

# The Howard 500 History

History Article provided by Dave Cummings



## The Real World Aircraft and its History

The Howard Aero Company was established in 1947, in San Antonio Texas with Durrell Unger Howard as its sole proprietor and Ed Swearingen his first employee. Dee had previously been working on the certification process of the C-46 for one of the first all cargo airlines, Slick Airways.

There were a lot surplus military planes around Dee and Ed landed the job of maintaining a converted Douglas A-26 bomber for the Reynolds Oil Company. At this point in history there were few aircraft that filled the purpose of being solely for use as executive class aircraft, one example was the Beechcraft Model 18.

One day Howard heard the rumble of an A-26 outside. It belonged to a wealthy Mexican man who had told his pilots to go up there and find out where they could get some dual flight controls like the Reynolds plane had. Dee said he knew where to get the parts and they agreed on a price and that the work would take two weeks to install them. While working on the plane, Dee told Ed, "look at the bomb bay of this plane someone is liable to fall right out of it". The plane had a poorly designed stair and the bomb bay was not secured or modified per the standard passenger conversion. Concerned for the safety of those who would ride on this plane Dee went ahead and did the modifications necessary to make the plane safe and in stellar fashion. The Mexican pilots showed up and were pleased with the work, but right away noticed the modifications to rest of the plane, they promptly said, "We're not going to pay for this extra work," Dee replied "Just wait a minute, I was worried your boss might just fall right out of this thing, there is no charge for the work." About a week later he again heard an A-26 rattling away outside. Out stepped a well dressed Mexican man and his two pilots, he wanted to meet 'an honest Gringo, he had never actually met one'. This was the beginning of a great friendship and you know one good turn deserves another. The Mexican was wanted a plane that could fly nonstop from Mexico to New York and provide ample cabin space so that he could actually walk around on such a long trip.

Dee got right to work on it and determined that the only plane that would be adequate would be the Lockheed PV-1 or B-34 Ventura bomber. Lockheed also made a Loadstar L-18 but no way would it have the speed or range to do the job. Most of the military conversions just did not have the cabin space for passengers. The Ventura though had potential and he told the Mexican about it. He was quite enthused after hearing what Dee had to say and said, "So why don't you do it?" Dee replied, "You're talking about a lot of money somewhere near 2 to 3 million dollars to get a program like that certified and get a good flying plane out of it". He told Dee he would agree to a joint venture with him and was willing to invest three million dollars. That was the story of how Dee got into the airplane manufacturing business.



A few years passed and at this point Dee had made quite a name for himself in the corporate aircraft world. If your company needed a fast long-range executive plane then Howard Aero was the first place to look. Dee was able to produce a respectable number of the 250 and 350 conversions. Dee however, was still looking to have the first transcontinental executive plane available. At this point he knew well what his 350's lacked and thought he could build a better mouse trap to make this type plane do what he needed. After all he was smart enough to stick with what he, his engineers, and mechanics knew best and that was the basic Lockheed design.

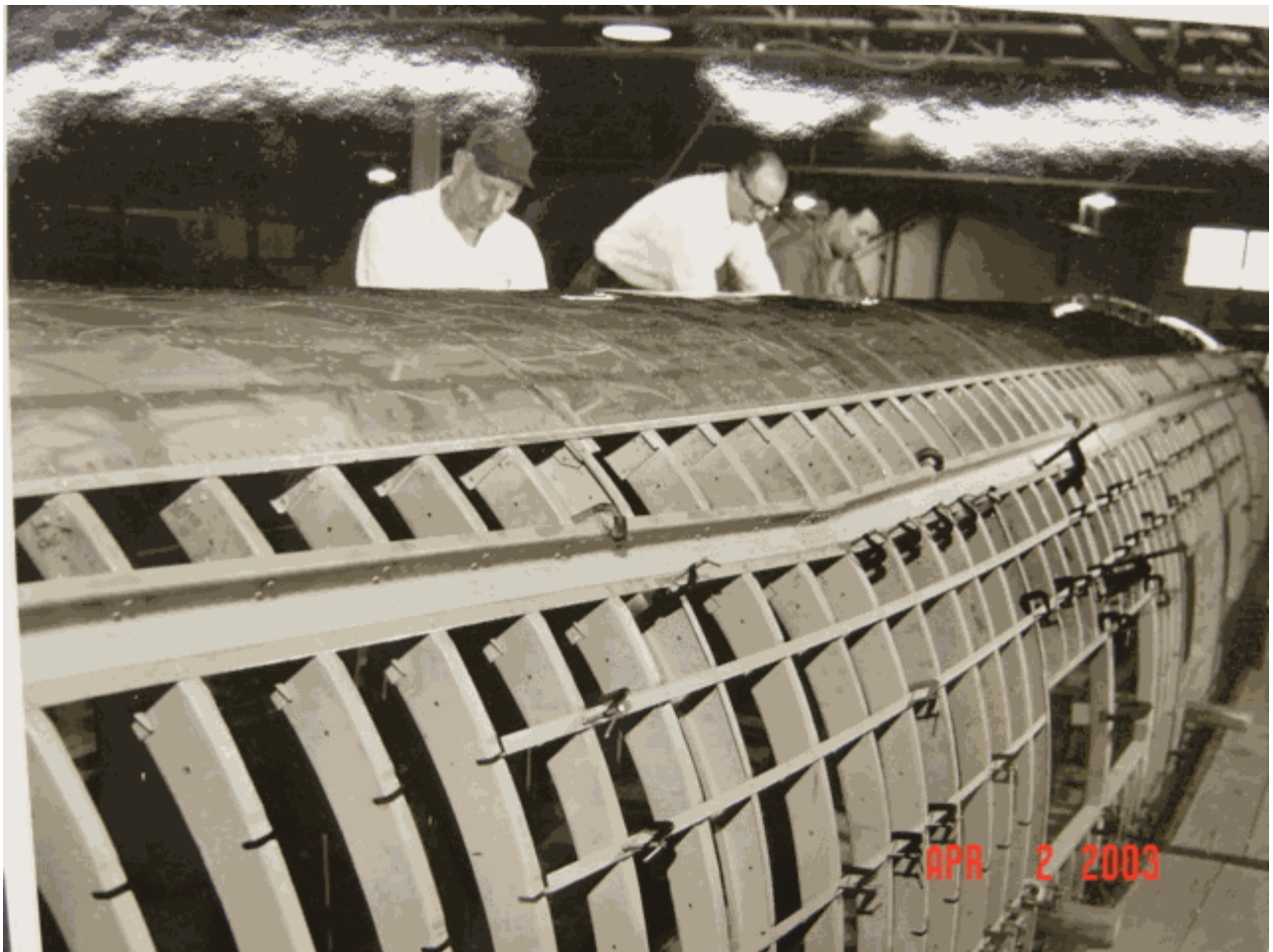
#### **Along comes the Howard 500**

A newer version of the R2800 was being used on the DC-6 aircraft and Dee thought it would be very well suited to the 500. The P&W R2800/CB-17 engine rated at 2500 hp with two stage supercharger and water injected ADI was a perfect choice for the plane. Light weight, at 2390 lbs it put out more hp/lb than most other engines on the market. It was the newest thing out there, having been developed in 1954 -'56 and readily available in 1957 it was produced until 1967.

Dee bought about 30 something PV-1 aircraft from the Canadian and South African Air Forces in order to get the parts he needed to get the 500 in the air as soon as he could. From these planes he would take most of the accessories, engine mounts, tail wheel assemblies, wheels, hydraulic systems and various other small parts. He was faced with building jigs for both the wings and fuselage, but had bought originals from Lockheed in Burbank to use as patterns. While the jigs were being built, improvements on the design of the 350 were being done. The wing needed to be redesigned because the PV-1 wing just ran out of lift and speed at about 20,000ft. The new plane would also need huge wet fuel cells built into it to give the high end CB's the endurance necessary.



The biggest improvement would be that of a remarkable pressurization system, one that would allow complete cabin comfort at 20,000 ft and beyond. The heart of the system would be based on the Garret Air Research engine driven compressor that the early Convair 580 and P-3 Orion aircraft were using. Howard was certainly a believer of the, "lets not reinvent the wheel" philosophy. This way he could get the job done fast and inexpensively. He was like the Japanese with their reverse engineering. He took what was being used successfully and made it better. He was able to pump his new fuselage up to an incredible 7 to 1 differential. This meant at 20,000 ft you could easily have a cabin of less than 2000 ft.



As Dee sat across the street at his favorite lunch place Jims Café with Ed Swearingen, he thought up ideas and drew them out on napkins. He said, "were going to have to accommodate this new engine and get a handle on the weight and balance for the plane, we need a bigger lever". He promptly went back to the office and asked his top engineer how much of an extension the Howard 350 would need to be stretched to give it what he was looking for. He estimated that 4 ft would do it, so 4 ft it was, now the new plane would be 4ft longer. To prove it, with the least expense of time and money he took one of his PV1's and cut it in two. The modified conversion flew weeks later and proved to be a whole new plane. They were very pleased with the performance changes.

The new 500 would incorporate dramatic changes that most believed to be simple conversions to the then PV-1. This is however not true. The most important fact about the Howard 500 is that it is a new aircraft, carefully designed by Dee and his staff. Those that say that it is a conversion know very little about what they are saying or what Howard did. While it is true that the 500 is somewhat of a "highbred" in that it used many parts from other planes. Again this kept cost down and saved time. For example, the propellers are Constellation blades and the spider or hub comes from an F4U Corsair, a # 60 spline 4 bladed propeller. The Landing gear, straight off a PV-2 (the PV-1 gear was just to light for the increased wt of the 500) but with some huge mods such as how it attaches to the airframe.





Concerning the airframe, how could it be that one could simply put glue on an existing PV-1 structure and get it approved as a pressurized plane certified under the then CAR 4B (transport category) certification? That is not only absurd but impossible. You must design around the fact that you are going to pressurize the aircraft. The 500 has a fuselage former every 6 inches. The PV-1 has them about every 20 inches or more much like a DC-3. The designs were indeed similar and one lead to the other, many parts from the PV-1 interchange, but not without some modification. Dee modified almost every part that came from the Ventura. As a pilot/mechanic for 8 years on this particular aircraft and nearly 1500 hours in it as captain I can tell you that there are very few, if any parts that are a direct interchange. I have had to learn the hard way what mods to make on the parts I repair or exchange. It is definitely an on going learning process to be certain. I can see his point of view, or the evolution of each piece as I mess with them or repair them. We all tend to come up with ideas on how to improve a product when we use it for any given length of time. That is exactly what he did with the Model 350 as it lent itself to the design changes found in the 500.



By late 1958 Howard had finalized the design of the 500. Certifying it was another thing as the now defunct CAA gave way to the ever changing FAA. This dynamic institution was trying to figure out how to harness the huge leaps and bounds in aviation that the world had witnessed due to the advancements that WWII and the Korean wars' provided.



The construction of the Howard 500, proceeded with out too many changes in the airframe design, but went through many system, electrical, and hydraulic alterations. It seemed like, as the FAA transport category certification requirements changed, so did the plane and it was tough to keep up with the two. Some of the design features that were required to meet the FAA requirements included; a rudder boost and elevator boost system to aid the pilot in holding the plane controllable during single engine demos. They deemed that 180lbs of pressure was just a tad too much for the average pilot. Next the plane needed a yaw limiting system and compressor disconnect in the event the left engine were to fail. An elaborate AC electrical system provided everything from heated windshields to hot food in the galley. The brakes and gear system are both backed up with nitrogen systems. There are quite a few ways to get the gear down in the 500 and it is one of the fastest deploying gear I have ever seen, in fact you really need to be extra careful when performing a static gear swing as the momentum of the huge gear and wheels will sweep the plane right off the jacks. But in flight it sure is a comforting feeling to see the gear there every time and in record fashion.



The first flight of the Howard 500 took place about may of 1960 and as recounted by Dee Howard, "When we stepped out of the plane I told 'Rusty' (Elton Rust his test pilot) 'I think I might need to go see the doctor, my face is hurting something fierce', Rusty replied, " Do you think it has anything to do with that huge smile you've had plastered from ear to ear since we pushed the throttles forward and raised the gear?", "All I could do was laugh some more" responded Howard.





According to "Cisco" (Bulmaro Alarcon) Dee's shop and field supervisor from 1955 to 1992, Howard built nearly 60 conversions of the 250 and 350 combined. The 500 was built from 1958 to 1963 and only 16 were produced. Cisco was there for the entire Super Ventura and 500 programs.



From 1960 to 1963 the planes were in more or less a limited limbo as they awaited the final retrofits of what the FAA would require for the CAR4B certification. Eventually most of the planes got the certification but at great expense to the Howard Aero Company. The advent of the turbine planes and small jets proved to be too much in the timing game and drove the Howard Aero Corp into near bankruptcy. In late 1963 Dee realized that the future was in these new turbine powered planes, but lacked the capital to invest in it. He agreed to sell half of Howard Aero to an outside investor. He eventually lost voting control of the company and the new owners let it slip away. Dee always says, "I didn't like the deal, but when you're going over the falls you'll hold your hand out to an alligator".



Not for long though, as Dee was ever the creator, he and Bill Lear became terrific friends and Dee helped Bill with his Lear jet project immensely. He was able to come up with a new wing design to help with the in-flight stability problems of the early Learjet. In fact, he built the first mockup of the Lear. He also invented the thrust reversers that are still in use today. He reopened the doors on his new company The Dee Howard Corporation just months later, again he built a name for himself in the conversion of large jet aircraft for which he became world renowned. The company was eventually sold to Al Italia in 1990 and to Singapore Technologies in the past year. The thrust reversing division was bought by Nordam Inc of, Tulsa, OK. The bright orange hangars are still there today on the south side of the field in San Antonio.

Our 500 is currently the only one that is airworthy in the USA. Serial number 105, or number 5, has had a few owners starting with Chicago Gas and Pipeline in the early 60's then they sold it to Southwest Forest Industries in the late 60's. Chicago Gas and Pipeline bought a saber liner jet then they actually bought this plane back because the executives liked the roomy cabin and realized that it really didn't take that much longer to get to their destinations. They paid more for it than they originally bought it for. A new Howard 500 off the assembly line had a price tag of \$565,000. The plane went to Florida and Tennessee in the mid 70's and was supposedly owned by an Elvis Pressley entity for a short period. In the late 70's it was sold to a directional drilling company from California that only flew it once for the owner and then parked it in the desert of Nevada. This is where we found it, having sat for quite a while and only flown for about 15 hours in 10 yrs it needed a lot of attention. We blew the right engine on take off out of cal city airport and took it to Van Nuys on our first flight with it. I went to Everette field in Washington and picked up a Precision Airmotive engine and brought it back to Van Nuys in a u-haul. I put it on and flew it to it's new home in Portland, OR. The owner was in love with the plane and wasn't about to spare any expense on it restoration. Bruce Stevenson, of Portland put his trust in me to do the best job I could with the plane. We started taking it apart bit by bit, fixing the parts, looking each over as we did, learning just what we were dealing with along the way.

I met Cisco Alarcon right away as I had him come up and help me learn as much as I could about the plane. Having maintained and flown

Dehaviland Beavers, DC-3's, Beech 18's, and DC-6's I was able to understand most of the systems from the start, I also had two degrees in aviation which included 727, of all things the Swearingen Metro III ground schools. I was very excited about getting the plane back in flying order so we worked around the clock on the plane and had a lot of 16 hour days. About 2 yrs later, we pretty much had it ironed out and began flying the plane. A few months later our beloved boss Bruce passed away from a heart attack at the age of 52. Our stable of planes, including a second Howard 500 serial number 9, our DC-3 and Beech 18 were promptly sold. I insisted the Howards be sold together as one supported the other. They went to the state of Minnesota and have since been together. They are currently owned by Phillippi Equipment Company of Eagan, MN. The plane is flown regularly, as Tony Phillippi the owner has quite a history of owning planes and is very knowledgeable about what it takes to fly and maintain a plane of this type. What he doesn't know he at least attempts to learn and expresses a genuine interest in. Most of that comes from being involved from an early age in an industry of heavy equipment and construction which primarily consist of dealing with large cranes and such.



**What a Classic!!**

### **Flying the Howard 500**

Well since much of my back ground is night freight and bush flying in Alaska, I would liken the Howard to an Airliner in cruise, nice smooth and quiet, very tame. But once it touches down, it is like throwing a saddle on a grizzly and spurring the hell out of it. You just don't know what will come next. It is no beginners plane and demands a pilots utmost attention all the way to the end. In deed it is a thoroughbred, it just really wants to go. When taxiing it will go 30kts in a heartbeat unless you learn to tame it from the start. It requires a lot of lead time for everything you do, turns, stops and roll-out. **On take off you must lead the left engine by as much as 20" MAP in order to stay on the runway.** There is a point where brakes have no more effect as it will just drag the locked wheel along for the ride to wherever you are telling the engines to go. It wants to follow those 12 ft paddles where ever you point it. **When you are approaching 50" + MAP up to 58" MAP you have to have it stabilized.** It all happens very fast and the beginner is overwhelmed with the information you need to interpret in a matter 10 seconds or less. I scan and verify all the engine instruments one against the other, check flight instruments, set power in smooth increments and determine if the take-off is a go in less than 10 seconds. While I am doing this I have to watch where I am going and give commands to the copilot. You really have to have a feel for these larger radials when you spool them up as they are much like a turbine waiting for them to make power as the supercharger kicks in. **The moments in the Howard are so large that there is just no room for error. When going through a transition period, you are the most vulnerable prior to the tail coming up.** It is at this point in the roll you just don't want bad things to happen. For example, a few years back we were just leaving to go to Oshkosh. As we came through 90kts the right engine blew an intake tube right off the jug. This unleashed nearly 60" MAP out one tube. The mixture ignited and blew a flame ball a good 8 ft out through the pressurized cowl and in front of the plane. Exciting to say the least, not to mention that now I had to deal with the huge moment created by instantly loosing 2400hp in a 35,000 lb taildragger! Imagine what's running through your mind. You're sitting there not knowing what happened, trying to figure, well what the hell.... In the meantime you're running out of runway, if you

don't react immediately you're screwed, there is no room for complacency You really have to be ready for anything. I just wiped everything out and got on and off the binders and we taxied back to the hangar replaced the tube and two hours later we went on to Oshkosh. There is a lot to be said for being a pilot-mechanic when you fly the Howard. There have been many instances where we would have been stranded if not for that.

In the event we are using water, the ADI system, we can push the throttles up to 58" MAP. The significance of using the ADI is that we gain an extra 400 hp on take off. That can be nice on a hot summer day with a heavy load. In our plane we use an equal mixture of methyl alcohol and distilled water, to that we add a few ounces of water soluble oil. The alcohol keeps the water from freezing up at altitude. Using distilled water means that it will not have any unwanted minerals in it to leave deposits in the lines pumps and regulator. The oil keeps the valves and moving parts lubed due to the fact that the alcohol is so corrosive. The entire system is stainless steel and uses high performance teflon coated lines. This is a fragile and high maintenance system. The Idea of the Anti Detonation Injection for those that aren't familiar with it, is that it allows us to use much higher manifold or power settings for takeoff than we normally would. Engines make their power at the top end, they need more fuel and air, increase the size of the pump, how? More rpm or more manifold the problem with this is that the poor pistons and jugs can only take so much heat. They begin to glow and will burn the fuel air mixture as soon as it is introduced or detonate. The water is introduced by a water regulator and metered directly into the fuel feed valve, that goes directly into the blower section and out the plenum to the jugs. **With about an 8.5 to 1 compression ratio and 2804 cubic inches there is a lot of air/fuel being moved here.** If you were to think of the fire in the jug as out of control this just helps to bring it back. Put a little water on the fire. If you run out of water or have a blockage you have about 2 seconds or less to catch it, this is not an exaggeration, bad things will happen and you will find parts of the inside of that engine strung out along the flight path of the plane like right now. So running the ADI properly and understanding what is going on in there is very important.

**The plane rotates at 100kts but I have found that if I carry an extra 5kts it has a much more responsive positive rate instead of mushing as we attempt to gain speed. It is no short field plane as it is a 120 knot final plane.** It has very high wing loading which gives it great cruise. To give you some perspective, a DC-3 maxes out at 26,900lbs and has a wingspan of 95' 7", the Howard weighs 8000lbs more and has only 70'4", that's 27% less wing.

**On take off we accelerate from 105 to 120 flaps up and on through 170kts depending on our weight we can climb as fast as 200kts.** For those of you that are multi-engine minded our **Vmc is 95kts with the bad one caged.** It doesn't matter much what speed we pick it is mostly weight that dictates the climb rate. We carry as much as 9300 lbs of fuel so there is a big swing in speeds. **In general 160kts is good and gives a rate of about 1200 ft to 1500 ft per minute.** We usually climb to about 9000 ft on short trips of 100 to 150 miles. If we go say 300 miles we go on up to about 15,000 to 16,000 ft. For long hauls of up to 1500 nm we play the winds aloft and like to go to about 20,000 - 22,000 ft. The cabin at these altitudes stays about 2500 ft if we don't go above FL220, above that it begins to drop off to about 4500ft at FL250.

**On the way up to 19,000 ft for instance it takes us about 18 mins to get there and we consume about 160 gal of fuel per engine (total 320 gal.). Climb power is 38" MAP and 2400 RPM. We burn about 160gal/hr per engine on climb.** As we go through about 12 to 14, 000 ft we shift the blowers from low to high. We try to use them on almost every flight if you don't use them you loose them. The clutches gum up and stick. Once this happens you'll never get them out without pulling the rear case. I have had to do that more than I care to so I try to use the blowers often. When you shift, the entire plane rumbles and shakes, you need to notify the passengers what is going on lest they think we just lost the left main gear or something. I must admit it's fun to be up there where you wouldn't expect a radial engine plane to be. Often we will hold at like 18,000 or something while we wait for crossing airliners descending or climbing to or from their destination. When they look out the window and see this big oversized beech 18, as most think it is, at 20,000 feet they are quite surprised they usually get right on the radio and ask center, "what the hell was that we just passed". **As we level out we gain speed to indicate about 200 to 210 knots which gives us a 260 to 270 knots true.** We lean back to auto lean then to peak on our BMEP and back another 2 to 12 drop below that. This gives us **about 50 to 55 % power at 32.5" MAP and 2200 RPM. The adjusted fuel flows are now about 91gal/hr per engine. Our props settle down to a quiet 990 RPM** and we usually switch tanks to the wings or rears and put on the tunes to enjoy the rest of the flight as the noise level comes down so much that we don't have to have headsets. We do not have an autopilot due to the expense of a one time STC, but no bother I never had that luxury when I flew automotive freight either. It keeps you on your toes anyway.

On descent from FL190 we would like to start down at about 95 miles out. Our speeds go through the roof on descent as there is no mechanism for stopping the effects of gravity, at least on this plane. We just can't pull the power back to "flight idle" like our turbine driver friends, we have 36 screaming cylinders out there in 30 degree below temps. So **we come back about 1-2" MAP and enjoy the ride.** (Actually leaving it right about at cruise with the increase in ram air pressure) Remember, again I am the same guy that has to change the cracked cylinders. **Typical ground speeds are in excess of 320 knots, and this persists all the way down to about 8000 ft where we hit thick enough air to slow us down to about 250kts.** If we don't get held up to the end (by center or approach) we stand a chance of coming down in time to land. Now this takes diplomacy as well as knowing what the plane is going to do. We first have to give a lesson to the controller or approach to explain that, "No we aren't a Hawker" and "sorry I can't do much about the 300+kts, so how low can I go?" It is like a circus for us to go into a place like O'hare or JFK. It's more like "move over... we're coming through". I once landed in Billings Montana, kind of behind a NWA DC-9, but really we ran a big circle around the 9 then landed. The air is thin at altitude and we just couldn't slow down. Approach held us up and asked us what type of plane we were. We explained it, or tried to, next he informed us there was a Northwest DC-9 20+ out for the field and that he would be number one, we were only 18 miles or less out coming from the opposite direction and we had to go to the other side to line up for final anyway so it seemed feasible that this should work out. Well I told the controller I needed to get down really quick here or I would be running over the inbound 9, he told them to keep their speed up as there was an older radial engine plane about to over take them. They said, "what did you say"? just about then we came sailing along on their left

side and did a left break back around to final to fall in behind. This was at about 6 mile final and they were still clean and keeping their speed up so we could keep the spacing. It was just so funny to see them look back at the Howard. I could see the captains face out the window as I turned, we were the only two planes around. After we taxied in and started fueling for our next leg these two NWA pilots came walking up to us saying that they couldn't believe their eyes when we came by at 240kts. I said," yeah and I had her throttled way back trying to slow for you".

On the side of our plane there's a little nose art depicting just what I described to you. We are right behind a jet trying to fit in, but having a little trouble slowing, so Donald Duck is helping to direct traffic. The depiction is twofold, one being the speed thing the other has historical significance. The early Lockheeds that were in the military commonly had nose art depicting Disney characters. So we wanted to find something that fit into the best of both worlds. From my perspective it makes perfect sense.

We usually intercept the localizer 12-15 miles out at 220kts and try like hell to slow to 190kts so we can get the gear down and get in line. The next number is the 170kt mark once we get to a few miles outside the marker, once we get there we are good to go. Flaps can all come down at 147kts and it slows right down to 135 once deployed. The plane is definitely designed to be loaded aft so it is a bear to land if there is no weight in the back. We usually ask all single passengers or a pair go to the last row and sit so we can land slower and use less braking. With a 40 ft long cabin it makes a huge difference if they're all huddled up front trying to watch the landing at a short field, short being anything under 5000 feet.

It is tough to stop 30,000+ lbs with nothing but brakes, especially when you're the guy that's going to change them. I am extremely protective of the brakes since they are very rare, just tough to get a hold of. They are from a Constellation L1649 and it seems as though most of them have been snatched up to supply the few operating Connies with their cache. We get the leftovers from what they don't have stocked or have not located. I spend a lot of time trying to find the Goodyear brake pucks that we need. Our plane flies every few days not just air shows, our boss thinks he bought a King Air and it goes out all the time.

On short final the copilot calls out speeds, and altitudes, monitors the corrections needed for the approach left, right, up and so on. We figure the final speed according to our weight, in general about 105 over the fence. With a nice stable approach of about 800 ft/min going we having to leave enough power to keep the tail flying, if you cut the power your dead, the tail will quit flying and your going to be polishing your teeth on the runway, so the power stays in. As soon as the mains touch, preferably with in 500ft of the numbers, the copilot wipes out the power, opens the cowl and leaves the flaps down as it helps in aerodynamic braking once the tail is lowered. We always wheel land a plane of this weight. In the event you make an error it is easier to go around and mostly if you drop it you won't snap the tail wheel off, there is just too much weight for that little tailwheel, something would have to give. You have to be patient as the plane rolls out so that the speed dissipates and you can transition to brakes. While on the mains you test the brakes to be sure they are equal in application and go ahead and get on them for a couple seconds then off to allowing cooling, then back on near the end again. At large airports of the international type I never even use the brakes on the runway. This is accounting is just at fields of less than 5000 ft.

After landing we answer the towers questions about this "taildragger Hawker" You see on their strip they see **HW50, the planes FAA designation, and the 300+kt speed and they get all confused.** Therefore, most of the time we are deemed a Hawker, a lot of times they start calling out like a mother bird looking for their young "where's the Hawker, and who are you guys?" it can be pretty funny sometimes. Then we taxi in to the FBO to join the ranks of the heavy metal GII, III, IV's, and countless Citations. We run the Darton Clean Kits (our oil recovery system) for about 10 mins to help put the oil back where it belongs in the tank until we preoil again for the next start.

Maybe we don't have the most glamorous uniforms and all, but we work hard to keep this piece of aviation history flying daily and do our best to fit in at Millionaire or Signature. Don't be afraid to stop by and say hello when we show up on your ramp.





**The Howard 500 at Home**

**More interesting history at Michael Zoeller's Lockheed Twins site [here](#)**