbank, Hughes opened the throttle on the supercharged engine of the H-1, reached for the low clouds and headed east for San Bernardino Pass. At 14,000 ft, he leveled off, reduced mixture and manifold pressure and adjusted pitch on the 10 ft - dia propeller for optimum cruise performance. He rode jet stream winds and, while adjusting oxygen supply, a visual of Winslow, AZ confirmed his course. He saw the sun rise over the clouds while over Colorado. He was not able to sort out recently rearranged airway frequencies for his RDF most of the time and thus relied on dead reckoning and breaks in the clouds for much of the flight. He estimated the crossing of the Mississippi at a little north of St. Louis. There were no ground station reports during the entire flight. He exhausted his oxygen supply over Indiana but continued on without it. Near Indianapolis, the jet stream veered to the southwest requiring him to crab the aircraft 28 degrees to the south in order to stay on course. Over Middletown (near Bethlehem), PA, he nosed down and began the long decent to Newark. The airplane, stressed for 550 mph, reached 380 mph in this long power glide. He made a



full power low pass over the Newark field at 1742:25 UTC as recorded by William Zint of the Longine Watch Company, official timer for the National Aeronautics Association (average speed of 332 mph over the 2490 mi course). He circled the field waving off once while waiting for a green light to land at the busiest airport in the world. Then, after passing the lady one more time, with a green

THE WORLD'S FASTEST AIRPLANE



light, he slid in over the boundary, dropped his gear and flaps and made a perfect three-point landing at 1802:30 UTC.

In typical Hughes fashion, he minimized this world record flight which bettered his own previous record by nearly 2 hrs. He said: “I wanted to see New York . . . so I tried to see how fast I could do it in.”

The Flight Simulator Computer Model

At last, with the advent of FSDS, justice can be done for this airplane. The program is absolutely astounding. It allows formation of complex convex and concave surfaces and, as far as I can tell, products are limited only by imagination, computer power, and FS2000/FS2002. However, the result discussed here and provided in the files is actually the second try.



The first model was built using the 3-view provided in the fourth edition of the Smithsonian publication *Aircraft of the National Air and Space Museum*. However, a visit to the NASM and several hours with the H-1, which fortunately has been moved to the Golden Age of Flight section, yielded some surprises. First, the real aircraft and its features were much more stunning than expected. Second, the first model, while looking good, was not accurate. All was not lost, however. In the NASM shop, I found Paul Matt's *American Heritage CD ROM Archive 3* which included beautifully detailed 3-views and photographs of the H-1. With a gentle hint to my daughter, the CD appeared as a Christmas gift. I augmented this data with newspaper stories,

THE WORLD'S FASTEST AIRPLANE



internet and library searches and my own photographs. The New York Times article of January 20, 1937 (then selling for \$0.02/copy) was of great interest for technical detail and literary style. Present day media should emulate! I also took ideas revealed in examples, but not the work, of flight sim developers who I have come to admire.

As rendered in FSDS, this model consists of 146 parts, 12,280 verticies, 10,950 polygons, including 66 animated parts. The numbers, however do not provide a meaningful description of the model. The wing fillets are the inside of quarter cylinders stretched and/or compressed to fit to the wings and fuselage. In the final assembly, every non-moving, joined, convex and concave part was blended together and all redundant points were removed. The parts were then again cut apart as required for texturing. All moving surfaces have thier own seperate wells so that sharp edges are not rounded. The model is round where an airplane should be round and it is flat where an airplane is flat. All control surfaces work, including the drooped ailerons/flaperons. The canopy and windscreen open and shut. The gear retracts into the 3-D gear bays. The Twin Wasp,Jr. is also 3-D. Howard Hughes is sitting in the cockpit and he will turn his head for you.

For those who are interested, animation sequences are as follows:

MOTION SEQUENCES for H-1B Gear & Surfaces

Ailerons-22deg - 3 Assemblies each location,
aileron & flaperon superimposed, drooped
aileron

Aileron.Undrooped

0-1F

Aileron.Drooped

99-100F

Flaps-22deg:

Flaperon

1-99F

Canopy w/Landing Gear - 5 Assemblies Each
half has 2 superimposed Assemblies

Full Canopy

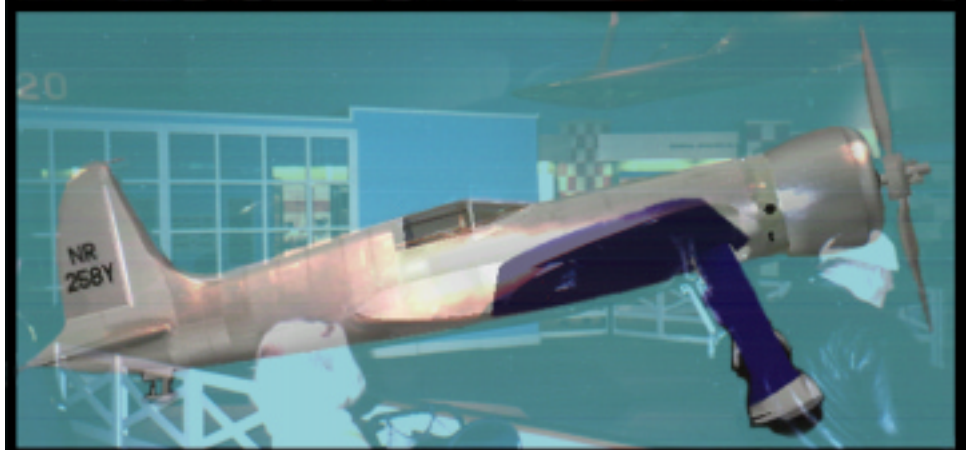
0-2G

Half Section Assembly

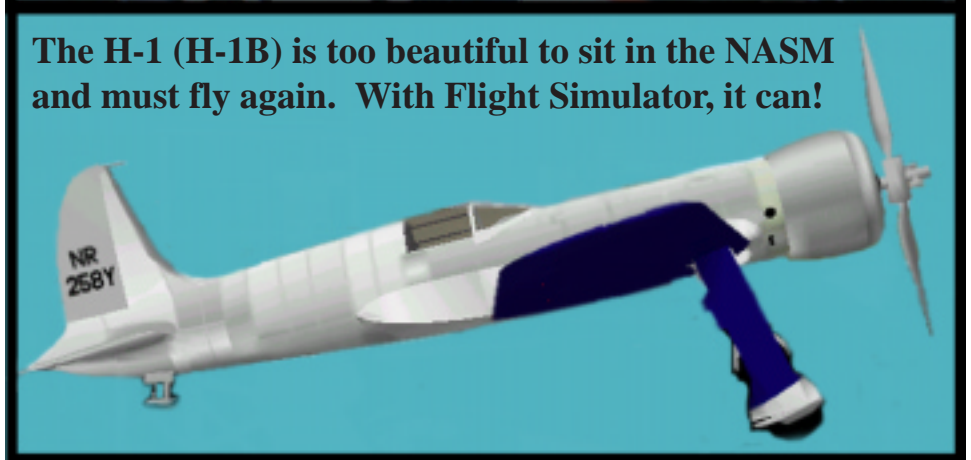
1-40:1;40-100:1H

THE WORLD'S FASTEST AIRPLANE

Half Section Assembly minus
 2 lower segments
 1-90:1;90-100:1H
 Windscreen w/Landing Gear -
 3 Assemblies, 2 superim-
 posed, 1 forward
 Windscreen A
 0-1G
 Windscreen B
 0-1:100H;1-96:0;96-100:0H
 Windscreen Fwd
 0-96:1H;96-100:1
 Landing Gear-90deg:
 Main Gear - Wheel & Main
 Strut
 1-15:+1H;15-20:0H;20-
 25:+2;25-100:+1
 Strut Assemblies - 8 each
 gear, 30%, 40%, 50%, 60%,
 70%, 80%, 90%, 100%
 Struts-30
 1-15:+1H;15-20:0H;20-
 25:+2H;25-35:+1;35-100:1H
 |
 |
 Struts 100
 1-15:+1H;15-20:0H;20-
 25:+2H;25-95:+1H;95-100:1
 Main Strut Cover.Up
 1-2:100H;2-20:0;20-100:0H
 Main Wheel Well Cover
 0-2G
 Main Wheel Cover.Up
 1-15:0;15-20:+20;20-100:0H
 Skid Assy
 1-10:6H;10-80:0;80-100:2
 Skid Door
 1-60:0;60-85:4;85-100:0
 Skid Well Cover
 0-1:0;1-2:100H;2-60:0;60-
 100:0H



**The H-1 (H-1B) is too beautiful to sit in the NASM
 and must fly again. With Flight Simulator, it can!**



THE WORLD'S FASTEST AIRPLANE

I used Micrografx Designer and Photoshop for preparing backgrounds and textures and a Lotus spreadsheet to run numbers for the FS2000 and FS2002 flight dynamics.

I am not a textures expert; but, I try. Most of the stuff can be analyzed by loading the texture files into a photo editing program. The fuselage textures are composites of individual skin panels rendered with gray gradients. I like the effect. I hope you do too.

Four instrument panels are provided. For FS2000, panel.H1 is a representation of the real airplane panel at the time of the record transcontinental flight. Panel.H1.M3 incorporates the Sperry Mk III and the radio gear installed in the airplane later after the transcontinental record flight. I personally like this panel because it allows set-up with a climbing turn - not available with the default autopilot. Panel.H1.FS provides full default instrumentation with a full blown autopilot, gps, fuel management instrumentation, etc. - to tool around with and investigate the full capability of this airplane with modern navigation instruments. The separation of autopilot configurations also eliminates the interference and erratic behavior that occurs when the Sperry and default autopilots were used together in the first release of these files. Unfortunately the FS 2000 Sperry Mk III will not work in FS2002. Panel.H1.M3 is thus not useable in FS2002; however, ATC, Check List and Map buttons are added to the H1.FS panel for FS2002.

I put the instrument panels together using CFG Edit. The gauges are FS2000/FS2002 (Profesional Edition) default except for the Sperry MK III by Bill Rambow and Arne Bartels. Their released files are in the panel.h1.m3 directory (FS2000 only). The fuel instrumentation is not as I would like it to be. The H-1 carried a total of 280 gal. of fuel in 2 fuselage and 2 wing tanks. Due to FDE and gauge limitations, the simulation uses one main tank (205 gal.) and one auxilliary tank (75 gal.)

The sound set is by Mike Hambly, Sound Designer (Blue Arrow). His readme is included in the sound directory.

The model has been thoroughly tested on my 650 MHz PIII Sager Notebook. I am not sure it will work well on slower computers. The flight model is almost a "kick the tires and light the fires" experience and probably behaves better than the real airplane; but beware of the effects of the huge prop and the 80 mph landing speed.

Use the "H-1 Start Up" flight to get used to the airplane and the "H-1 Transcontinental Record Flight" to explore the problems Howard Hughes must have had in making the record flight. *(Remember that Howard Hughes had no radio, no autopilot, a cranky RDF and an inadequate oxygen supply when making the record flight.)* Full check lists and notes are provided for all panel configurations. I hope you enjoy flying this great personal airplane.

Visit this site: <http://www.wrightools.com/hughes/default.htm> to view and read about the

THE WORLD'S FASTEST AIRPLANE

fascinating reconstruction of a flying H-1.

I freely offer my ideas for the use of other developers so that the breed may be improved. This package is freeware but any authors still hold the copyright. No repack or rework of any kind of this historic aircraft model will be approved. As with the real H-1, this model is ONE OF A KIND! If you know something more about this aircraft and would like to share it, please contact me.

Dave Carroll
Flyway@mail.com