

Howard DGA-4 Mike and DGA-5 Ike

The Golden Age of Air Racing, by Truman "Pappy" Weaver and Wes Schmidt



Benny Howard and "Mike"

AFTER COUNTING THE trophies and money won by "Pete" in the 1930 and 1931 races, Benny Howard decided that there was money in the race game. He was also aware that "Pete" was on the way to being outclassed and if he was to remain in the winner's circle, he would have to do something about it. So early in 1932 work began on two larger racers. The end result was "Mike" and "Ike," (they look alike). The two racers were almost identical, the only difference being in the landing gears. They were both painted snowy white with shiny black lettering. "Mike" (DGA-4) drew license number NR-55Y and race number 38, (race number 7 was used, at Omaha) while "Ike" (DGA-4), carried NR-56Y and race number 39.



"Mike" at the National Air Races

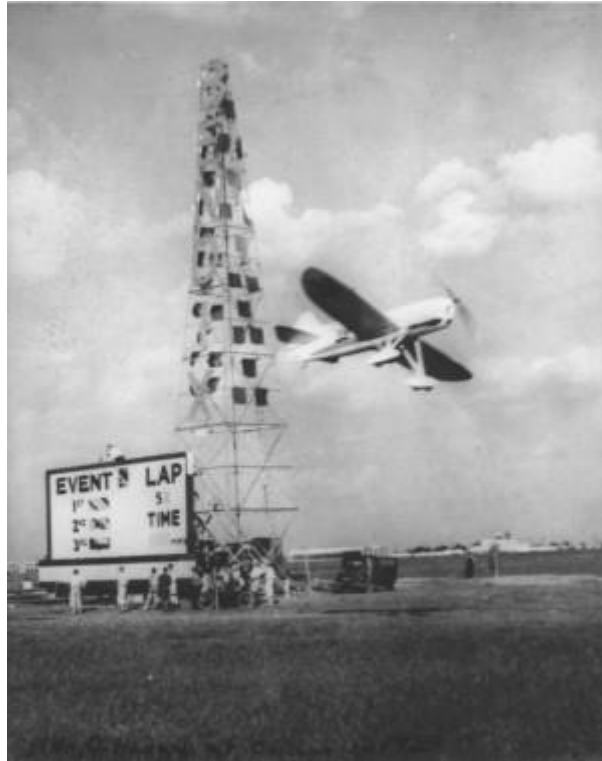
Both racers were low-wing, wire braced monoplanes, and like "Pete" were very small and had a minimum of frontal area. There was a slight difference in weight, "Ike" being a bit lighter of the two. Both were powered by Menasco Buccaneer engines of 485 cu. in. displacement, differing in octane ratings only. The engine in "Ike" was set for a higher octane, thus giving a little boost in horsepower. The extra horsepower and being a little lighter may have accounted for "Ike" being the faster of the two in 1932. Oddly enough, it was always a toss-up as to which of the ships would be the fastest from year to year.

Wing span of both ships was 20 ft. 1 in. and the fuselage was 17 ft. long. The cockpit in each case was hinged on the side and closed after the pilot was inside. A large hole for the pilot's head was left open. Ventilation was assured by 30 small holes drilled in the windshield. The cockpits were small and the pilot's seat was level with the rudders. A slight difference appeared in the engine cowling, with "Mike" having less cooling louvers than "Ike" but a larger rectangular opening on the left side of the cowl for cooling. "Mike" had a cowl designed for a spinner, which was never used.



DGA-4 "Mike" and DGA-5 "Ike"

The landing gears on the two ships were very different. The gear on "Mike" was similar to that used on Pete. with the rather large wheels housing an internal shock; absorbing system needed to meet CAA (then ATC) requirements (both aircraft were built to these specification-but never certified because of cancellation of ATC races . "Ike" had a novel tandem gear arrangement consisting of two small wheels spaced about 20 in. apart and covered by a single wheel fairing, one on each leg. Howard stated that this was done for a gag, but the gear did prove rather successful. However, ground handling and spotting the aircraft in the hangar presented problems since the wheels did not caster. Single wheels with spats replaced the original gears on both ships.



DGA-5 "Ike"

Ben Howard entered "Ike" in six events at the 1932 National Air Races. He flew three of them himself -taking two firsts and one second. During one of the races he was pressed closely by Roy Liggett in the Cessna CR-2 with Johnny Livingston and his short-winged Monocoupe a length behind. Bill Ong ran fourth in this event but later got "Mike" wound up and took second under same conditions.

Two major air races occurred at the same time in 1933, so Howard sent Harold Neumann to the American Air Races with "Ike". The tandem wheels had been removed and replaced with normal small pantod wheels. This resulted in a weight saving and improved streamlining so a performance improvement resulted. Harold participated in only one event, placing third. He was dogged by engine trouble during the balance of the meet, so he stepped into the Folkerts SK-1 to finish the races.

Roy Minor and "Mike" were sent out to take over the Nationals. "Mike" had been modified considerably. The spinner design for the cowl had been abandoned and the large rectangular opening on the side was closed. Many of the cowl louvers were also faired in. A set of small wheels and wheel pants replaced the large unspatted wheels of 1932.

Minor and "Mike" really took over the National Air Races of 1933, copping four firsts, two seconds, two two fifths, two thirds and one fourth. Both ships were present at the 1934 Nationals, with no apparent changes other than a recovering job on Mike," whose lettering was now in gold edged with black. Roy Hunt was in the cockpit of "Mike" and Harold Neumann in "Ike". Hunt picked up two fifths and .Neumann finished with two fourths. Best closed course speed for "Ike" this year was 211.55 mph, 30 mph faster than "Mike".

Jokingly called the 1935 "Benny Howard National Air Races", this was a banner year for Ben. His racers won the Bendix, Thompson and Greve Trophy races that year.

Ike" was sponsored by the Chevrolet Division of General Motors and was known as "Miss Chevrolet". It was equipped with a special carburettor and now held the worlds inverted speed record. However,

the ship did not participate in the races as Neumann wiped the gear off during qualifying runs. Harold came back strong winning the Thompson in "Mr. Mulligan" and three firsts in the 550 cu. in. class with "Mike". Marion McKeen had worked the bugs out of his new Brown B-2 and gave Neumann some uninvited competition by finishing less than one mile per hour behind "Mike".

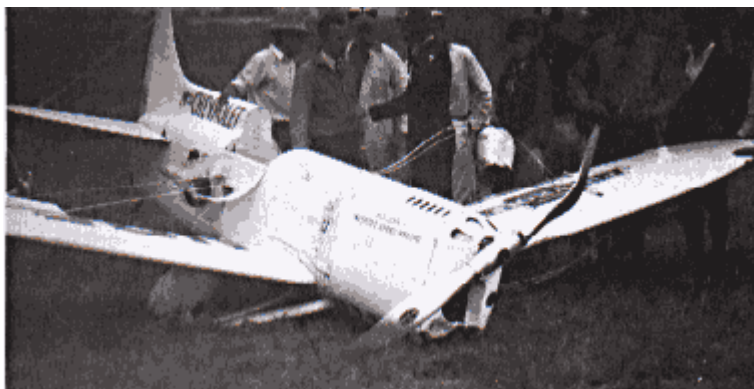
The 1936 Nationals certainly were not a repeat for Howard. "Mike" was the only one to finish a race that year. Harold Neumann ran a speed dash in it, clocking 223.714 tnph, which placed him fourth in the Shell event. Joe Jacobson placed fifth in the Greve and nosed over on landing. The 1936 races were not profitable to Ben Howard.



DGA-5 "Ike" and Harold Neumann All American Air Races, Miami 1936

Only "Ike" appeared at the 1937 Nationals, now travelling with the Fordon-Brown Air Shows. It did not race as the Menasco was not functioning properly. Both "Ike" and "Mike" were brought by R. Rovner of Cleveland and were to participate in the 1939 races, but due to technical difficulties did not appear. The only visible change was a yellow paint job on each.

"Ike" and "Mike" are still in existence, located in Ohio where it is rumoured that they are undergoing restoration. During the racing career of these two ships the honours for top speed changed hands many times. "Mike" turned a speed dash of 241.61 mph compared to 239.63 mph for "Ike," but closed course speed honours went to "Ike" with 215.2 mph, with 214.4 mph for "Mike". Not much difference in speed performance, yet they differed as much as 30 mph in single events in which both performed. Could it have been piloting?



HALLEY'S COMET WENT by in 1910 and Ben O. Howard whizzed past the spectators at the National air races, Chicago, in 1930. Both events were equally startling. In fact, I had expected Halley's Comet, but the comet-like Howard was a complete surprise to me. Neither before nor since has there been such a popular racing combination as Bennie and "Pete," the little white plane with the Gipsy engine, in which he won five first places and finished third in the Thompson trophy with a speed of 162.80 mph. Since then many pilots have flown faster, but none have created the sensation that Ben O. (just plain Oh) Howard created at Chicago in 1930. That was the high point of his life, everything since then has been a stepping down from that climactic period of his career-until he finally got married-and that was the end of him as a speed demon.

His ship won \$6,925 prize money, next to the highest amount, won by the Wedell-Williams Air Service, \$13,400. That must have cheered Ben a great deal and sweetened his outlook on racing, which rather soured on him last year.



Ben Howard was born in Palestine, Texas, Feb. 4, 1904, and despite his best efforts to avoid any education whatever, was held in school long enough to finish half a term in high school, when he leaped clear of all guidance and attached himself to a soda fountain. They paid him too much money, for one week he had \$10 saved and bought a Standard for the ten, promising to pay another ten every week for fifteen weeks. Well, next day he sent word from the hospital that the former owner could have the wreckage of the craft. Ben had taken it up with enthusiasm, and nothing else. He spent a hot summer in a plaster cast, which is an uncomfortable way to spend a hot summer in Texas.

When the 17 year old flying enthusiast was able to hobble around again, it was that fine gentleman, the late R. W. Mackie, who gave him some needed flying lessons in return for mechanical work. This was in Houston in the winter of 1922, after which Ben flew a year for C. C. Cannon, an oil operator with drilling operations scattered all over south Texas. He paid for the Standard he had used up, went to Nicholas-Beazley in the summer of 1924 and then back to Houston to build his first ship, DGA-1. "Mike" and "Ike" are DGA-4 and DGA-5. DGA stands for. The answer is Damned Good Airplane!

In the spring of 1926 Ben joined J. Don Alexander at Denver, where he stayed two years, was fired twice, and went to Dearborn to insert rivets in Fords for a month, then joined Robertson Air Lines in St. Louis to fly J-5 Fords on the Chicago run. Next spring he was fired by his dear friend, Bud Gurney, and went to work for T. A. T., which was just starting. By Christmas he was fired for reasons that seemed adequate to Dog Collins, even if they didn't to Ben, so he went to work for Universal, flying mail back and forth between St. Louis and Omaha in Pitcairns and Stearmans, and mail and passengers from Chicago to Tulsa in F-10's, until he told his boss, Bob Dentz, a few truths, and got fired in September, 1930 In November he was working for N. A. T., in time to be canned in December because they shut down the Stout Airlines.

For a couple of months he rebuilt "Pete" and then went to work for Bill Bliss, in person, for Century Airlines, but was offered his job back with N. A. T., so returned to that company, where he has been ever since, flying between Kansas City and Chicago. He is careful not to get fired from N. A. T. because he is running out of airlines. Besides, he's married now and settled down. Probably the sensible thing to do will be to stay on the airline, and shuttle back and forth between Kansas City and Chicago until he finally wears out. We all wear out at something or other - usually something we don't care especially about. In Ben Howard's case he has an undoubted genius for designing racing planes - and I hope he designs a dozen more of that interesting series known as DGA.



Howard DGA-3 Pete



In 1929, Benjamin "Benny" Howard built, Pete, one of the first purpose-built air race planes. Howard created the plane specifically for air racing and especially for the events at the National Air Races. Scarcely seventeen feet long with a 20 feet wingspan, Howard's third plane, Pete, was designated DGA-3, with DGA standing for "Damned Good Airplane." Pete's first test was at the 1930 National Air Races in Chicago. Winning five of the first seven races, Pete became one of the most successful

racers in any form of motorsport. In the men's "Free for All," contested by seven planes with larger, more powerful engines, Pete finished an impressive third place, despite a huge horsepower disadvantage.

Howard entered the little plane in the 1931 Cleveland race, but obsolescence was already setting in; Pete could only eke out a sixth place finish. The money he won with Pete allowed Howard to build Ike and Mike, two larger racing aircraft. Pete flew in the 1932 races along with Howard's two new planes, but Pete's his winning days were over, and Pete was sold. Profits from this sale, along with the winnings from Mike and Ike, were used to fund the building of Howard's highly successful Mr. Mulligan racer (DGA-6).

Pete went through several owners until after World War II, when an optimistic soul bought Pete and entered him in the new Goodyear Trophy Race for midget planes in 1946. The rules mandated an enclosed cockpit and a Continental engine similar to those used in the ubiquitous Piper Cub. The end result was uncompetitive, not surprisingly, given the 20-year-old airframe. Pete was sold several more times and was extensively modified and rebuilt several times. Pete was finally acquired by an aircraft restorer in California who remembered the "original" Pete, and restored the plane back to its original appearance and function.



DGA-3 "Pete" and Benny Howard

Wingspan: 20 ft 1 in
Length: 17 ft 9 in

Wing Area: 67 sq ft
Airfoil: NACA M-6

Powerplant: Wright 4-cyl Gypsy
326 cubic inches
85 hp @ 1900 rpm
90 hp @ 2500 rpm
95 hp @ 2600 rpm

Empty Weight: 635 lb
Gross Weight: 900 lb

Maximum Speed: 163.5 mph

Cruising Speed: 150 mph

Landing Speed: 60 mph

Cruising Range: 250 miles

Heath Baby Bullet



Instead of paying 3000 Depression-era dollars for an antiquated biplane, the young enthusiast could buy a Heath-Kit for \$199, and build the plane at home! In the wake of the "Lindbergh Boom" thousands of such projects were started, in barns and basements, throughout the United States and a score of foreign countries. This book recounts the personal experiences of several such young "builders", offering a realistic insight into their many trials and tribulations.

Heath's air racing career, which both promoted and financed his plane manufacturing enterprises, was also a spectacular success. At the 1928 National Air Races his diminutive "Baby Bullet" won every race it entered. With a top speed of over 150 MPH, it easily outran planes three times its size and horsepower.

A mysterious crash of an experimental low-wing model took Heath's life on February 1, 1931. Both the New York Times and Chicago Tribune covered the story of the tragedy, but none could account for the unusual wing failure of a previously trouble-free design.



Parked next to the Texaco Lockheed Air Express the small size of the Bullet is readily apparent. Plans for the 1928 Baby Bullet first appeared in the 1930 Flying and Glider Manual. When Heath introduced his diminutive Baby Bullet in 1928 he swept all competition, posting 142 mph around pylons at the National Air Races held in Los Angeles that year. The racer was powered with a two cylinder 32 hp Bristol Cherub engine.

Hughes H-1



In August 1935, after eighteen months of secret effort, they rolled their creation out into the California sunshine. A closely cowled, superbly streamlined monoplane, the H-1 looked like a winner. Despite some opposition from the others, Hughes did the testing himself; thus it was to be with every plane Hughes ever built. (Later, in the case of the XF-11, this practice would nearly cost him his life.)

The H-1 flew beautifully and was far faster than any aircraft previously built. Hughes determined to try to recapture the world landplane speed record, which had been taken for France the year before by Raymond Delmotte in a Caudron C-460 built in French Air Ministry facilities at a cost of over a million dollars. They tuned the Twin Wasp Jr. for maximum output using newly developed 100 octane fuel especially shipped in five-gallon containers from the Shell refinery in New Orleans. In this way they got nearly 1,000 horsepower from an engine nominally rated at 700.

On September 13, 1935, at Santa Ana, California, representatives of the National Aeronautics Association and the Internationale Federation Aeronautique, including Amelia Earhart and Hollywood stunt pilot Paul Mantz, clocked Hughes and his racer at 352.39 miles per hour, nearly forty miles per hour faster than the in existing record set by Delmotte." The speed runs that day nearly ended in tragedy. As Hughes completed his final mg so pass along the measured three-kilometre course, the engine quit and the little silver monoplane dropped out of sight into an adjoining ploughed field. When Odekirk and other observers got there Hughes was climbing down from the cockpit. Fortunately, the

plane was scarcely damaged; a crash would have voided a new record. Later they found a wad of steel wool in a fuel line. But according to Odekirk that did not stop the flow of fuel-Hughes had run out of gas.

Odekirk had warned him to watch the time because he was only carrying a minimum fuel load to keep his weight down. But Hughes had been so intent on breaking the record that the engine quit before he could switch to an auxiliary tank containing a small reserve supply.

The Coast-to-Coast Record Falls

Hughes's next goal was to better the ten-hour coast-to-coast record set by Roscoe Turner in the 1934 Bendix Trophy Race. But it would be months before the H-1 could be repaired and fitted with a longer wing for distance racing. So Hughes looked with renewed interest at the new Northrop airplanes.

Famed aviatrix Jacqueline Cochran had recently purchased a Northrop Gamma, a sleek advanced monoplane she was readying for the Bendix race. Hughes calculated that if he replaced the 1535 engine Cochran had on the plane with the latest Wright Cyclone R-1820G 850 horsepower engine coupled with a Hamilton Standard variable pitch propeller, he could easily better Turner's record. At about eleven thirty one night the telephone rang in Cochran's hotel room. She groped sleepily for the phone at the bedside table.

"Hello."

"Jackie, this is Howard."

"Howard who?"

"Howard Hughes. "

She was tired and in no mood for practical jokes at what for a working girl was a late hour. "Aw, come off it. It's late and I'm tired."

"No, really. It's Howard. I want to buy your airplane."

"Well, it's not for sale," she said. "I'm going to fly it in the Bendix."

"I don't want to fly it in the Bendix, I want to fly it transcontinental."

"So do I," said Jackie. Hughes wouldn't be put off. "Come on out to Mines Field tomorrow, look at the racer and we'll talk about it some more."

The offer to inspect Hughes's "fabulous" racer was irresistible. She hadn't been able to keep her eyes off it whenever she had seen Hughes exercising it. "Aero-dynamically," Cochran says, "the plane was as far apart from the then-accepted airplanes as the jets are from the planes of World War II. I had been looking at this racer with my mouth watering." She got to sit in the airplane-she didn't get to fly it. Hughes, with his usual persistence, kept trying for weeks to work out a deal for the Gamma that she could not refuse. At that time Jackie was unmarried and supported her aviation activities through her efforts in the beauty and cosmetic business. Hughes knew that she was terribly short of funds. Finally he offered to rent the Gamma from her for nearly as much as she had paid for it. "I couldn't afford not to rent it to him," she says. Meanwhile, Hughes made eleven flights as a Douglas DC-2 co-pilot on TWA's his transcontinental runs during 1935, apparently to build his transcontinental experience in preparation for the record attempt.



On January 13, 1936 Hughes flew the modified Gamma from Burbank to Newark in nine hours and twenty-seven minutes at an average speed of 259.1 miles per hour for a new record. Then he went on to set intercity records for New York-Miami and Chicago-Los Angeles.

"It just broke my heart," said Cochran, "but I couldn't afford to do otherwise. Then the deadline was up for him to either return the Gamma or to purchase it. So he sent me a purchase check because he was in Chicago and too busy to return the airplane, I guess. Then he turned around and sold it back to me for much less a few days later-and he did a lot of work on it for me for practically nothing, which was interesting. He has a very interesting streak."

For his achievements Hughes was awarded the coveted Harmon trophy. On January 20, 1937 en-route to the presentation ceremony he flew a revamped H-1, now fitted with a longer wing and a new Pratt and Whitney R-1535 Wasp engine of 700 horsepower, from Burbank to Newark in seven hours, twenty-eight minutes and thirty-five seconds. (Hughes built two sets of wings for the H-1, one with a span of only twenty-five feet-that he used to set the closed course record, and the other with a span of thirty-one feet nine inches that he used for his long-distance runs. The wings were of wood and the fuselage was aluminium.) The little racer averaged 327.15 miles per hour over the 2,490-mile course for a record that was to stand for ten years. And he did it using only forty-eight percent power because he to be sure and make it non-stop.

A Major Milestone

H-1 had a great impact on the design of high performance aircraft. Noteworthy were the close-fitting, bell-shaped engine cowling, the gently curved wing that moulded the wings to the fuselage, the retractable landing gear, the extra smooth surfaces with countersunk rivets and flush joints, ailerons that drooped 15 degrees when the flaps were fully extended (thus increasing the lift along the full span of the wing during takeoff and landing), and the smoothly faired canopy for easy entrance and exit. The landing gear was so perfectly fitted that the gear fairings and doors were difficult to see when the gear was retracted.

So important is the H-1 in the history of flight technology that it is now enshrined at the Smithsonian's Air and Space Museum in Washington, D.C., where a plaque reads: "The Hughes H-1 racer was a major milestone on the road to such radial-engine powered World War II fighters as the American Grumman F6F Hellcat and Republic P-47 Thunderbolt, the Japanese Mitsubishi Type 0 (Zero), and the German Focke-Wulf 190. The H-1 demonstrated that properly designed radial engine aircraft could compete with the lower-drag inline designs."

Hughes's development of the H-1 racer made another vital contribution to American aviation, according to Jacqueline Cochran. "He had a group of young engineers working on that racer who

became the backbone in the development of our wartime aircraft. And at that time they probably couldn't have gotten a job as a busboy in a cafeteria. We were in the heart of the depression in our country, and great talent would have just gone by the wayside if he hadn't put up the money for the development of that and many other things in aviation.... I have a lot of respect for him, frankly, in spite of his eccentric attitudes."



While Hughes was still on the East Coast after his record-breaking transcontinental flight in the H-1 he was telephoned by General O. P. Echols, Commander of the Army Air Corps' Wright Field in Dayton, Ohio, a centre for Air Corps testing and procurement. Echols told Hughes that the Air Corps was keenly interested in the H-1 because it was faster than anything they had at the time. "Can you stop by and let us see it on your way back to California?" Hughes agreed and Echols arranged for a group of top brass to be on hand to meet him.

According to Noah Dietrich, there now occurred the first of several incidents that would poison the minds of key Army Air Corps officers against Hughes for years to come. He over-flew Wright Field, gassed up in Chicago, and continued on to California. Echols, who later became Chief of Air Corps procurement, never forgot the snub. He vowed that Howard Hughes would never get a "dime's worth of business" from him. Hughes told Dietrich that he just forgot to stop in Dayton. Dietrich thought the snub was intentional, that Howard simply "didn't want those generals snooping around his airplane and stealing his ideas."



Such an incident did occur, according to the testimony given in the 1947 Senate hearings, but not in the way Dietrich recalls in his book. According to information in Hughes's logbooks Hughes did not fly the racer home. The plane sat in Newark until Allen Russell, corporate pilot for William Randolph Hearst, flew it back to Burbank.

The H-1 flies again!

At approximately 7:15 AM, July 9, 2002, the Wright built Hughes H-1B, serial #2 became airborne for the first time. The dream of one man became a reality because of the hard work, dedication and perseverance of a talented team of individuals.

September 13, 2002

On the morning of September the 13th, 2002, Jim Wright piloted the Hughes Racer Replica to a new world speed record (category C-1.d) of 304.07 mph. The H-1 Racer has once again earned a place in the record books.

The Challenge

August 28, 2002

By Dennis J. Parker

I had to smile a little during testing of the Hughes H-1B (serial #2) the other day. The airplane was built from scratch by a small group of dedicated individuals sometimes referred to as "The Racer Team". As usual the airplane drew a small, unexpected crowd and (as usual) there were grins from ear to ear. I was humoured by a gentleman's comment, "They don't make 'em like that anymore." I was humoured because the gentleman was wrong. We did make one - and then we flew it.

Howard Hughes was the builder of the original Hughes H-1B (serial #1), which now sits in the Smithsonian Institute in Washington DC. Back in 1935 he flew that aircraft to a new land speed record and for a brief period of time was the fastest person ever to pilot a land airplane. He was a man with remarkable ambition who built his dreams for himself instead of waiting for the world to create them for him. He was also a secretive man. His life and his accomplishments are somewhat of a mystery, and the H-1 is no exception. The history books only touch briefly on the H-1, an airplane that Hughes reportedly considered one of his greatest achievements.

Hughes shattered two world records in the original H-1 before he retired the aircraft, eventually donating it to the Air & Space Museum at the Smithsonian Institute in Washington D.C. where it sits in a place of honor. After setting the transcontinental speed record in 1937, Howard Hughes would never again fly the H-1 Racer. The public would have to wait almost 65 years to see an H-1 fly again. That happened at 7:15 A.M. on July 9, 2002, when serial number two flew for the first time.

Unravelling the history of the H-1 and of Hughes during that era was an intriguing challenge. The impact that the original aircraft had on aviation made it a natural choice for a team that wanted to build a one of a kind reproduction. Barely forty hours were flown on the original. Yet, according to the Smithsonian Institute, "The Hughes H-1 racer was a major milestone aircraft on the road to such radial engine-powered World War II fighters as the American Grumman F6F Hellcat and Republic P-47 Thunderbolt, the Japanese Mitsubishi Type 0 (Zero), and the German Focke-Wulf FW 190." The H-1 broke the world speed record at 352 mile per hour, could fly from standard runways, had practical flight characteristics, and had an almost unimaginable range of nearly 4000 miles! Hughes flew the H-1 from Los Angeles California to Newark New Jersey in 7 hours 23 minutes without stopping for fuel. That was fast enough to capture the world record, and that was in 1937!

Since the goal of the Racer Team was to recreate the aircraft as precisely as possible, the Team needed access to the original. Using Paul Matt drawings of The Racer, estimates were made regarding fuselage and wing shape. Then reverse templates were cut using these estimates. The Smithsonian graciously allowed members of The Team access to the H-1 outside of normal business hours to make measurements. The reverse templates were held up to the actual H-1, and notes were made where they did not match. Several trips to Washington D.C. were required during the design

phase. With each trip, the Racer Team gained new appreciation for the genius of Howard Hughes. Whatever else Hughes may have been, his genius in aircraft design was becoming apparent.

Hundreds of pictures were taken, and pages upon pages of notes were made. While this work was being done, hundreds of man-hours were spent in research. It seemed like everyone that had any knowledge of the original H-1 was eager to help. We were impressed with companies such as Pratt & Whitney, Stoddard Hamilton, and others who happily opened their historical archives to help us understand Hughes and the H-1 better. We learned from the historian at Pratt & Whitney, Jack Connors, the history of the R-1535 that we have, as well as the history of the original that sits on the H-1 in the Smithsonian. They actually have documented history on each and every engine that they have built. It turns out that Pratt & Whitney had leased the engine to Hughes for the record-breaking attempt. Mr. Connors noted (with a chuckle) that there was no record that Hughes ever actually paid Pratt & Whitney for the engine!

We learned from an original test engineer on the R-1535, Skip Eveleth, that in his opinion the engine was one of the most trouble free twin row engines built. Skip worked directly with Howard Hughes on the project. Skip was a test engineer on the R-1535 in the 1930's and assisted in tracking down the original performance figures for the R-1535 for our Racer Team. There were less than 3000 of the R-1535 engines made, and today they are exceedingly rare. Most are believed to have been destroyed. We believe that the engine installed on the Racer replica is the only known flying example of a P&W R-1535 in the world.

Howard was anxious to work with Skip to obtain performance figures on the engine. At the time these were considered classified. Apparently Pratt & Whitney wanted Hughes to have the data, despite the classification. According to Skip, Howard was directed to an office that by "sheer coincidence" had the performance figures laid open upon the desk. Howard was instructed to wait in the room while they reviewed his request for the data. Skip's boss returned a short time later to inform Hughes that his request for the information was denied. With a grin Hughes replied that he would no longer need it. Skip also recalled, (with a chuckle) that when Howard Hughes called him to discuss the data, that he called him collect. Skip asked his boss if he could accept collect calls to which his boss replied, "Only from Howard Hughes."

We had many discussions with one of the original design engineers on the H-1, Mr. John Newbury. John revealed much about the project, and what it was like to work for Howard. Apparently Howard had a habit of wearing sneakers, which allowed him to walk about very quietly. Howard would often stealthily enter a work area to monitor his staff without being detected. He was not always successful with this though. John recalled with humour that at times Howard would go a considerable time between washings of his sneakers - the odour of which would then betray his presence.

We spent several hundred man-hours trying to locate the original blueprints. We had several leads and tips, and tracked the prints as far as Lakeland Florida. Unfortunately, we failed to locate them. This challenged the design team to "back engineer" the structures in the aircraft that are hidden from view. Considerable engineering time went into the reproduction. Old photos of the internal wing structure were pored over. Additionally, we were able to obtain the wind tunnel data done on the original aircraft (GALCIT report #135). The Hughes team spent over 90 days at the wind tunnel at the Guggenheim Aeronautical Laboratory, California Institute of Technology (GALCIT). Howard Hughes did not make guesses or leave things to chance. He was insistent that things got done right, regardless of the expense.

The implementation phase overlapped the planning/design phase for the building of the replica. Major factors involved were the coordination of subcontractors, selecting talented and compatible team

members, coordination with suppliers, and managing the hundreds of visitors. The coordination of subcontractors was sometimes challenging as time estimates were often exceeded. All tolled over 35,000 man-hours went into the replica. Some of the most talented artisans in the industry were employed on the project.

Selecting team members was straightforward. All were local pilots, all had experience with completing experimental aircraft projects (some award winning), and two are certified aircraft mechanics. A total of five team members constituted the main team: Jim Wright, Ron Englund, Dave Payne, Mike Mann, and Al Sherman. Support to the team is provided by employees of Wright Machine Tool.

Their efforts have not gone unnoticed. Local radio personality and pilot, Bill Barret, expressed his views in an open comment posted to the Racer Team on their forum. Bill was present at one of the initial flights and said, "... I tried to express to Jim (Wright), how much the H-1 project demonstrates the sometimes intangible American Spirit. I was in the Saturday throng that watched and listened with childlike excitement as Jim taxied out for take-off. When the H-1 surged off the runway and climbed powerfully into the blue, I was proud to see their dream realized. Although tucked away in a small hangar in Cottage Grove, Oregon this project speaks loud and clear to the spirit of America. Individuals grasping a challenge and seeing it become a gleaming reality. Jim and dedicated crew saw the goal, and did the hard work with obvious skill and patience. I was delighted to see the H-1 fly and to share its' story with my children ..."

It is difficult to capture (in words) the scope of an undertaking like this. I have been around a lot of experimental aircraft. Building an aircraft is not easy. It has been likened by some to climbing a mountain. In that sense the H-1B is the Mount Everest of experimental homebuilt aircraft. It has taken the talents of dozens of people to make it all come together. It has taken stubborn patience, hard work and an unprecedented attention to detail to reproduce this airplane. The list of talents employed to complete the project include: machinists, engineers, wood workers, metal workers, mechanics, assemblers, painters, electricians, secretaries and computer draftsmen. Above all else, it took the dream of one man who wanted to be the fastest man in the world, and the later dream of another who wanted to recreate that vision.

I was once asked why anybody would want to tackle such a project. There really isn't a single canned answer to this. This aircraft is many different things to different people. It is tough to put into words. There is something timeless about the aircraft. It exudes an aura unlike any other aircraft that I have seen. My suggestion to those that might ask why is this: take a look for yourself at the Wright built Hughes H-1B. Get up close to the airplane and see what those guys built. If you still have to ask why, you wouldn't understand the answer.

On August 4, 2003, while attempting an emergency landing in Yellowstone National Park, Jim Wright veered his Hughes H-1 replica away from people on the ground, guiding the aircraft to a point that would present no danger to anyone else. The aircraft exploded on impact and was completely destroyed. Jim Wright did not survive.



Hall Bulldog Racer



AS THE YEAR 1932 started its march across the calendar, air racing enthusiasts around the nation and especially in the intensely air-minded city of Springfield, Massachusetts eagerly awaited the completion of the two most unusual race planes of that era.

Bob Hall, who had recently split with the Granville Brothers of Gee Bee fame, decided to form his own new aircraft company at Bowles-Agawam Field across the Connecticut River from where the Granvilles had their shop. Bob Hall had originally served the Granvilles as chief engineer, test pilot and draftsman. But after a heated dispute with Zantford Granville over race plane design, he decided to go it alone and build his own speed planes. This new group would be known as Springfield Aircraft, Inc. With two firm orders in his hand, Bob Hall had leased a corner of the main hangar at Bowles Agawam Field where work began early in 1932 on the two never to be forgotten Hall racers.

Work began almost simultaneously on the two speed planes. The first was built on order for Frank Lynch, a wealthy sportsman. Lynch expected to fly this high wing plane around the world in a record attempt. It was considerably the larger of the two Hall designs and seated two people in a staggered side-by-side arrangement.

As work progressed, Bob Hall turned his attention to the International Air Races at Niagara Falls New York which were to begin June 24, 1932. At 8:40 p.m. the evening before the big races were to begin at Niagara Falls, the two place aircraft took to the air for the first time with Bob Hall at the controls. Spectators commented that it resembled a giant moth as it flew through the twilight sky. Actually the new speed plane was intended to resemble an insect, in its paint scheme at least.

It was painted green with cream and brown designs on its wings and fuselage patterned after the Cicada, a type of Mexican locust. To complete the picture, eyes were painted on the engine cowling. With these facts in mind, it is easy to see why the name "Cicada" would forever identify this aircraft



After its first test flight, which Hall considered a success, work continued on the ship late into the night. The morning of June 26th, Hall, bleary eyed from lack of sleep, flew the plane to Niagara Falls just in time for the final day of air racing. He had decided to race the "Cicada" at Niagara Falls just to see what the new speed plane could do in competition.

The Niagara Falls Manufacturer's Trophy Race was the big event on the 26th. It was a fifty mile free-for-all race with a high cash purse plus a trophy. When all was said and done, Bob Hall flying the "Cicada" placed fourth. His comparatively poor showing can be attributed to several factors. First, the "Cicada" was not primarily a pylon racing plane nor was it completely finished. Second, Hall was certainly not in tip-top shape after the last minute rush, and probably did not do as good a job of piloting as he was normally capable of.

Bob Hall then flew the "Cicada" home where he completed final details on the aircraft. It was then officially delivered to Frank Lynch who decided to enter the 1932 Bendix Trophy Race, in preparation for his round the world attempt. After considerable testing, Frank was forced to scratch his racer from

the Bendix competition because of engine problems which could not be smoothed out in time for the start of the Bendix race.

Determined that he would race the "Cicada" one way or the other, Frank Lynch hastily began the task of fitting his speedster with a P&W R-1340 "Wasp" engine (800hp) , hoping to at least get in some pylon racing at Cleveland.

At this point in my story we must go back to early 1932 and the second race plane that Bob Hall was building under contract. It also was due to be finished in time to compete in the 1932 Cleveland Air Races that were to begin August 27th and run through September 5th.

This second race plane designed and built by Bob Hall was a beautiful gull wing design. It was a single place speedster which was expected to be the equal of any other ship entered in the Cleveland National Air Races. This, of course, meant that an exciting rivalry was shaping up in Springfield between the Granvilles and the new Hall group.

The new gull winged racer was built under contract for Marion Price Guggenheim of the New York family, well known for their support of all types of aeronautical activities. The contract stipulated that only Russell Thaw or a pilot designated by him, would be permitted to fly the new race plane. Young Thaw was known as the playboy of east coast society circles and worked as chief pilot for the Guggenheim family, flying a Lockheed Air Express and a Vega. Mrs. Guggenheim would later christen this new race plane the "Bulldog", in honour of the famed Yale University mascot.

Hall chose the gull wing design because he thought it would produce longitudinal stability. He also designed a rather intricate exhaust system with pipes exiting at right angles to the air stream and flush with outer contours of the engine cowling . . . the theory being to create a low pressure area in the exhaust ports to better scavenge exhaust gases, thus increasing the volumetric efficiency of the supercharger. The engine was the same as mounted in the "Cicada", a P&W Wasp Jr., which developed 535 hp. Hamilton Standard made available to Hall one of their first handmade controllable pitch propellers for use on the "Bulldog". The wing span was 26 feet with a fuselage length of 19 feet. The racer was painted red and black with a white separator stripe and was assigned race No. 6 for the Cleveland races.

As July slipped into August, feverish preparations were carried on by the Hall group to ready the "Bulldog" for the Cleveland Nationals. The schedule called for an early August test program before the racer would be turned over to Russell Thaw, the chosen race pilot.

Hall held to his schedule and began the testing of the "Bulldog" early in August 1932. His speedy gull wing racer almost came to grief on its very first test flight. As he roared down the runway on his first take-off, the "Bulldog" started to roll to the left at about 10 feet of altitude. Hall cut the engine and got the wing up enough to clear the ground as it fell back to earth on its left wheel. Skillfully he brought the other wheel down and the airplane rolled to a stop. The excess shock caused the left tire to blow out with resulting damage to the wheel pants, which was easily repaired. The "Bulldog's" fin was then modified three times and the rudder four times, before Hall was satisfied with the ship's flight characteristics. This was because the gull wing was directionally destabilizing to a degree that Hall had not foreseen. While this was going on, the ejector exhaust system was removed because insufficient time remained to iron out various unforeseen details of heat expansion and contraction of various parts.

Russell Thaw, the chosen race pilot, then got the chance to fly the "Bulldog". At the last minute Thaw expressed dissatisfaction with the airplane. He indicated that he probably would not fly the plane

during the National Air Races after all. There was no indication of whether he would choose a substitute pilot or if Hall himself might fly the plane. Hall's associates were very disappointed over this sudden turn of events and it was hoped that money could be raised to repurchase the plane from Mrs. Guggenheim. The plane had been officially delivered to Thaw only a few hours before his decision to withdraw it from the races.

Russell Thaw was quoted by newsmen as saying, "The ship is not my idea of a racer". He declined to elaborate on the statement and things were pretty much up in the air. Hall meanwhile flew the plane to Roosevelt Field to confer with Mrs. Guggenheim. He reportedly had managed to dig up enough money for the ship's repurchase. This did not transpire but at least he came away from the conference with permission to fly the plane himself in the Cleveland races. At least Hall would not be denied the chance to test his design against that of the Granville group in the famous Thompson Trophy Race. He had missed his chance to enter the Bendix race because of his lengthy conference with Mrs. Guggenheim.

Meanwhile, Frank Lynch had just completed the installation of the new Wasp Jr. engine in his "Cicada" as Bob Hall arrived back at Bowles-Agawam Field with permission to fly the "Bulldog" at Cleveland. They had both missed the Bendix race, so with all due speed they climbed into their airplanes and headed for Cleveland and hopefully some good pylon racing.

At Cleveland preparations were getting underway for the Shell speed dashes, qualifying event for the famous Thompson Trophy Race. Much to everyone's delight, the Hall "Bulldog" and the Hall "Cicada" came in over the canvas-covered Brookpark Road fence, (the north boundary of the Cleveland Airport), and taxied up to the hangar line. Once in Cleveland the new engine on the "Cicada" began to act up and Lynch and his airplane were forced to sit out the entire Cleveland races. Bob Hall and the "Bulldog" fared much better as Hall qualified his racer at 243.717 mph in the Shell speed dash, which meant he would be a competitor in the Thompson race.

The 1932 Thompson Trophy race would be 10 laps around a 10-mile course. It was flown on Monday afternoon, September 5th. The "Big Daddy" of closed-course air racing events drew eight contestants: Jimmy Doolittle in the Gee Bee R-1, Lee Gehlbach flying the Gee Bee R-2 Jimmy Wedell, Roscoe Turner and James Haizlip in their Wedell Williams Specials, Bob Hall in his red, black and white "Bulldog", Bill Ong in Howard's "Ike" and Ray Moore in the "San Francisco I". With a quick chop of the starter's flag and the boom of a mortar, the racers were off in a race-horse start.

Hall was first off the ground and around the scatter pylon, but Doolittle in the Gee Bee R-1 passed him almost at once and began pulling away. In the second lap, Ray Moore dropped out with engine trouble and Hall fell back into sixth place. Jimmy Wedell moved up to second place, Turner third, Haizlip fourth, Gehlbach fifth and Ong brought up the rear. The race ended in that order. Jimmy Doolittle lapped the entire field at least once and roared over the finish line trailing smoke and pulling farther ahead with each revolution of the Gee Bee's eight foot prop. Doolittle's average speed, a new closed-course record, was 252.7 mph. Wedell in second place had 242.5 mph. Bob Hall placed sixth at 215.57 mph. Needless to say, he was a very disappointed young man. Once again the Granville brothers had proved their ideas for fast aircraft were correct.

There was some conjecture, after the race, that the basic pitch settings on the experimental Hamilton Standard controllable pitch propeller on Hall's "Bulldog" did not permit the Wasp Jr. to develop peak power during the closed course Thompson event. Hamilton Standard, as well as Pratt and Whitney engineers, analyzing the "Bulldog's" sluggish performance were anxious to correct the horsepower shortage, but this never did come about.

A short time after the 1932 Cleveland Air Races a disappointed, disillusioned and disgusted Bob Hall dismantled the "Bulldog" so that it would never race again. Cleveland Model Supply, a well known Cleveland model airplane kit manufacturer acquired the cowling, wheel pants and cockpit canopy, the only large pieces remaining after the aircraft was torn apart. These last remaining parts of the "Bulldog" were eventually donated to a scrap metal collection in Cleveland during World War II. The "Cicada" on the other hand met a different fate.



After sitting out the 1932 Cleveland races, Frank Lynch flew his racer back to Bowles-Agawam airport where it was to be gone over in preparation for future competition. A short time later after some minor reworking, Frank Lynch climbed into the cockpit for a routine test flight. But as it turned out, this would be the last flight for both Frank Lynch and the "Cicada". For as the "Cicada" roared down the runway and became airborne, it suddenly veered from its line of flight and clipped a corner of a hangar top, crashed and burned as horrified spectators watched in disbelief.

In qualifying for the Thompson Race the Bulldog reached a speed of 243.717mph. In the race the speed was a disappointing 215.57mph with a very brief top speed of 270mph

Jupiter SK3

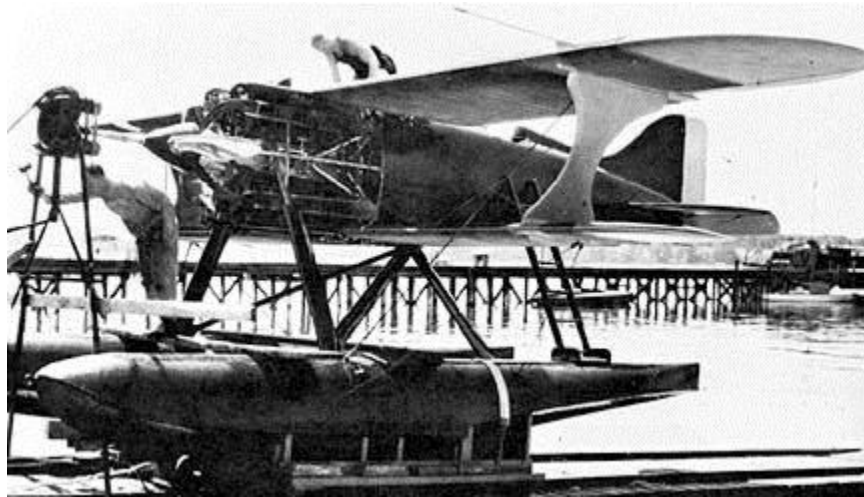


built by Clayton Folkerts of Bristow, Iowa.

The winner of the Thompson trophy series air races of 1937



Kirkham-Williams Racer



A 1927 private seaplane venture by engine manufacturer Kirkham and then-Navy Lt Al Williams, with support by Packard Motors, for the Schneider Trophy Race prize of \$100,000. All-wood construction, powered by two 625hp Packard V-1500s mounted in a common crankcase to form an impressive four-bank, 24-cylinder, X-shape motor — hence the model designation. Originally on twin pontoons, money ran out during the testing stage and the plane never made it to the starting gate at Venice, Italy. It was converted to wheels, however, and later set an unofficial world speed record of 322.6 mph.

Keith Rider R-3/Marcoux-Bromberg Special



The Marcoux-Bromberg Special started life in 1933, when Keith Rider built it as the R-3. Mrs. Edith Clark of Santa Monica and WH Marcoux financed the airplane which was originally designed for the MacRobertson Race. It was constructed in Santa Monica in an abandoned casket factory. Jim Granger a pilot with little if any high performance experience, took it up for it's first flight in 1934, he landed with too much speed and applied too much brake and the airplane nosed over, damaging the vertical tail and crushing the cockpit and killing the pilot. Once repaired Vance Breese made a record flight from San Francisco to Los Angeles, after which the airplane was put in storage for a time.

Earl Ortman was hired to fly the airplane in 1935. On July 3, 1935, Ortman took off from Vancouver, Canada and flew to Agua Caliente, Mexico in 5 hours, 27 min, 48 seconds; setting a record that stood for 2 years. A larger engine was installed for the 1935 Bendix, an installation which was completed shortly before the race. On it's test hop the day before the race the cowl pulled forward into the prop. Hasty repairs were carried out, and the airplane departed on time for Cleveland. It made it as far as Kansas City where it landed with a split fuel tank, chewed up cowl and damaged propeller. After further repairs it proceeded to Cleveland where the contest committee ruled in un-airworthy for the Thompson. The airplane was repaired and flown back to California where it was tied up due to labour liens against the Rider-Clark Airplane Company.

In early 1936 the title was transferred to Hal Marcoux. Hal was employed at Douglas Aircraft where he enlisted the help of Jack Bromberg who at that time was an engineer for Douglas. The Marcoux-Bromberg team proceeded to rebuild the ship, making major changes in the process and renaming the ship the Marcoux-Bromberg Special. The airplane placed second in the 1936 Thompson with an average race speed of 248 mph.

The airplane was reworked once more for the 1937 races. In the 1937 Bendix, Ortman encountered foul weather. Attempting to stay out of it he climbed too high, and lacking oxygen became light headed and drifted far off course. Eventually winding up over Lake Michigan, despite this the racer arrived in time to take second place with a time of 9 hours 48 minutes. It also took second in the 37 Thompson with an average race speed of 256 mph despite encountering problems with spark plugs that did not stand up to the high boost in use. On the way back to California he experienced a fuel leak. The source of the leak was a stand pipe vent that runs from the top of the tank downward where

it protrudes from the lower forward end of the main tank. The location of the hole was such that fuel in the top 40 gallons of the tank would pour out. This leak was never repaired due to the expense.

Later in the year the airplane was flown for the MGM movie "Test Pilot" starring Clark Gable. Early in 1938 it was raced at the Golden Gate Classic where it won, setting a closed course record of 266 mph. In June 1938 it set a record from Oakland to San Diego of 1 hour and 48 minutes. In the 1938 Thompson the oil coolers were unexplainably wired closed, resulting in extremely high oil temperatures. An oil leak developed and the last several laps were flown with no oil pressure, the engine freezing up just as it passed the finish line. Despite this it placed 2nd with an average speed of 268 mph. A new and more powerful engine was installed for the trip home. Upon landing in Kansas City for fuel, with ice on the brakes and no flaps, the airplane ran off the runway and nosed over. The ship was rebuilt in Kansas City with a new propeller and larger tail surfaces. It stayed in Kansas City until shortly before the 1939 Thompson. During the 1939 Thompson the engine quit three times. Despite this it managed to finish in the money at 3rd Place with an average speed of 254 mph. The airplane was retired after the 1939 Thompson.



Marcoux-Bromberg Special New England Air Museum

Original (1933) Configuration

Wing Span 25 ft
Airfoil NACA 23015
Length 21 ft 8 in

Powerplant: P&W Wasp Jr (500 hp)
Fuel Capacity: 170 gal
Top Speed 270 mph

First Flight: 1934
Total Built: 1
Registration: NX14215/NR14215

Spar Material - Laminated Black Walnut.

1935 Bendix Configuration

Powerplant P&W S1D1 direct drive Wasp (550 hp)

1936 Rebuild (Marcoux-Bromberg)

Wing Span 22 ft 3 in

Airfoil: Modified 23012 (thicker section, blunt leading edge.)

Length 22 ft 3 in

Fuselage Diameter 40 in

Cowl Diameter 46 in

Registration: NX14215

Changes:

- New Cowling
- New fuel tanks
- Wing skin thickened to 1/8 inch
- Wing airfoil modified from 23012 to a thicker section with a blunt leading edge.
- Fuselage skin stiffened locally.
- Changed to an open cockpit as a quick fix due to excessive heat and lack of ventilation.

Speed (Test Hop): 312 mph, SL, 2425 rpm, 48 inches MAP.

Speed (1936 Thompson Qualification): 258.9 mph

Speed (1936 Thompson): 258.9 mph, with one lap at 278 mph

Modifications for the 1937 Races

- Added heavy longitudinal members to forward fuselage.
- Replaced all fuselage skin from the aft edge of the cockpit forward.
- New fuel system with larger tanks.
- Landing gear modifications
- Changed Powerplant to R-1340-S1A5-G Twin Wasp Jr (825 hp)
- Installed a 3 bladed prop.
- Enclosed Cockpit

Ortman noted the following:

- Great increase in wing loading.
- Tendency to mush at anything less than 80% power.
- some directional instability
- longitudinal stability very poor
- elevator control too soft at low speed.

Vtop: 340 mph at SL

1937 Thompson Qualification speed: 263 mph

Modifications for the 1938 Races

- Increased fuselage diameter to conform with the 46 inch diameter cowl.
- Added an additional oil cooler
- installed a two gallon oil tank in the extreme rear fuselage. The tank was controlled by a valve and was intended to be filled to shift the CG aft for landing and taxi.

1938 Thompson Qualification: 270 mph.
1938 Thompson Average speed: 268 mph.

1938 Post Race Modifications

- Larger Twin Wasp Jr X8B4 installed.
- After a nose over the tail was rebuilt with larger surfaces.
- A prop with more blade area was installed.

1939 Thompson Qualification: 244 mph
Later Thompson Qualification run of: 307 mph
Thompson 1939: 254 mph avg speed



Lockheed 12A



Long-distance racer. The Bendix Trophy Race, a major cross-country race from Los Angeles, California, to Cleveland, Ohio—2,043 miles—was a big part of the National Air Races. Milo Burcham

decided to enter a 12A, and to overcome his speed disadvantage, he intended to make the trip non-stop to save the time need for fuel stops by the other short-range competitors. He installed additional fuel tanks in the cabin; they put his plane—formerly NC18130—on a Restricted or "NR" license. With race plane number 20, he finished fifth in the 1937 Bendix. At 184mph, fifth place was a respectable showing, especially since he raced against the privately owned Seversky P-35 pursuit planes that placed first and fourth. He won \$1,000.

World flight attempt. Another 12A with distance modifications was NR869E; it was owned by the Republic Oil Co. but flown by famous distance pilot Jimmy Mattern. It was being readied for a record-setting flight around the world by having its cabin filled with fuel tanks. The cabin windows and passenger door were eliminated, and the crew entered through a hatch in the top of the cockpit. Named The Texan, this 12A had a good chance of beating Howard Hughes' around-the-world record of 91 hours, 14 minutes and 10 seconds that was set in July 1938 with a Lockheed Model 14 Super Electra.

Unfortunately for Mattern—and for Hughes, who was planning another dash—WW II got in the way.



The 12A—R18130 with race number 20—that was flown by Milo Burcham to fifth place in the 1937 Bendix Trophy race. What appear to be rubber de-icer boots on the leading edges of the horizontal stabilizer and lower fins are not such; they are rubber anti-abrasion strips that prevented gravel that had been kicked up by the wheels and propellers from denting the leading edges.

Lockheed Vega



The Lockheed Vega is the aircraft used by the famous Wiley Post to set a number of altitude and speed records and was also flown by Amelia Earhart. First flown in 1927, the Vega is considered one of aviation's milestone aircraft.

The aircraft shown in the photograph is a fully developed model 5C version. Both the internal structure and the outer covering of the aircraft were wood. The wing was of the internally braced, cantilever type, and the fuselage was of semi-monocoque construction. A new feature, which appeared on this aircraft, was a circular cowling surrounding the 450-horsepower Pratt & Whitney Wasp air-cooled engine.



This cowling concept was one of NACA's early contributions and provided substantial increases in the speed of aircraft employing radial engines, but, at the same time, directed the cooling air through the engine in such a way as to provide adequate cooling. The maximum speed of the Lockheed Vega was increased from 165 miles per hour to 190 miles per hour by the addition of the NACA cowling. Fairings, called pants, around the wheels of the landing gear also reduced the drag and resulted in an increase in the speed of the aircraft.

The Lockheed Vega had a very low zero-lift drag coefficient of 0.0278. The low zero-lift drag coefficient was obtained through careful attention to detailed aerodynamic design of the aircraft and by the absence of drag-producing struts, wires, and other external drag-producing elements. The fixed landing gear, however, remained as a significant drag-producing feature of the airplane.

The maximum lift-drag ratio of the Vega was 11.4, which was unusually high for that time period. The Lockheed Vega was used in airline service (six passengers) and was also employed in many record-breaking flights. The aircraft shown in figure 4.3 is painted to represent the famous *Winnie Mae*, which Wiley Post flew solo around the world in about 7 1/2 days in the summer of 1933. The actual aircraft Post flew on this remarkable flight is in the National Air and Space Museum In Washington, D.C. The Lockheed Vega was a highly advanced and refined design for its day, and, even now, the performance is very good for an aircraft with fixed landing gear.

Laird/Turner Meteor



In 1936, Col. Roscoe Turner, an old timer in the race game, felt the need of a new racing mount. Colonel Turner, Nevada National Guard, had been a famous name in race history since 1924. Along with his robin's egg blue uniform, whipcord breeches, military cap, gold wings with RT in bold letters, he also had Gilmore his pet lion.



replica aircraft

Gilmore accompanied Roscoe on most of his cross country record breaking flights and his name, along with the flashy uniform, became synonymous with Colonel Turner. Roscoe had set many records with his Lockheed Vega, Air Express, and Wedell Williams but the Wedell was getting outclassed and in 1936 Turner contracted with Lawrence W. Brown Aircraft Company to build him a new racing aircraft. The racer was designed by Turner himself and engineered by Howard Barlow of the University of Minnesota. The ship was built at the Brown factory in California and completed in mid-year 1936. It was a full cantilever mid-wing monoplane, fixed gear and powered by a Twin Wasp Sr., 1830 cu. in. 1000 hp engine. The wing span of the original racer was approximately 22 ft. and quite narrow in chord. The fuselage was constructed of chrome-moly tubing with spruce and fabric fairing.

The two solid wing spars were of 14 ply laminated spruce, ribs were reinforced plywood and the leading edge metal covered. The fuselage was covered with metal from the engine cowling to the cockpit and from this point rearward Irish linen was used for covering. There was also a strip along the bottom of the fuselage that was metal covered to protect this portion from flying stones during take-off and landings. The rudder faired smoothly into the tail cone of the fuselage, giving an uninterrupted airflow line.

The stabilizers were constructed of wood and the elevators and rudder were steel tubing. All were fabric covered. The paint job was a silver gray, license number R263Y and race number 29. The wheels were un-spatted but were thin and equipped with full side caps. Turner flew out to California to test the aircraft but after looking it over decided it was too heavy for the narrow wing. The racer was never flown with the narrow wing but was taken apart and shipped to the Laird factory at Chicago. Turner then redesigned the wing and Matty Laird rebuilt the racer in his factory.

During the redesigning Turner had approximately 13/2 M. added to each wing, the chord width increased, and the engine set back 6 in. The final specifications of the Turner Racer were: wing span 25 ft., length 23 ft. 4 in., height 10 ft., wing area 95 sq. ft. empty weight 3300 lbs., gross weight 4923 lbs., wing loading 51.8 lbs. and a power loading of 4.92 lbs. It carried 215 gallons of fuel and had an oil capacity of 15 gallons. Manually controlled wing flaps decreased the landing speed.

The speedster was sponsored in 1937 by Ring Free Oil and arrived at the Nationals wearing the name "Ring Free Meteor", a star, and race number 29 on its flanks. The name Laird in a diamond appeared on the vertical stabilizer.

Roscoe and the "Meteor" got off to a bad start as he was forced out of the Bendix when a welding explosion ruptured the oil tank of the racer. However, he was very fortunate that the speedster was

not completely destroyed. Then en route to the races he flew through a hail storm, causing considerable damage to the leading edge of the wing. He repaired the damage and entered the Thompson Trophy Race and was running second behind Steve Wittman and his D-12 "Bonzo". Wittman developed trouble on the 17th lap and Turner slid into the lead.

He held the lead until the final lap and on one of the final pylons, blinded by the sun, felt that he had cut the pylon so he returned and re-circled it. At this point he was passed by Earl Ortman in the Keith Rider R-3 and Rudy Kling in the sleek Folkerts SK-3. Turner and the "Meteor" finished third in the Thompson with a speed of 253.802 mph.



Roscoe roared into the 1938 National Air Races with his silver Meteor and a determination to win the Thompson Trophy. During the early part of the year he had experienced problems in cooling and lubrication but these bugs had been worked out and the Wasp was full of vitamins. Only minor changes had been made on the racer itself. One was the wheel pants covering the gear. The racer's new sponsor was the Pump Engineering Service Corporation of Cleveland. The name "Ring Free" had been removed and "Pesco Special" replaced it. Many stories have been circulated about some of the pilots planning to box Turner and the "Pesco" so he could not win the race and that his answer was, "I'll chew their fuselage apart with this big fan of mine and then bail out". However, none of these stories have ever been proven true.

The ships lined up for the Thompson and as the flag dropped the "Pesco Special" sprang forward as the big Wasp screamed under full throttle. At 100 mph the racer appeared alive, aware of her controls, and at 125 mph Turner lifted her into the air.



On the first lap the "Pesco Special" was running second behind Earl Ortman in the R-3. The Twin Wasp Sr. SBG-177 that had been built and delivered in 1936 was rated at 1000 hp at 2600 rpms and a maximum manifold pressure at takeoff of 40.3 in. HG. Turner was turning the Wasp slightly over the 2600 rpm mark and pulling 47 in. HG. (6.7 in. over maximum). He held this all during the 300 mile grind, consuming 185 gallons of fuel (under 2 miles to the gallon) and with no damage to the engine. Pulling this power and flying a wide race so as not to cut a pylon, Roscoe streaked ahead of Ortman and went on to win the Thompson with a speed of 283.416 mph, turning one lap at 293 mph. With this win he became the only two time winner of the Thompson Trophy Race.

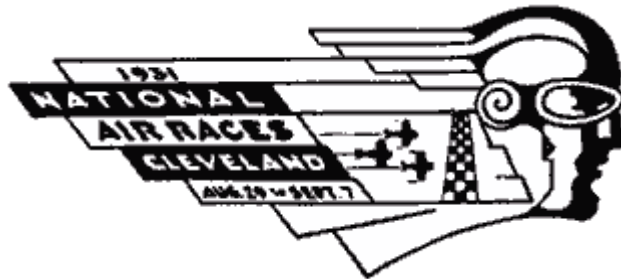
Turner and his powerful Racer was back in 1939. No changes had been made in the ship, except the sponsor. Champion Spark Plugs now sponsored.

The speedster and their insignia appeared on the fuselage and the racer was now known as the "Miss Champion". Turner considered Ortman and Wittman top competitors for the Thompson Race but figured Ortman was too young and would not plan all the angles for the long race, so Wittman would be the man to beat. Roscoe was slow getting off the ground in the start of the Thompson and was setting in fourth spot. Then it happened again, on the second lap he cut a pylon and had to go back and re-circle it. He now trailed the entire field but he pushed the hay to all the extra horses in the nose, streaking by the other racers one at a time, and pulled into the lead. He went on to win with a speed of 282.5 mph and became the first and only two and three time winner of the Thompson Trophy Race.



After the race Colonel Turner stated that he and the "Miss Champion" were retiring from the race game. Today the racer can be seen hanging in the Roscoe Turner hangar at Indianapolis.

Laird Super Solution



The Laird "Super Solution" was designed and built for the Cleveland Speed Foundation. It was not an entirely new design as E. M. "Mattie" Laird's racers had made a fine showing at the 1930 Chicago National Air Races. This included Speed Holman winning the Thompson race in a Wasp Jr. powered Laird "Solution", and two other Laird Speedwings, Cirrus and Chevelair powered respectively.



Work began on the Super Solution LC-DW500 the 8th day of July, 1931 and was test flown on the 22nd of August, 1931. The test flight was made by "Mattie" Laird at Fishborn Field in Chicago, near the Laird Factory. Laird said that very few changes or adjustments were needed before the ship was turned over to Jimmy Doolittle. Visible changes were smaller horizontal stabilizers and elevators and the wing strut fairings. Normal struts appeared on the ship during the test (see photos) with "I" struts being added later.

The LC-DW500 (LC-for Laird Commercial; D-for series; W-for engine (Wasp); and the 500 for horsepower) as fitted with complete instrumentation for cross country and blind flying, which made it about 200 lbs. heavier than the 1930 Laird Solution (LC-DW300). Because of the -monoxide fume trouble encountered by Holman in the "Solution", the Super Solution featured a new fresh air system. This consisted of two vents placed at the leading edge of the top wing, well outside the range of engine exhaust, which channelled fresh air into the cockpit. The streamlining was carried out more thoroughly with a completely enclosed cockpit consisting of three members. The upper member was mounted on a track and moved fore and aft to make contact with the headrest. The side members were hinged about halfway down the side of the fuselage with the upper edge forming part of the track on which the upper member moved.

The landing gear was changed considerably with the rigid aerodynamic cross member eliminated and a tension wire substituted at the top of the wheels. Two Cleveland pneumatic struts were used for each wheel permitting a maximum shock travel of 4 in. The wheels and struts were completely streamlined which increased the high speed performance considerably. The landing gear tread was 4 ft. 5 in. The ship was equipped with 650x10 Aircraft Products wheels. These wheels were used during the Bendix race and also the Thompson race. It had been planned to use 20x4 wheels and smaller wheel pants during the Thompson but time did not permit the change.

A direct drive engine was used for the Bendix race and it was planned to install a geared engine for the Thompson, but again time did not allow this change to take place. The direct drive engine used a prop of 8 ft. 3 in., while the geared engine used a 9 ft. prop. The engine turned 2400 rpm with the direct drive as opposed to 1600 rpm with the geared drive. Later the geared engine proved to be 30 mph faster than the direct drive.

The empty plane weighed 1580 lbs. and grossed 2482 lbs. fully loaded, giving a wing loading of 27.16 lbs. for every square foot of its 112 sq. ft. of wing. The span of the upper wing was 21 ft. and 18 ft. for the lower wing. The length was 19 ft. 6 in. Fuel capacity was 112 gal. and oil capacity 11 gal. The fuselage of the Super Solution was painted a brilliant green with the wings and horizontal tail surfaces a bright yellow. The wheel pants were trimmed in yellow and the racing number "400" was painted on the sides of the fuselage and the under surface of the lower wing. Named the "Sky Buzzard", the plane was a picture of speed in motion and had a top speed of 265 mph.

The year 1931 marked the first running of the Bendix Trophy Race. Vincent Bendix offered the trophy to the winner of the cross-country race from Los Angeles to Cleveland, with additional prize money for a new transcontinental record. The race had been run in 1929 and 1930 but under National Air Race Management sponsorship.

On the morning of September 4, 1931, eight pilots warmed up their powerful racing planes at Burbank Airport, Los Angeles for the swift dash to Cleveland. Jimmy Doolittle was first off in his Super Solution. He hauled the tiny plane into the air after a short run of 500 ft. and roared through the early morning darkness of Cajon Pass. A quick stop at Albuquerque and Kansas City for fuel and he was screaming toward Cleveland. Landing well ahead of the second place aircraft, he hurriedly took on fuel and pointed the Sky Buzzard toward Newark. His wheels touched the ground at Newark 11 hours, 16 minutes and 10 seconds after take-off from Burbank, clipping 1 hour and 8 minutes off of Frank Hawk's record. His average speed to Cleveland was 223 mph and 217 mph for the 2450 mile coast to coast flight.

At Newark he refuelled and streaked back to Cleveland. Time did not permit the changes planned for the Thompson so the Super Solution ran with the same configuration as it had in the Bendix. Doolittle was running second to Bayles in the Gee Bee Z when a loss of power forced him from the race. Upon investigation it was found that a piston in the Wasp Jr. had been scuffed.

After the 1931 races, Jimmy Doolittle and the Shell Oil Co. decided to have the Laird Super Solution modified with a retractable landing gear. The modification was done at Wichita, Kans., and was completed in August of 1932. The plane was completely remodelled with new wings, new control surfaces, a modified fuselage and retractable gear. A new semi-bubble canopy which protruded above the top wing was installed to improve the visibility. The gear retracted vertically upward into the fuselage where the wheels were flush with the under skin surface. The fuselage aft of the canopy was much deeper in order to fair in properly with the raised canopy. The sides of the cockpit down to the upper longeron were transparent so that visibility in all directions was good except where it was blanked out by the wings

The plane was painted a bright yellow with red tail surfaces and a red nose cowl. There was a large Shell insignia on the nose cowl and a larger one on the vertical tail with the plane's license inside it. The No. 400 on the plane's sides had a jagged streak of red lightning slashing through it diagonally. Unfortunately, on the first test hop August 23, 1932 the gear failed to come down after being retracted. Jimmy made several attempts to lower the gear but finally had to belly the ship in. The landing was good but the aircraft was damaged too badly to be repaired in time for the National Air Races. Shortly after this Doolittle was chosen to fly the Gee Bee R-1 at the Nationals.

Parts of the Super Solution and the Solution appeared in an aircraft in 1937. This ship carried the license number of the Solution and still sits in a hangar in Carolina. (Parts of this article were taken from a story by Mattie Laird that appeared in the October 1931 issue of Aero Digest.)

THE SPORT OF air racing in 1931 was entering what had come to be called its Golden Age, an age short in time -it would last only a decade-but an age intensely long on memory. It was an era noted for its colour and competition, an era of the individualist when designers and pilots alike often put all they had, every dream and every dollar on one airplane.

In this era the little racer served as proving grounds for many new techniques, its wings carried the faith of the future, the 50 feet of air space between it and the pylons became the wind tunnel. The country was in the depths of a depression. Money was hard to come by and only the dedication of a few kept aviation progressing at all.

Prompted by the Laird "Solution's" triumph in the 1930 Thompson Trophy Race, the Cleveland Speed Foundation ordered from the Laird Co. a new and faster "Solution"-a "Super Solution". Thus the Foundation indicated their support of a bigger and better National Air Race in 1931. Even in mid-depression such an affair should promote a real financial stimulus.

During a trial speed run in mid-1931 the ailerons and a good sized piece of right wing tore off Jimmy Doolittle's freshly rebuilt Travel Air "Mystery S." Jimmy was saved by parachute but the plane was lost, apparently because of an overbalance of its new Frise ailerons. He had hoped to enter the "Mystery" in the National Air Races but its loss made him available to pilot some other races. The Speed Foundation immediately secured his services to fly a new Laird.

Jimmy Doolittle, then just 34 years old, was already a legend in aviation. His reputation in the field of high speed, cross-country and aerobatic flying was world renowned. He had established an enviable record during his 13 years in the Army Air Service, earned a Sc.D. degree at M.I.T. in record time, won the 1925 Schneider Trophy Race and set a world speed record in the Curtiss R3C-2 floatplane. Resigning from the Air Service in 1930 as a Major, Doolittle accepted a position with Shell Oil Co. as director of its aviation department. He was already a pioneer in blind flying techniques and precision aerobatics. There was no question the Cleveland Speed group had picked the best man to represent them at the controls of their "Super Solution".

The "Super Solution" was simply a refined and more powerful version of the 1930 "Solution". It was the contention of both Matty Laird and his chief engineer, Raoul J. Hoffman, that with refinements and added power the same basic design could be faster than any plane scheduled for entry in the forthcoming National Air Races. Moreover, acting on Doolittle's request, they became convinced they could make it suitable for both the transcontinental Bendix race and the closed course Thompson Trophy Race. Because of the entirely different flying demands, few aircraft designs were ever suitable for both competitions.

Laird's answer was to design the "Super Solution" to accept two different versions of the same engine, the Pratt & Whitney Wasp Jr., so successful in the "Solution". They would use a geared Wasp for the full out power demands of the Thompson race and a direct drive version for the high altitude and steady power needed in the Bendix.

Both engines were specially modified versions of what later became well known as the standard 420/450 hp P & W R-985 OI the civil model Wasp Jr. S2A which was then commercially rated at 375 hp. However, for racing in which engine life was not a principal factor, the popular Wasps were often over-boosted and used "doped" fuel with a high lead content. The "Super Solution's" engines differed from stock by using high compression pistons and doped fuel. Laird was willing to risk engine failure and short engine life, but in return both of the engines developed well over 500 hp.

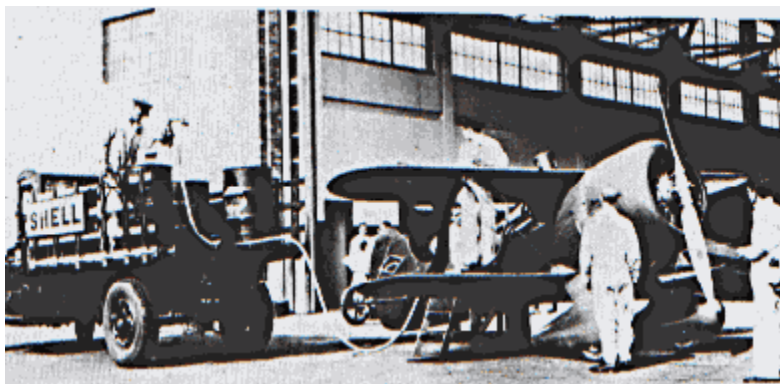
In fact, the direct drive Wasp delivered 510 hp at 2400 rpm driving an 8 ft. 2 in. propeller, while the 3:2 geared engine, swinging a 9 ft. propeller, could develop up to 560 hp (according to Doolittle's later report. P & W rated it at 525 hp). The geared engine also ran much cooler than the direct drive model.

Work began on the "Super Solution" July 8, 1931. Construction went forward with a minimum of delay since most of the major components were identical to the previous year's "Solution" racer. Since the air races were scheduled two months later ~ over the Labour Day holidays the first weekend of September, the "Super Solution" did not undergo the 21 days crash program as had the "Solution".

Within six weeks, on August 22, the green and yellow racer was rolled out for flight tests. She looked like an entirely different plane, yet her wings, tubular fuselage framework, engine mount, and tail surfaces were all identical to the "Solution's".

Doolittle, writing later, remarked that he made the first flight "from the old Aero Club Field, south of the Chicago Municipal Airport. Laird felt or hoped that the high speed would be around 300 mph." The P & W geared Wasp Jr. had been installed for the first flight, its big 9 ft. Hamilton-Standard adjustable propeller set at 37 degrees pitch at the 42 inch station. Doolittle continued, "The airplane ran about a mile and a half before it could be pulled into the air and then flew about two miles more before it picked up sufficient speed to come under complete control. In succeeding flights the propeller pitch was reduced 5" and the take-off was satisfactory though the engine over-revved somewhat. Clearly a case where the controllable-pitch propeller would have solved everything.' There did not seem to be any appreciable torque resulting from the large propeller and geared engine except an acceleration torque when the throttle was moved quickly."

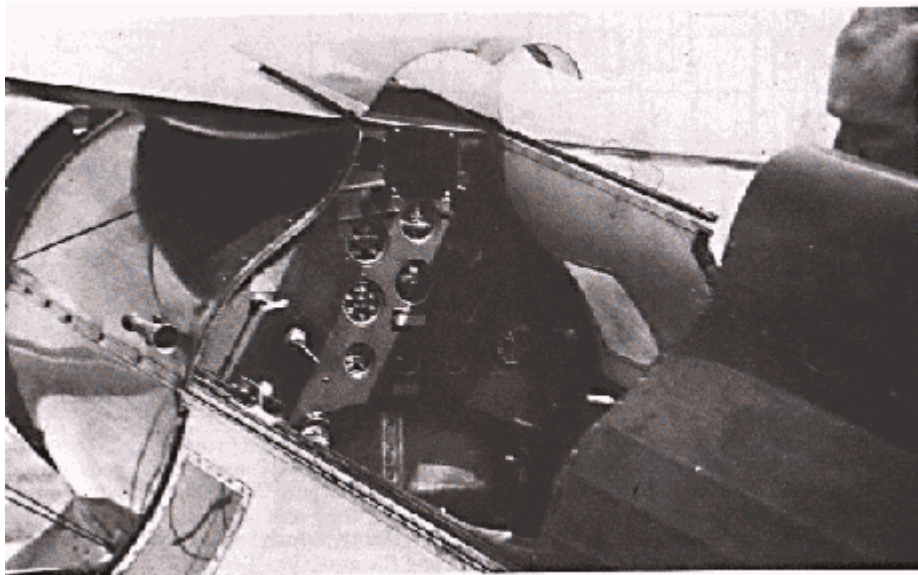
Both Jimmy Doolittle and Matty Laird made several test flights over the next few days. The plane proved stable longitudinally and laterally but extremely unstable directionally. This directional hunting increased with speed and Doolittle reported it was barely manageable at speeds in excess of 200 mph. Raoul Hoffman pinned the cause on too much "fin area" forward of the c.g., the culprits being the longer NACA cowl used on the geared engine, the large wheel pants, and the fairing fillets used between the landing gear struts. After removing the wheel pants and strut fairings she flew beautifully -but the unclothed under-carriage now caused unwanted drag. To correct the problem the fin and rudder were increased in height about 9 inches, and the wheel pants reinstalled.



Writing in Racing Ramblings, Doolittle commented, "Although the pilot sat on 50 lbs. of lead shot the airplane was so stable longitudinally that it was difficult to get the tail down in landing and the plane landed fast." In later tests with the direct drive engine and the 8 ft. 2 in. propeller the plane weighed about 75 lbs. less and the landing speed was nearly 5 mph slower.

The LC-DW 500, (LC-Laird Commercial, D-series, Wasp engines, and 500 horsepower) was fitted with complete blind flying instruments. Doolittle, of course, was an old hand at blind flying and would use this experience in the Bendix race.

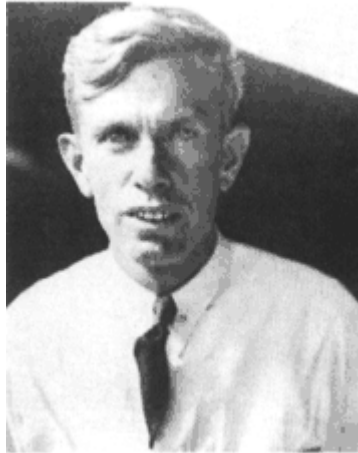
Vincent Bendix, pioneer in the aviation and automotive industries, inventor of international prominence, and President of the Bendix Aviation Corp., sponsored the Bendix Trophy Race with a view to encouraging transcontinental air travel. The race was an open competition from Burbank, California, to Cleveland, Ohio, and stimulated developments in all-weather flying, communications, and navigation. There had been transcontinental air races in 1929 and 1930 under sponsorship of the National Air Race Association, but these were mere sporting events offering little or no prize money. The Bendix suddenly made it lucrative with a purse of \$17,750 plus a gold replica of the Bendix Trophy, second, \$3,750 with a silver trophy replica, third, \$2,500 with a bronze replica, fourth, \$1,500 and fifth, \$750. An additional \$2,500 would go to the pilot who on the same day completed the flight from Cleveland eastward to Newark to establish a true transcontinental speed record.



It was no surprise when eight entries showed up for the running of the first Bendix race on September 4, 1931. Flood lights rimmed the ramp and hangar area at Burbank's Union Air Terminal as the racers were groomed to start. Of the eight racers, six were Lockheed's (three Altairs, two Orions, and one Vega); the remaining two were custom built. One was a modified Travel Air "Mystery Ship," NR614K, which had won the 1929 Thompson Cup Race and the other was Laird's "Super Solution". The 1930 "Solution" was also entered but a landing mishap en-route to the west coast prevented it from making the starting deadline. The contrast between the large Lockheeds, slower but capable of making the distance non-stop and which had dominated the earlier two cross-country races, against the two special speedsters which were just a bit more than flying engine but must refuel along the way, led to vociferous pros and cons as to which would get to Cleveland first.

It seemed as though a million stars were sparkling with excitement in the unusually clear night sky at the drama about to unfold below. Departure was timed so that arrival at Cleveland would occur at the climax of afternoon activities, and as race time approached the tempo of action increased. Large numbers of spectators began to line runway 15, and by 1:00 a.m. all pilots were in their planes with last-minute weather conditions, navigation procedures and flight plans double-checked. Tension ran high-the Bendix was big business. It shared national headlines with Sir Hubert Wilkins, who was probing under Arctic ice packs with his submarine-the Nautilus.

It was time. Lou Reichers swung his Altair onto the runway, eased the throttle forward and at 1:20 a.m. PST, Larry Therkelsen, official NAA starter, dropped the flag. Fifteen minutes later Walter Hunter responded to the starting flag and eased his 600 hp special Travel Air "Mystery Ship" into the star-studded sky. Harold Johnson bounded down the runway just three minutes later, lifting his new Continental Airlines Orion aloft, followed within five minutes by Asa Chandler's Orion which was piloted by Beeler Blevens. Doolittle would be next. The rest of the contestants would follow within the next twenty minutes.



Jimmy snapped the cockpit shut, checked the latches, pored over the glowing instruments, tightened the seat belt and pulled out to the starting position. The big engine cowl hid his view of the runway; "she was a blind airplane all right but I got used to it" was Doolittle's comment. The starter's flag raised as the Wasp beat out a symphony of power. At 1:40 a.m. PST (4:40 EST) the flag dropped and Jim pushed the throttle to the firewall. The "Super Solution" was airborne in less than 500 feet.

Doolittle climbed at a fast rate, skimming the mountains to the east and heading for a brief levelling off at 5,000 feet to check engine temperature gauges. He soon spotted the tail light of Blevens' heavily laden Orion slowly climbing at full throttle. The "Super Solution" zipped past, prompting Blevens to relate later, in his slow Southern drawl, that he figured he was flying backwards or was about to stall out when he saw Jimmy pass. Now Doolittle pointed the Wasp for 11,000 feet and better winds.

Setting a course of 075 degrees, he trimmed the racer, streaked over the Mojave desert and headed straight for Albuquerque, New Mexico. Flagstaff, Arizona passed below and the Laird was dipped into a long whistling shallow dive, planning to arrive at pattern altitude simultaneously with reaching his first fuel stop. Some of the six non-stop starters would no doubt be up at 15 or 16,000 feet taking advantage of the thinner air and stronger tail winds. Every degree of error in navigation, every change of altitude meant minutes to each contestant. For Doolittle, every mile at top speed counted and refueling stops had to be fast.

Albuquerque appeared in the distance and Jim increased his dive. Over the field he peeled into a short pattern and in just 3 hrs. 2 min. after take-off the Laird's wheels touched the ground. He had averaged 228 mph on the first 674-mile leg. Doolittle slid out of the cockpit, wiped his hands on his clean white knickers, swallowed a glass of milk, and slipped back into the pit as the fuel caps were secured. Refreshed and with a full load of fuel the "Super Solution" was again nosed toward Cleveland. Dawn was just breaking as Jimmy leveled off at 10,000 feet and sped toward mid western prairies and Kansas City, his next stop



Unknown to Doolittle at the time, he had gained a commanding lead, since the Lockheeds, still with heavy fuel loads didn't have their running shoes on as yet. Wait Hunter had landed his \$15,000 modified Travel Air at Winslow, Arizona, fighting mechanical problems plus a painful ear block caused by a bad head cold.

Three hours, six minutes and 765 miles later Doolittle greased the "Super Solution" onto Kansas City's airport. He only had time to stand in the cockpit and stretch-refueling was completed and Jim was off again in ten minutes.

By now the sun was high and hot, the air was choppy, and thick cumulus were building. Early afternoon thunder storms appeared, and soon it was apparent a vicious squall line stood like a stone wall guarding Cleveland. To go around or over the storms was impossible, so Jimmy was forced to go on instruments and bore straight through.

With his eyes glued to the needle-ball and airspeed, and a glance at the engine instruments, he barrelled into the fire-filled sky. Some of the other pilots were using the new aural null radio direction finder, a bit primitive and subject to static, it effectively forced time-consuming detours around the storms. After a half hour of wild bouncing Jim thankfully noticed the pounding rain was tapering off, and the "Super Solution" suddenly broke into clear sunshine. Dead ahead was the big red and white chequered home pylon with the name Bendix emblazoned on it. Doolittle had sliced through the black turbulence with less than 2 degrees error in navigation.

As he taxied the mud covered ship to the line, Jim spotted his wife, Jo, and their two children, Jim Jr. and John. Jo was waving a lunch she had prepared but Jimmy had already clambered onto the cockpit edge, grabbed a hose and begun assisting in refuelling with more Shell gasoline. He had decided to continue to Newark and attempt the full transcontinental route. The public address system was blaring his name, asking him to come to the speaker's stand, but Jim's winning smile and those characteristic movements of eagerness meant only one thing-he was impatient to be OFF. With knickers now thoroughly oil soaked, Jim slipped back into the pit, fired up the Wasp and threw sheets of muddy water as his salute to the Cleveland crowd.

Once again the "Super Solution" was airborne and soon was flashing over the infamous Hell Stretch of Allegheny Mountains where the lives of many pioneer airmail pilots were lost. The air was extremely turbulent but Jim had complete faith in the Laird/Wasp combination. Still uncertain if he had won the Bendix, he streaked into Nebraska at 3:51 p.m. His elapsed time from Burbank was 11 hrs. 16 min. 10 sec., his average speed 217 mph, beating the 2,882 mile transcontinental record set by rank Hawks in his "Mystery Ship" earlier the same year by one hour, eight minutes.

Newsmen and jubilant spectators met the plane as it rolled to a stop. Jimmy was quickly informed that he had indeed won the Bendix and had also set a new transcontinental record-and, incidentally, nice to know, he was \$10,000 richer. After spending 30 minutes with the press he climbed back into the trusty "Super Solution" and headed back to Cleveland where he was greeted with a big kiss from his wife, and that beautiful prize money. Doolittle then relaxed in the Company's Bellanca executive plane while Jimmy Haizlip flew him to a Victory party in St. Louis. The "Super Solution" was left with Laird and P & W maintenance men to be readied for the Thompson race.

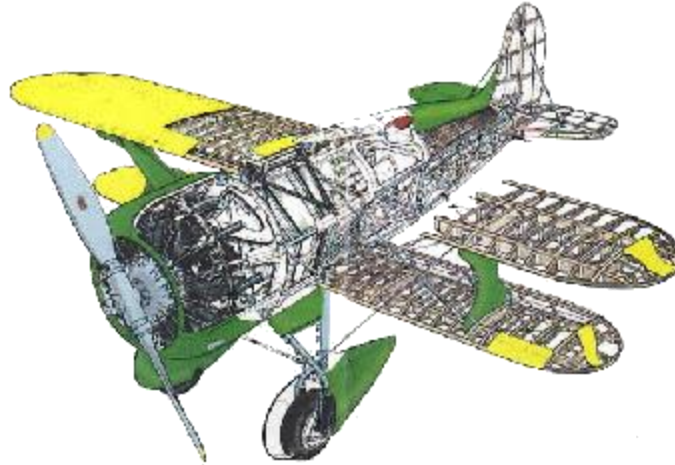


It was impossible to continue the Bendix, but patch repairs were made in time for him to fly into Cleveland in time to make a try at the Thompson. But even more bad luck dogged him. During speed trials prior to the Thompson a fuel line broke and the plane burst into flames. Walt bailed out at treetop level, spent six months in the hospital suffering from severe burns, but lives today to relate those wild experiences from the left-hand seat of a Boeing 707.

Doolittle returned to Cleveland and prepared for the closed-course Thompson Trophy Race. The race was established in 1930 by Charles Edwin Thompson of Thompson Products, Inc. of Cleveland and Detroit, manufacturers of aeronautical equipment, their most important being sodium cooled valves. It was an international free-for-all for men pilots only and engines of unlimited cubic inch displacement. More than 60,000 spectators would stand enchanted as the world's fastest, most powerful racers dashed 10 times around the Thompson's 10 mile course. In 1931 time trials preceded the big event. The qualification course was a straight path in front of the grandstands with each hopeful flying two speed dashes in each direction. This would give the pilots a chance to check out their planes and by requiring at least 175 mph to qualify, would help insure keeping them in a pack during the main race.

The small group of trained personnel assigned to the "Super Solution" were busy removing the direct drive Wasp Jr. and fitting the geared engine, shipped from Laird's Chicago plant, onto the plane's mount. On Doolittle's first test run the big engine, slinging its nine foot propeller, gave the plane about eight miles per hour more speed, but she had a strong tendency to roll to the left. She was hurriedly rigged right wing heavy, and Doolittle notified the timers he was ready to make his qualification runs. He took the green and yellow bullet up and flew a couple of laps around the pylons indicating 240 mph on part throttle. Then he headed down the home stretch past the grandstand and over the qualification course. He rocked the wings as a signal for the ground timer indicating this was a timed run, but the roll was so slight that Jimmy was uncertain if the timer had noticed it. The Thompson course was an irregular pentagon and Jim came down the stretch, flipped around the first and second pylons but at the third, where the angle was sharper, the left wing would not come up. He found himself unable to recover until he had made a complete roll. As he fought the controls he barrelled to the right, attempting to get back on course. Then he had trouble getting out of the right bank. By this time, Jim reflected, the timer must think he was horsing around. At No. 4 pylon Jim banked left but

again the bank increased-suddenly the controls reversed and Jim throttled back to regain control. The speed during the run had been clocked at 260 mph.



Doolittle landed the plane to have the rigging checked, but nothing appeared to be seriously wrong. Jim took her up again and made another attempt at the three kilometre straight-away Thompson qualification course. On the first pass the plane rolled to the left until almost out of control. Jim chopped the throttle and she smoothed out. Apparently the roll instability got much worse at faster speeds. So, for his second pass, Jim decided to experiment by entering the course with the right wing down about 30°. The racer had now accelerated, and as the one kilometre marker flashed she was rolling against the stick, her wings already level. By two kilometres the left wing was down some 30 degrees and depressing rapidly. Again Jim was forced to throttle back, unable to make even one satisfactory pass across the course.

It was now apparent that something was progressively loosening up. The wings were warping in flight, and rough air encountered on one of the speed runs made the rigging so flabby that Jim could actually watch a lateral wiggle along the upper wing trailing edge. He commented later, "The racer was extremely temperamental to rig. Here was an airplane that could be rigged in flight. The difficulty was that it wouldn't hold its rig.

"In this airplane," he continues, "the main wing truss was incomplete. The auxiliary wing truss had depended upon a fitting around the center of the continuous rear spar in the upper wing to take unevenly distributed wing loads. A careful inspection showed that the spar had crushed at this point and the bolt holes had elongated. As a temporary expedient an eighth-inch thick piece of sheet steel was driven between the fitting and the spar to take up the play. This corrected the trouble temporarily, but after a few hours flying it again appeared due to further crushing of the spar."

The Thompson race was scheduled the next day leaving no time to modify the wings, make new fittings or devise new rigging. The geared engine could not be used because its dynamics induced wing warping and aileron reversal as the speed approached 250 mph. Jimmy felt certain he could handle the Super Solution. with the direct drive Wasp, although now it might respond "sloppily," as he put it. The engines were changed overnight and the morning of race day was spent re-rigging the plane.

With the plane again serviceable, a test flight was made to check the Wasp Jr. engine and accomplish the qualifying runs for the Thompson. The only real competition seemed to be coming from Lowell Bayles who clocked a pre-race time trial of 267.242 mph in his radical new Gee Bee Z racer. Doolittle took the "Super Solution" over the qualification course and turned in an average of

255.354 mph, while his fastest lap was a blazing 272 mph. There was no doubt it would be a tight race. Doolittle landed, satisfied he could at least put up a scrapping good fight. Almost at once it was race time. The "Super Solution" had been rigged right wing heavy to aid left bank recoveries, and with hope overriding misgivings, it was rolled to the starting line.

As Jimmy surveyed the line of eight starters he felt fairly confident about the "Super Solution's" chances. If he could get a head start he would have a fighting chance and the racer's poor visibility wouldn't be a factor. Jim was frankly worried to be so restricted in forward view if he had to fly in the midst of several racers. As he assessed his competition, he judged Lowell Bayles his greatest threat, but the sly dark horse could be Jimmie Wedell in his own racer, No. 44.



The starters flag was raised-held five seconds-and dropped. The little racers were off. Doolittle jumped into a commanding lead and streaked for the scattering pylon. He flipped the Laird around the first marker, shaving the pylon with a mere five feet to spare, and charged well out in front as the first lap passed into history. Already the strain was beginning to show on the over-revved direct-drive engine. Jim alone knew this as temperatures- began to climb and gauges went into the red. By the second lap, everyone knew, as smoke belched from the exhaust stacks and trailed off the rudder. With each succeeding lap the Wasp became sicker. Bayles had taken the lead in the third lap, but Jim was determined and grimly hung on until the seventh lap when he finally had to pull out of the race before his engine failed completely. Bayles went on to win the Thompson that year in the Gee Bee, averaging 236.24 mph. Doolittle, despite his ailing engine, had averaged a remarkable 228 mph. Investigation disclosed the Wasp had blown or scuffed a piston.

Recalling this difficulty, Jimmy related, "The fuel used in the (Bendix) was straight run gasoline containing three ccs of tetraethyl lead per gallon and having a knock rating of 87 octane. For full throttle operation (Thompson Race' 89 octane gasoline containing five cc of lead was used. With the 89 octane fuel there was no detonation and head temperatures were steady at about 520" F'." The fuel mixtures were carefully compounded and analyzed by Shell Oil experts and had previously been used in the Wasp engines by Doolittle during earlier tests. He had confidence the high octane fuels would not harm the engine if specific time limits were not violated during full throttle operations. Everything was running smoothly until the one piston was damaged, possibly by a speck of foreign matter. Temperatures began to rise thereafter. The direct-drive Wasp Jr. had done her duty for the Bendix, but the gruelling pressure of the Thompson was the breaking point.

In September 1931 Jimmy Doolittle, with yet another long-distance speed record in mind, flew the "Super Solution" to the Pratt & Whitney plant at Hartford, Connecticut to have its engine majored. On September 18 the racer was rolled into the P & W experimental hangar, and within three days a comprehensive report was released. This indicated the racer weighed 1752 lbs. empty, 2585 lbs. gross, and its direct-drive Wasp Jr. engine was number X-27, which the shop people had originally called the "Yellow Jacket", to continue the series of P & W nicknames, based on stinging insects. As

applied to Doolittle's engine, however, the name was unofficial. It was later given officially to an experimental 20-cylinder water-cooled engine which was never produced.

Shortly after the overhaul Doolittle took the "Super Solution" to Ottawa, Canada, the jumping off place for a three capital speed record, including Ottawa (Canada), Washington ~ U.S.A.) and Mexico City (Mexico). At about 5 a.m. on October 20, 1931, Jim lifted the stubby little biplane aloft for its first non-stop leg to Washington, D.C. After refuelling there he made a dash for Birmingham, Alabama. The pattern of operation was similar to the successful Bendix race, with Jimmy never on the ground more than 10 minutes at any of the stops. From Birmingham he bored to Corpus Christi, Texas, and after a total of 12 hrs. 36 min. he landed at Valbuena Field near Mexico City. The Doolittle/"Super-Solution" pair had established an inter-city record that challenged speed flyers for several years thereafter.

The "Super Solution" proved itself a good, all-around fast airplane suitable for both closed-course pylon races as well as long distance speed flights. Its drawback was poor pilot visibility. Jimmy Doolittle summed it up: "Had we been able to use the cooler-running; geared engine; had the wing trussing been complete or the centre cabane fitting more secure so the wings wouldn't warp; had we known as much then as we know now, none of these difficulties would have arisen-but that is experience."

In the summer of 1932 Doolittle and Shell Oil Co. officials decided to correct these deficiencies, and Doolittle suggested several considerable modifications. These included a longer, sharper nose cowl to aid engine cooling, engine adjustment to "throw" more oil, installation of an air-cooled oil tank, redesign of the wing trussing, raising the pilot seat 10 inches for visibility over the top wing, and installation of a sliding canopy and door so the pilot could stick his head and shoulders out as an aid in landing. Doolittle also believed that gas capacity should be increased, a controllable pitch propeller employed, the c.g. moved aft to correct excessive longitudinal stability, cockpit ventilation improved, and a retractable landing gear fitted to increase speed.

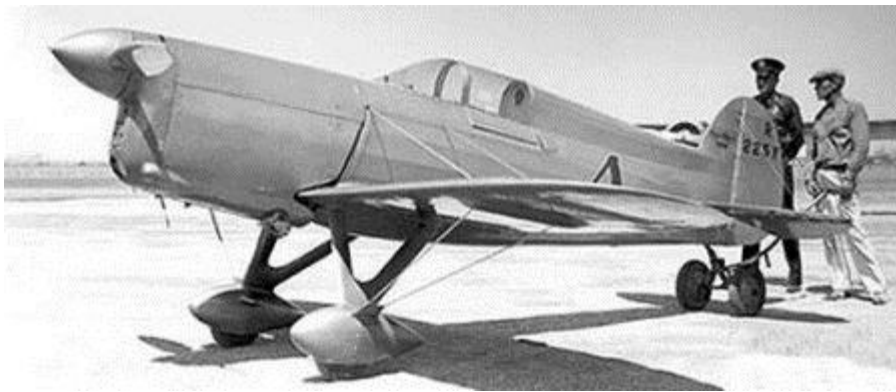
These modifications were discussed with the Laird Company but their bid for the work was too high. Doolittle took the job to the Christopher Bros. in Wichita, Kansas who completed all the changes he had stipulated by mid August. Doolittle made the first flight in the completely redesigned "Super Solution" at Wichita on August 24, 1932. "It seemed that we had corrected all the faults in the original design," he remarked, "until time came to land. The landing gear, in ground tests, dropped all the way out, then spread and locked into place. In actual flight the air loads and rotation of the slipstream spread the gear before it had dropped out locked it in an intermediate position and it was necessary to make the first landing on the bottom of the fuselage." The gear fault was corrected by using a rubber shock cord which held the wheels together until the telescoping struts were fully extended.



In succeeding flights Jim discovered the plane was subject to bad tail flutter, especially when in slow flight or in landing configuration. The deficiency was attributed to the reshaped fuselage which had been made more rotund in order to accommodate a larger fuel tank located near the c.g. A number of large fillets were tried between the lower wing and the fuselage in attempts to correct this fault, but as August merged into September, trials were still unfinished, and the chance of having all the bugs worked out in time for Jimmy to fly it in the Thompson, held on September 5th seemed bleak. When Doolittle was offered the opportunity by the Granville Bros. to substitute as pilot of the Gee Bee R-1 racer, he took it, and thus set the stage for his historic 1932 Thompson win with the ill-reputed racer.

The brilliantly painted Shell "Super Solution," resplendent in red and yellow decor and looking very little like its old self, stood abandoned in the Wichita hangar for months. Finally it was crated and shipped to the Shell Oil Co. hangar in St. Louis. Here it was shoved from one corner to another slowly gathering dust and losing parts one by one to scroungers. Its ultimate fate is uncertain.

Miles Atwood special



The Miles Atwood special. This little Menasco engined racer topped out at 189.6 mph and placed sixth piloted by Lee Miles in the 1935 Greve race. She came back to Cleveland in '36 but did not do any better.

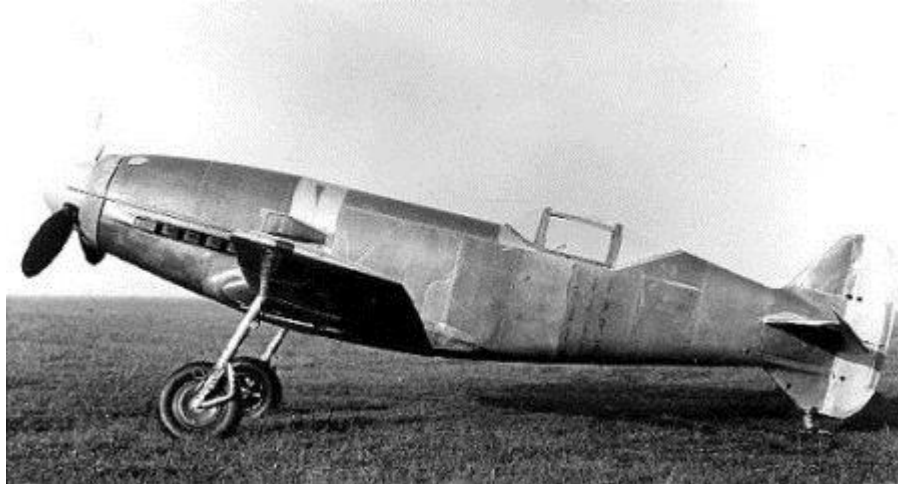
Messerschmitt Me 209 V-1



The world's fastest piston engined airplane was this Messerschmitt Me 209 V1 which set the absolute world speed record of 469.22 mph on April 26, 1939. Aircraft was flown by Flugkapitan Fritz Wendel, (shown below being congratulated by designer Willy Messerschmitt). Power was a specially designed Daimler-Benz DB 601 ARJ twelve cylinder inverted liquid cooled engine of 1,800 hp which could be

boosted to 2,300 hp for short bursts. Aircraft was completed in June 1938 and first flew August 1, 1938.

Just a few weeks prior to Wendel's flight, on March 30, 1939, 22-year old Hans Dieterle flew a Heinkel He 100 V8 at a speed of 463.92 mph to break the then existing absolute speed record set June 2, 1933 by Italian pilot Francesco Angello in a Macchi-Castoldi MC-72. Angello's record was 440.7 mph. He flew a tandem engine, open cockpit, externally braced wing, twin float seaplane. Dieterle's record lasted less than a month. The record set by Wendel in the Me 209 V1 would last for 30 years. It was broken on August 16, 1969 by American Darryl G. Greenamyer in a highly modified 3,100 hp F8F-2 Bearcat "Conquest 1", at an average speed of 483.041 mph. Some parts of the Me 209 V1 still exist today, stored in the Polish Air Museum at Krakow.



The ME-209 Speed Record stood for over 30 years until August 16 1969 when an American named Darryl G Greenamyer broke it by flying 483.041 mph in a highly modified F8F-2 Bearcat.



The Me 209 was intended from the outset as a record breaker but the basic fuselage was used in the otherwise totally different Me 209 V4 in the effort to build a Bf 109 successor. The snake was added as a bit of propaganda.

In the years between 1935, when Germany first revealed formation of the Luftwaffe, and the outbreak of World War II, Adolf Hitler was most anxious to impress upon the world the capability of the fighter aircraft that equipped his new air force. This resulted in design of the Messerschmitt Me 209 to be used to establish a new absolute world speed record. With only superficial resemblance to the Bf 109, the Me 209 was tailored around a specially-built Daimler-Benz DB 601ARJ engine with a take-off rating of 1342 kW (1 800 hp), which could be boosted to a peak of 1715 kW (2,300 hp) for very short periods. This capability proved sufficient for the Me 209 to set a new record, Flugkapitan Fritz Wendel flying the first specially-prepared proto type on 26 April 1939 at an average speed of 755.136 km/h (469.22 mph).

At this point the German propaganda ministry stepped in, details for ratification submitted to the FAI identifying the record breaking aircraft as the Messerschmitt Me 109R in an attempt to convince other nations that the record had been gained by a variant of the Luftwaffe's new fighter. Nevertheless, the record stood for just over 30 years, but although attempts were made by the Messerschmitt company to develop a new fighter based on the ME-209 design, Me 209A prototypes flying later in the war, the programme was abandoned.

.Macchi M-39



Victor of the Schneider Cup race in 1926 at Hampton Roads ,Virginia ,U.S.A. Italy's D. Bernardi attained a new record with Macchi M-39 designed by Mario Castoldi.

Length 6.7m 22.1 ft
Wingspan 9.2m 30.4 ft
Height 3m 10 ft
Average speed 394km/h 246mph
Weight fully loaded 1600kg 3528 lb.
Engine 1 water-cooled Fiat V-12 engine
Power 800 hp
1 man crew



Macchi-Castoli MC 72



From designers to great pilots, through specialists, Schneider Cup has so much heroes to feed a lot of tales.

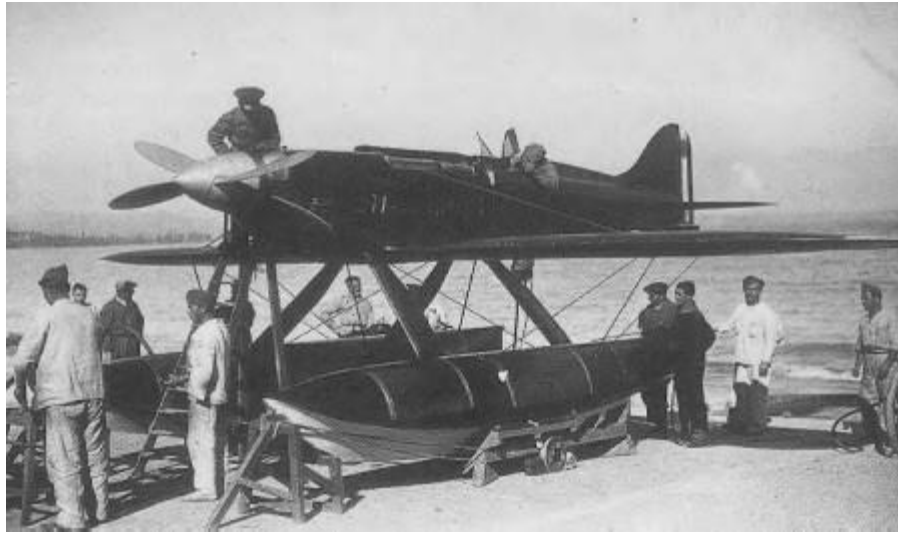
A vivid portrait of Eng. Mario Castoldi, Macchi's designer, has been drawn by his successor, Ermanno Bazzocchi: "Misogynous, good wine loving, he had the hobby of rice growing. His huge and heavy complexion was the most improbable for a man devoted to catch for the speed. We believe he flew only once".

His irascible character is reported in an exclamation "In FIAT, power is measured in donkey-power", pronounced after the 1927 defeat. Not casually, perhaps, before Venice race, Maria Vittoria De Bernardi had been warned by Castoldi not to leave her husband fly on such aircraft.

For Subofficer Francesco Agello it's sufficient to say that he reached the record only when, after death of Lt. Ariosto Nari, he remained the only pilot endorsed for MC-72. Heavy responsibility on his shoulders must be paired with the constant memory of the killed colleagues but also, we believe, with the sense of revenge of a man damned to be an eternal reserve.

About De Bernardi, Baldassarre Catalanotto remembers when, talking about his secret technique to turn around the pylon, he answered: "When I first flew Macchi 39, it had no intention to turn at all, to lower the wing. So, I kicked in the pedals, ripped the stick and the aircraft turned very well. Since then, I ever did so". Behind his simple words, one of the best natural talents of pilot ever seen in Italy was hidden, one in which technical ability was glued with instinct to form an unbeatable champion.

Besides those strong personalities, were peoples like Armand Palanca, chief civil technician in RAV workshop and last to disappear among Schneider's protagonists. After studying the problem of turbulence around air intakes, Palanca studied and patented a special carburettor, RAV.26, to solve the heavy breathing failures of AS-6.



Macchi MC-72 after his record flight (107Kb)

The decision to trust in a single type for 1931 edition mobilised resources never available before, allowing to build sophisticated devices to test the tricky FIAT AS-6 engine, conceived by Eng. Tranquillo Serbi. To avoid the problems created by huge propeller torque, Zerbi decided to adopt a double, counter-rotating fixed-pitch propeller. Not only efficiency was some 15% higher, but rear propeller was immediately flooded by air flow and was efficient even during take off.

In the difficult floating phase, torque absence should allow to have a balanced load on the floats: an important aspect, considering that, with 1800HP engine, the left float was loaded 23% more than right one. In 1931 Supermarine S-6B with 2650HP was 32% overloaded, while MC-72 barely reached 3% even with 3000HP. Behind this propeller stand a singular twin engine, obtained coupling on the same axle two 12V, 60 degrees engines directly derived from AS-5, each moving a propeller through two coaxial crankshafts passing through forward engine banks. Air intakes were in the centre, between both engines, while breathing system, composed by a centrifugal compressor and a bank of 8 aspirated carburettors, was single for the whole plant.

The plates "Front Engine" and "Back Engine", still in the cockpit, show that semi-engines were independent, as confirmed by run-up scene in the famous movie of the record. It seemed the simplest solution, but, as often happens, AS-6 promises were harder to win than expected.

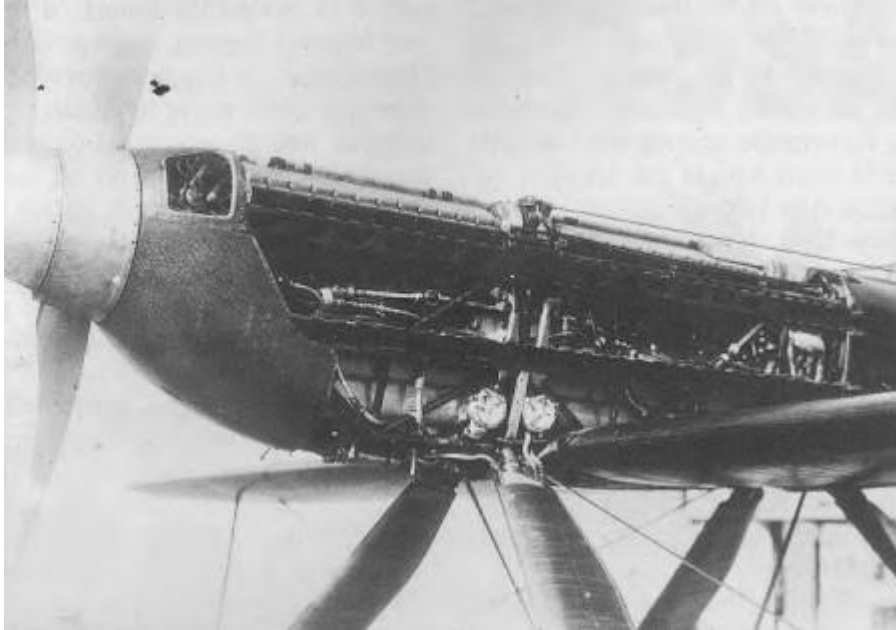
Once defined the engine solution, airframe realization proceeded rapidly and without problems. Design base was conditioned by the 4m of the engine, and aircraft emerged as a steel tube frame, acting both as engine mount and forward fuselage, completed with mounts for wing, floats and rear fuselage. Wing structure was also metal, with rectangular shape, covered with flat surface radiators, while tail unit, with empennages and cockpit, was a monocoque wooden structure. Under the tail a further radiating element was foreseen.

The floats, used as fuel tanks and also covered with flat radiators, were initially metal but were eventually changed with wooded, lighter and smaller ones. All above gave a very nice and sleek aircraft, whose main section was lower than MC-67 one, giving no flight problems even if control surfaces were not dynamically balanced as surprisingly happened in all Schneider's planes.

What let the participation to 1931 Schneider Cup to be abandoned was finally AS-6 tuning, which emerged as difficult beyond any prevision: 18 months tests first on loose parts, then on

subassemblies, finally on the whole engine, running for one hour on April 20, 1931. It offered 2200HP only and burned two valves.

problem solution required two months, twelve different valves combinations and 1000 valves in 10 different steels. Reached at the end of May the 2400HP, an AS-6 was mounted on the first MC-72: optimism of the tests were frozen on June 22th, shortly after first take off. Detonations and flameouts, so strong to crack the compressor, obliged Monti to land immediately.



FIAT AS-6 engine, producing 2500/3000HP (103Kb)

While the test flights continued, the necessary modifications were implemented. Then on August 2nd, 1931, Monti crashed on take off and died. Ltn Ariosto Neri and Stanislao Bellini took over with the second MC-72: only 40 days were left before the race, but no solution for the troubles was in sight.

On September 3rd, Ministres of Aeronautics of Italy and France asked British Royal Aero Club to postpone the race one year: the Britons refused, without fair play but pragmatically, because their participation was only paid by sponsors, and retiring that year could mean forever. Thus, on September 12th the British Supermarine flew alone. A record attempt was held also in Desenzano, on September 10th, but concluded dramatically: flameouts, detonations and MC-72 exploded in flight. No escape for Bellini.

In two months, RAV had been shocked and humiliated, but remained alive to gain the world speed record and the 100Km one. To resolve the carburation troubles a third engine test bed was set up, filling a whole hangar where two 400- and 700HP engines simulated wind up to 750Km/h. The device was used to verify proper functioning of Palanca's RAV-26, fitted with transparent elements to observe fuel flow.

On February 26, 1932, a 2400HP AS-6 simulated on the test bed a record flight on 3Km basis: to get an ideal fuel "Rod" Banks, the British wizard of fuel mixtures, was enrolled. He created a mix of 55% gasoline, 22% benzol, 23% alcohol and 0,15% lead. Engines were prepared with 3000HP for record runs and with 2500HP for endurance, working mainly on supercharging.

Neri and Agello, eternal reserve, restarted flying in June: On 15th Neri had the first flutter experience, landing safely only thanks to his skill. Unfortunately, Neri died three months later on a training flight on a CR-20.

Only Agello was left, having scored an unofficial record of 664,078Km/h: a third attempt was interrupted on June 4th after only 8 minutes. The final assault to 700Km/h was finally decided, with Agello as pilot. After several aborts, a first attempt was held on May 13th, interrupted for flameouts. Second attempt on June 22th, aborted for compressor failure. Third try on July 4th, with strong vibrations insurging. Then, long stop until autumn.

Here's another unsuccessful flight on October 1st. On October 13th, other flameouts and further delay. On October 23rd, take off at 14,56: 64 seconds floating, light mist, then the four official passes. Landing at 15,11, with Agello unaware to have beaten his own record. After the calculations, average resulted of 709,209Km/h, with the third, fastest pass at 711,462Km/h. Finally, decorations, promotions, celebrations came, with the immediate storage in a museum of the three MC-72 left, which perhaps never flew again.

In December 1938 RAV command was handed over to Agello, now Lieutenant, which disbanded the remaining of the wing on May 6th, 1940: 61 men, including two officers and two pilots. Agello's record resisted four years and a half, then was beaten two times in a month: by Hans Dieterle on Heinkel 100V8 at 746,450Km/h on March 30th, 1939 and by Fritz Wendel on Messerschmitt Me-209V1 at 755,1Km/h on April 26.

In seaplanes category the record was overcome only on August 7th, 1961 when soviet jet plane Beriev M.10 of Nikolau Andriewski flew at 912Km/h.

