

## Chapter One

It was early morning on September 13, 1935 in Santa Ana, California. The calm weather was a welcome sight to the crew at the Eddie Martin Airport who had been busy throughout the night preparing a sleek, single seat aircraft for an attempt at nothing less than breaking the world speed record. Their boss would make the dash for the record in an aircraft that was unlike any aircraft ever before seen. It was conceived in the mind of a 29 year old entrepreneur named Howard Hughes, and was designed by a team of engineers assembled and supervised by him. Rumors of the aircraft had been circulating for months, but the project was shrouded in secrecy. Up until this day only a handful of people had seen the aircraft, and even fewer had seen it fly - but it had been seen. The aircraft had been test flown, and moreover test flown from a public airport (Eddie Martin) in the daytime. Those who had glimpsed the craft realized that they had witnessed more than just a mere curiosity. The press and the public stood up and paid attention. Something remarkable was taking place in Santa Ana.

Howard had sworn his staff to secrecy. He knew that what they were doing was on the cutting edge of technology, and was in fact engaged in the creation of new technology. Others would be eager to obtain technical information on this aircraft, information that was hard fought for and very valuable. Howard drew his crew around him early in the project and bluntly told them, "If you leak information, or tell anyone anything about this project, bad things will happen to you." He was not threatening them so much as very clearly defining for them the importance of secrecy. Hughes employees liked him and liked working for him. They also knew he was a man of his word: they all believed him when he talked about "bad things will happen". Hughes definitely had the resources to make good his warning. Nobody leaked information.

Chief engineer on the project was Richard "Dick" Palmer. Richard Palmer had worked on the project from the beginning, first part time then turning to full time. Howard had met Dick back in November of 1931 when he was employed by the Lockheed Aircraft Corp. as project engineer. Howard had contracted Lockheed to make performance enhancements to his Boeing 100 biplane. Howard was forever looking for a faster airplane. Dick was put in charge of designing the modifications, and quickly developed a series of modifications that greatly enhanced the top speed of the airplane. Initially Hughes was somewhat intimidated by Palmer's extremely quiet nature, but the design changes made to the aircraft thoroughly impressed Hughes. Palmer clearly had real talent. As impressive as the speed modifications were though, Hughes still complained that airplanes just weren't fast enough.

Howard had in his employ at the time a talented aircraft mechanic named Glenn Odekirk. Odekirk had graduated from Oregon State University in 1927 with an engineering degree, and had a natural aptitude in mechanics. He had even designed and built his own automobile which he toured around the United States with his wife. Hughes had met Odekirk while he was filming his blockbuster movie, "Hells Angels". The movie made use of over 130 WWI era aircraft that demanded constant maintenance to keep flying. Hughes was impressed with Odekirk's work, and over the course of several months the two men became friends. He was the only aviation oriented employee that Hughes had at the time, and he was keenly aware of Hughes' desire for more speed. Hughes was constantly complaining that existing aircraft just weren't fast enough. After winning the All American Air Meet on January 14, 1934 in his (Palmer modified) B-100 biplane, Hughes still lamented that speeds just weren't good enough. Odekirk laughed, and made the innocent (and half kidding) comment to Howard that "you won't be satisfied until you build your own airplane." Howard went suddenly silent, gazing blankly as if drawn into deep thought. Several moments of uncomfortable silence ensued. Odekirk wondered if his lighthearted jab had offended Hughes. Recovering from his sudden trance he said simply, "I think you're right Odie." Gazing over his B-100, Howard knew just

the man that could help them. Being a man of few words, Howard Hughes' telegram to Dick Palmer asked simply, "Would you like to help design the fastest plane in the world?"

By then Palmer was working for the Aircraft Development Corp. as an engineer for Jerry Vultee. For an engineer like Palmer an offer like the one Hughes made was more of a summons than an invitation. Palmer had a secure job with Vultee, and it was difficult to cut loose from that security. At first Palmer devoted his after hours time to the Hughes project. With all the overtime that he was already putting in for Vultee, the added strain of Hughes' project began to show. Vultee became aware of Palmer's work for Hughes and eventually gave Palmer an ultimatum: "Choose one or the other." Palmer couldn't resist the challenge presented by Hughes. Suddenly Palmer was faced with a difficult career choice. Hughes' offer was exciting, but it also represented an unknown to Palmer. At the Aircraft Development Corp. Palmer was a minor (but extremely talented) player who often was forced to constrain his creativity in favor of Vultee's ideas. The job paid well and seemed stable, but Hughes was offering an opportunity that Vultee could not. The opportunity to be chief engineer in the design of the "fastest plane in the world" was one he couldn't turn down. The chance to prove himself in his own right was too great. He had already laid down some preliminary sketches on the design with Hughes, and he was excited about the possibilities. Palmer took the job with Hughes.

Now, barely 18 months later he was gazing upon the fruits of his design labor which was gleaming brilliantly in the early California sun. The fuselage of the aircraft was a highly polished aluminum structure, using aluminum skins that were butted together (rather than overlapped) for aerodynamic efficiency. All rivets used on the fuselage were flush rivets that were each individually machined and finish polished to give the skin an absolutely smooth surface. The one piece wooden wing was part of the fuselage and firewall structure - an innovation that increased strength and reduced weight. A huge central keel system was incorporated into the fuselage, which provided for greatly improved rigidity and strength. The aircraft had retractable landing gear and was powered by a Pratt & Whitney Twin Wasp Jr. capable of 1000 horsepower. The airplane was the first airplane ever designed by Hughes and his team. It was known by different names in the press. Some called it "The Mystery Ship", while others referred to it as "The Silver Bullet". Hughes referred to it as the "Hughes A" and sometimes as "The Racer". The name that stuck however was the one we know today: the "H-1". For the Hughes Aircraft Company, it was serial #1.

The engine used on the H-1 was a Pratt & Whitney Twin Wasp Jr. and by itself represented remarkable achievement. It was a reciprocating radial piston engine with fourteen cylinders, and a total displacement of 1,535 cubic inches. Hence the engine designation was the P&W R-1535. The design was a slimmed down ("Junior") version of the P&W R-1830, which was developed concurrently with the R-1535. The cylinders were arranged in two banks of seven cylinders each, which is the reason for the "Twin" in Twin Wasp Jr. The engine was supercharged and swung a mammoth ten foot propeller made by Hamilton Standard. At 100% power, the engine was estimated to burn 100 gallons of fuel per hour. The original design of the R-1535 allowed for 700 hp but with modification (and specially formulated fuel) could be made to develop 1000 hp. The modifications called for higher than standard compression in the cylinders which available standard fuels could not tolerate. The modified engine required 100 octane fuel to function properly.

The engine was developed in secrecy by Pratt & Whitney, strictly intended for military use. Little was known to the public about this state-of-the-art power plant. Standard performance specifications were public, but standard specifications are always set conservatively. They do not represent what the engine can ultimately do before failure. They represent a rather a conservative and "guaranteed" set of performance figures. Hughes had been anxious to obtain data about how hard the engine could actually be run before failure. Hughes established close contact with Skip Eveleth, a test engineer for Pratt & Whitney in an attempt to obtain the data. Hughes called repeatedly on the telephone (always collect) to try to obtain the actual performance specifications. It was policy at Pratt & Whitney to withhold this information. Because of this, Skip could not reveal the data that Hughes wanted.

Ultimately Hughes had traveled to Pratt & Whitney to personally request performance data on the engine from the management. Hughes was insistent. Finally he was led to an office to wait alone while management reviewed his request. By sheer “coincidence” somebody had inadvertently laid the performance specifications for the R-1535 open upon the desk in that office. When the manager returned a half hour later, he informed Hughes that they could not release the data. Hughes smiled and replied, “I won’t be needing it.” Hughes ultimately signed a lease agreement with Pratt & Whitney for an R-1535 and obtained engine serial number 22. The engine was shipped to Hughes June 30, 1934.

September 13, 1935, found Glenn Odekirk and his team busily preparing the aircraft for the record run. They had been up most of the night. It had been a scant 14 months since receiving the engine. Work had progressed non-stop. Odekirk and his team had built the Racer under the guidance of Hughes and Palmer. Odekirk demanded superior workmanship from his crew. “Superb” was the watchword for acceptable standards. A design built for speed demanded the highest quality workmanship possible, and that is just what Odekirk and his team delivered. The finished aircraft seemed more a work of art than a machine. It was obviously a product of men who were proud of who they were, and what they could do. Glenn was the perfect man for supervising the construction crew. He was known to openly argue mechanical issues with Hughes on points they disagreed on. Hughes was the boss and his decisions were final, but Odekirk would not hesitate to assert his own opinion as necessary. Glenn Odekirk was not a “yes man” for Hughes or anyone else, and this is exactly what is called for with a project like this.

One of Howard Hughes’ greatest talents was his ability to build good teams. Perhaps his greatest achievement on the H-1 project was the team that he was able to build. It was a talent that he would demonstrate again and again throughout his life. His enthusiasm was infectious and the men liked Hughes. Though demanding, the H-1 project had been interesting and could possibly serve to advance the careers of everyone involved. It was comforting to know that what they were doing could lead to a better future not just for aviation, but for themselves on an individual basis. On this morning though, there was tension in the air among them as they rolled the aircraft from the hangar. The aircraft had been flown for the first time on August 17, 1935 and had barely three hours of flight time since then. Each flight had not been trouble free. The aircraft was still in the “shakedown” phase, and normal test flight procedures would mandate a much lengthier flight regime. There was an inherent risk in what Howard was about to do, and the men knew it.

On this day Howard Hughes intended to push the aircraft harder than he ever had. In fact he intended to push the aircraft faster than any land airplane had ever gone. Wind tunnel tests predicted that the aircraft might easily exceed 350 mph, a speed realm that no land based aircraft had ever visited. He was going to urge the aircraft into that realm and not all present shared the same cocky assuredness that was his style. The engineering figures said that the H-1 *should* be able to do it. The wind tunnel figures said that the H-1 *could* be able to do it. All the test figures said the aircraft *would* stay together. Now all that was left was for Howard to find out. He took it to himself to do what slide ruler, intellect, and solid engineering could not do. An engineer risks only his credibility if he is wrong. Wind tunnel experts risk reputation. Howard Hughes would risk much more. This was his project, and there was no way that he was going to allow a test pilot to prove the point. He was about to risk it all. He was about to find out if the figures proved correct.

All eyes were riveted on the aircraft as Hughes swung up into the cockpit. It was not in Hughes’ character to consider the fact that this day lay on Friday the 13th. To him it would have been just another day in September. He would not have considered his own destiny to be determined by a simple superstition. He was a young and ambitious man who was possessed of a remarkable intelligence. He was a person who defined himself *for himself*. In his mind he had already accomplished the goal he had set for himself; he just had to prove it to the rest of the world. All of his close advisors knew that their boss was engaged in extremely risky business by pushing this aircraft to its limits after only three hours of test flights. His closest advisors put what pressure they could on him to allow a test pilot to make the flight. True to his nature he did not feel the pressure from those

around him, or if he did he ignored it. He was Howard Hughes, and his self-confidence did not rely on the encouragement or fears of others. He was going to fly the record attempt himself, and that was it.

The attempt would take place over a specially instrumented course near Santa Ana, California. The course to be flown for the record attempt consisted of a three kilometer timed portion with a one kilometer setup and a one kilometer exit portion for a total of five kilometers. The rules required that he never exceed 820 feet (250 meters) above the ground at any time during the attempt. The rules required at least four consecutive passes over the course, two in each direction. He would have to complete the four passes within a thirty minute time frame to qualify for the record. The record officials representing the Federation Aeronautique International were on hand to authenticate the results. Special high speed cameras were set up to help certify the timings through the three kilometer portion of the course. Stunt pilot (and Hughes' good friend) Paul Mantz and aviatrix Amelia Earhart were on hand flying FAI observers in Earhart's red Lockheed Vega. Their job was to certify that Hughes did not exceed the 820 foot limit. The official ground observers were John Drew, Stanley Hicks, Russell Jedland and L. E. Therkelsen.

Many of Hughes' friends and associates were present for the attempt. Representing some of his friends were W. M. Kenman, Charles Connaught, Carlos Wood, Milford Eisner, Edward Simons, Noah Dietrich, Philip Colman, Dick Palmer, Jim Petty, C. F. Lienesch, Bill Perley and Lloyd Miller. Noah Dietrich felt a deep and personal apprehension as he watched his boss climb into the largely untested craft. He always felt queasy when he watched his boss fly. He knew that Hughes had a natural talent as a pilot, but talent is not the same as experience. The H-1 was a beautiful and inspiring aircraft. It was also complex, powerful, and looked to be the most advanced aircraft yet built. Noah was Hughes' right hand man and as CEO of his corporation, ran most of Hughes' business affairs for him. If something went terribly wrong on this attempt he would likely be out of a job, as Hughes had no living heirs or will. While Noah was a businessman and not an engineer, it was not lost on him just how many things could go wrong on a flight like this. Noah perhaps recalled the words spoken by test pilot Jimmy Doolittle the previous year, "... I have yet to hear of the first case of anyone engaged in this work dying of old age."

The aircraft was equipped with an inertial starter that requires hand-cranking. The honors on this morning went to Dick Palmer. The handle was inserted into the side of the plane and at the signal from Hughes, Palmer started the process. Cranking an inertial starter is not an easy task, to say the least. It takes a force of 100 lbs. of force for 40 seconds to achieve the rpm necessary to start the engine. As the flywheel gains rpm, the pitch of the sound it makes gets ever higher. Palmer knew that he had achieved the right rpm by listening to the pitch and removed the handle from the starter. He carefully reached in behind the cowl and pulled the starter engage lever. The engine caught and barked to life. Palmer deftly stepped over the landing gear and moved carefully down the wing. When starting the engine the person cranking the engine is a scant 22 inches behind the prop. Care must be exercised to remain out of its way lest unfortunate things happen.

Howard allowed several minutes for the engine oil temperature to come up to acceptable levels, then taxied into position and advanced the throttle to full power. The sound of the twin row radial engine was deafening. It is a throaty reverberating sound akin to what a thousand lions might sound like if they were all roaring at the same time. The crack of the prop as the tips break the sound barrier wash right through the body. Its awe inspiring roar confirmed to the crowd that this airplane meant business. This was no mere toy to suit a rich man's fancy. This machine had "bark" and one could only conclude that it had "bite" as well. The aircraft accelerated quickly and was in the air and climbing almost immediately. The gear was quickly cranked up after breaking ground and the aircraft accelerated out onto the course.

Dick Palmer watched nervously as the aircraft quickly picked up speed. The aircraft had captured the attention of the nation, and the spotlight was now on. His mind raced through all of his calculations and data. Had he gotten everything right? Was there a misplaced decimal in his math somewhere? This flight would explore speed regions where little was known. He had insisted on both static and dynamic balancing of the ailerons. Would this help stave off flutter at high speed as his

calculations showed? His predictions as an engineer would be put to the test on this defining flight. Some of his early predictions would have proven catastrophic had they not been caught in the wind tunnel. That is why wind tunnel testing is done. He desperately wanted more testing done before the craft was pushed to its limits. Palmer was worried for the safety of his boss in this defining moment, but he was also intensely aware that this flight would define his future. The nation was focused on this project and if things went well his career path would take a much different course than if things went wrong. If catastrophe struck, his career as an aeronautical engineer would likely be over. He would be branded as the engineer that screwed up, killing the world's favorite aviator.

As they witnessed the aircraft streaking through the timing gates, everyone realized that Howard was breaking the record. Nobody had ever seen an airplane go that fast. The H-1 screamed through the timing gates in less than 19 seconds on this first run. Palmer, Odekirk and crew knew that if Hughes could make three more runs posting similar times, then the record would be in hand. The H-1 did not disappoint them. The aircraft only needed four passes, but Hughes did seven. Recorded speeds for the passes were 355, 339, 351, 340, 350, 354, and 351 miles per hour. Odekirk watched with pride and apprehension. The H-1 was the product of his labor. He knew the aircraft intimately as only a man who built it could. He was confident in his team, and proud of their workmanship. He replayed in his mind all the inspections he had done. Had he caught all errors? Was every bolt properly torqued? Had all tools been accounted for? While these thoughts rolled around in his head, Hughes just kept on making passes. They had only planned for four, possibly five passes. Howard was now on his seventh. By the end of the seventh pass, Odekirk was at wits end. He knew that Howard had loaded only the minimal amount of fuel for the attempt. In his delight at the aircraft performance Howard was not monitoring his fuel. He had been contacted from the ground that his average speed was in excess of 350 mph, which easily beat the old record of 314 mph held by the French. With the record in his grasp, Howard decided to push the engine as hard as it would go. He had yet to open the throttle wide open, and was now eager to see what the aircraft could really do.

Howard pulled the aircraft around and lined the H-1 up for another pass. As the aircraft lined up on course Hughes pushed the throttle wide open. The engine responded with a roar - it was screaming unlike anything it had done before. Hughes watched as the airspeed indicator quickly wound up past 300 and still accelerating. The aircraft had soon passed the 350 mark, then 360. The crowd was collectively holding their breath. Soon the aircraft reached 370. Then something happened that Howard had not intended. The thunderous roar of the R-1535 suddenly stopped. The engine had died. Time seemed to play out in stop motion. The aircraft was a scant 20 feet off the ground doing 370 mph with no engine! The rush of the wind was still very great as the aircraft hurtled through the air, not unlike the sound of a modern day jet rocketing through the sky. It is an ominous sound to hear an aircraft streak through the air at those speeds without the accompaniment of the engine. Not quite like the sound of doom, but very close. The crowd gasped - it was obvious that something had gone very wrong. "Goddammit," thought Odekirk, "he's run the thing out of fuel."

Hughes pulled up hard, exchanging airspeed for altitude. The moments suddenly seemed to tick by heart beat by heart beat. He managed to climb to 1000 feet before he was forced to push the nose over to maintain airspeed. It is critical to maintain flying speed, but it is hard for a pilot to push the nose towards the ground when he so desperately wants to stay aloft. The stick forces were tremendous as he had no time to re-trim the aircraft. The situation had turned deadly. He would have to maintain at least 140 mph to keep the aircraft flying, and without engine power could only do that by pointing the nose Earthward. Altitude is precious, and every moment saw more altitude lost. He had little time. The next 30 seconds would demand every ounce of his piloting skill. He was now flying "dead stick" and Mother Earth was beckoning. It was obvious to him that he could not make the airport. Options were few. "Shit!", Odekirk muttered as Hughes dropped from sight, "Now he's going to ball the damn thing up."

Hughes made for a plowed bean field. The best technique for a field like this is to leave the main gear retracted, and belly land the aircraft. He did not have time to lower the gear completely anyway. He knew the ride would turn rough at touch down, and he braced for the shock. Realizing

how critical it would be to keep the aircraft skidding straight, he lowered the rear skid, hoping it would act a bit like an anchor. The approach angle to dead stick an aircraft like this to a successful landing is alarming. He would have just one shot at it. Those on the ground saw the aircraft descend towards the ground and disappear below the tree line. The crowd was panicked. The worst of their fears seemed to be playing out. Howard Hughes had gone down.

Not knowing what to expect or what they would find the crew jumped into cars and raced to the spot, some riding on the running boards. Nobody had spotted smoke, but the sense of emergency found the pack of vehicles making considerable speed. Thankfully, the H-1 had been belly landed with only minor damage. The crew arrived at the scene only to find Howard sitting calmly atop the aircraft jotting down notes in his note pad. Only his closest friends noticed the shake in his hands. His friends and associates were greatly relieved. Everyone knew that this could have ended much worse, even tragically. In a rush of emotion his friend Paul Mantz said to Howard, "You must be the luckiest son of a bitch alive!"

Everyone was elated not only that Hughes had broken the record, but that he had belly landed safely. In fact, very little damage was done, which owes to the fact that the FAI allowed the record to stand. Hughes explained to the crowd that the fuel system had "malfunctioned", resulting in engine failure (more likely he simply ran out). In his usual style, Hughes was quick to credit superior workmanship and good design for the feat. "I was just the guy that rode along," he told them. Someone from the throng shouted out to him that his average speed was 352 miles per hour, and that was a new world record! Howard paused a little while in thought, taking a moment to compose himself and assessing the minor damage to the craft. He finished jotting down notes on the small pad, and replaced it in his breast pocket. Looking up he said simply, "It'll go faster."