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FOR THE PILOTS OF OWNER-FLOWN, CABIN-CLASS AIRCRAFT

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Howard 500

Vintage Cabin-Class Twin
Embodies Artistry & Power

**Delivering Hope: Owner-Pilots Play
Critical Role Following Hurricanes**

Wake Turbulence: It Can Happen At Any Altitude

Seeing the Future with Vertical Profile Radar

Miller: Do You Know Your Limitations?

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Jay Selman Photo (www.jaybirdaviationphotos.com)

Howard

For the first time since it had arrived at Oshkosh AirVenture 2017, the big blue-and-silver beauty was not surrounded by throngs of gawkers. Only curious stragglers, captivated by the machine, wondered aloud what it was. Upon learning it was a Howard 500, most assumed that Howard Hughes, Hughes Aircraft, or the Howard Aircraft Company (builders of the single-engine Howard DGA) were involved. None were, though its elegance easily conjures up such romanticized imagery.

Mechanical Artistry

The Art Deco period ended as WWII began, but Dee Howard seems to have been a fan of the era's unmistakable panache. The decommissioned military aircraft he and his famed mechanic Ed Swearingen built ushered in upscale executive transportation. Their ever-evolving series of conversions, focusing mainly on the Lockheed Lodestar and Ventura models, seemed to ooze art deco styling. Howard Aero Corporation's swan song was a design Howard hoped could compete while retaining unparalleled luxury.

Through obsessive persistence, it became the first pressurized, cabin-class, bizliner with transcontinental range. Sadly, even Mr. Howard admitted, it came a decade too late. The design was finalized in 1958 and conversions of PV-1/B-34 Ventura airframes began in 1959, concurrent with the process to certify the Howard 500 as an independent type. The HW-500 was not a conversion in the truest sense. Design and engineering changes imposed upon donor airframes were so extensive that the final product was a whole new aircraft, including unique flight characteristics, systems, performance and operational parameters.

Fuselages were built new, incorporating a 48-inch stretch and major structural changes necessary for pressurization. Huge double-pane windows, a three-panel windshield, a vault-like cabin door, and a fully enclosed aft lavatory were designed in. Under the floor, two massive baggage areas resided where the Ventura's bomb bays had been. The typical 12-passenger corporate configuration included



by **Matthew McDaniel**

folding tables, divans (couches), galley and numerous stowage areas. Although, in a high-density configuration, it could carry 19 passengers.

The all-new wing center-section incorporated additional tanks for fuel, oil, deice and engine anti-detonation fluids. This wider and stronger wing spaced the engines further apart, lowered cabin noise, incorporated redesigned fowler flaps, and provided a wider gear stance. Pratt & Whitney R-2800 engines (the same 18-cylinder radials used on the DC-6 airliner) produced

a total of 5,000 hp (20 percent more than the PV-1). Two-speed superchargers boosted manifold pressure to 62 inches for takeoff and kept it well above sea-level power through the entire altitude envelope. Power was converted to thrust with 11-foot, Hamilton Standard props made up of Lockheed Constellation blades, modified Corsair hubs and DC-7 spinners.

The extra weight was carried using strengthened gear from the heavier PV-2 Harpoon with massive brakes adapted from the DC-7 (including an analog anti-lock system). Every flight control, mechanical, electrical, pneumatic, and hydraulic system was redesigned for increased reliability and redundancy. In the end, the only commonality between a WWII production PV-1/B-34 and the Howard 500 were the outer wing panels and the tail feathers.

Certification Purgatory

Howard's team worked and waited from 1959 to 1963 to achieve type certification of the HW-500. Meanwhile, large competitors (propelled by massive budgets and infrastructures earned as the spoils of

Front office of the Howard 500: One of the busiest throttle quadrants to be found on any twin.





The elegant lines of the Howard 500 are apparent from nearly any angle. The distance between the aft belly and the ground is not nearly as close as the grass parking spot makes it appear.

wartime contracts) sailed their new turbine business aircraft designs through certification with relative ease. Concurrently, 17 Howard 500's were produced. Yet, even among those, Howard and Swearingen were still tweaking the design, essentially building highly individualized, handcrafted aircraft. Thus, no two HW-500's were exactly alike (further complicating certification).

Even before certification, the HW-500 found itself competing against new turbine aircraft designs already dominating the marketplace. It wasn't the performance of those aircraft that sealed the fate of the HW-500. In fact, the Howard's performance could best that of the early cabin-class turboprops. However, the comparative ease of maintenance offset any minor



The distinctive twin tails of the Ventura did not need to be enlarged to deal with the higher weight and horsepower of the Howard 500, thanks to extra 4 feet of length designed into the 500's fuselage. The 13th Howard 500, N500LN, in its natural element.

performance deficiencies and the smaller, less-opulent cabins of the turboprops. While the Howards required many hours of maintenance per flight hour, the competing turbine aircraft

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operated routinely using the opposite equation. Time had run out to bring a truly standardized production version of the HW-500 to market. The process did provide the HW-500 one distinction it is likely to retain forever: it was the last radial-engine, passenger aircraft to be FAA-certified in the Transport Category. In future ventures, Dee Howard and Ed Swearingen would both continue to leave indelible impressions in the aircraft design, modification, and manufacturing fields for decades to come.

Some purchasers wouldn't accept their plane until the design was officially certified as an HW-500, which didn't happen until February 1963. Buyers who'd taken delivery upon completion, received a "Pressurized PV-1 Ventura" conversion. The assumption being that once certification of the Howard 500 was complete, re-certification as HW-500's would be a simple paperwork exercise. In most cases this happened in 1963-64, but in at least one case, it never happened.

N500LN (Howard 500 Serial #500-113)

Most of Howard Aero's PV-1 donor aircraft were ex-South African Air Force (SAAF) aircraft (some with actual combat histories). The 13th PV-1 to morph into an HW-500 was Lockheed serial No. 5560, which began its military life in September 1943 as SAAF ship #6417. It accumulated only 827 total airframe hours before acquired by Howard Aero in late 1959. Its transformation was completed in Nov. 1962. Five owners and registration numbers later, it was exported to England in 1978, where it remained under the U.S. registration N500LN for 30 years. Today, it is one of only two Howard 500's still airworthy, both owned by Tony Phillippi of TP Aero in Minnesota. Both are still actively flown as corporate aircraft, supporting Phillippi's equipment and export businesses.

The first operator accepted delivery before Howard Aero officially achieved certification of the HW-500 type. So, it was delivered as a "Howard Super Ventura" (in Howard Aero's marketing lingo). Apparently, the original buyer (nor any subsequent owner) felt the need to complete the paperwork after the HW-500 type certification was completed. Thus, when it returned to American soil in 2012, it did so still officially designated a Pressurized PV-1 (L-B34) in the FAA records. TP Aero has owned and actively flown the only other flyable Howard 500 (N500HP, the fifth of the 17 HW-500's) for the past 15 years and employs the only active, type-rated, HW-500 pilots in the world. In order to fly both aircraft using their existing HW-500 type ratings, they successfully convinced the FAA to allow N500LN to be operated as a HW-500, based upon the fact that (official certification notwithstanding), the aircraft conforms to the HW-500, rather than the PV-1/B-34 it was derived from.

Since its purchase in 2009, N500LN has been thoroughly restored. While still in Europe, it received new engines and extensive mechanical work before touring parts of Europe and crossing the North Atlantic. The restoration was completed in the United States, concluding with new paint and a brand-new interior (that exactly matches the original and retains that Art Deco style). Attention to detail is apparent everywhere you look and stepping aboard is like walking into a time warp. N500LN personifies the belief that the journey is more important than the destination.

The Howard 500 was unique from its Ventura lineage right down to the rudder pedals.



High Pilot Workload: The Cost of Going Retro

After walking through the long, stand-up cabin and stepping over each of the three beefy wing spars, I climbed into the cockpit and sat for a long time. Taking in the placement of controls and instruments, I tried to imagine workload flows for various phases of flight. Buttons, knobs, levers, and switches blossom like wildflowers on a prairie. The workload in the ergonomically-designed, glass-cockpits of today is laughably simple in comparison.

Ryan Mohr was instrumental in the acquisition of N500LN. While he currently flies Boeing 737's for an international airline, he is also still a current HW-500 captain. Mohr soon arrived to help me better decipher the checklists and preflight items. At times, the uniqueness of each Howard 500 would present itself as we'd reach an item on the checklist that caused a pause. Mohr commented that some items only applied to

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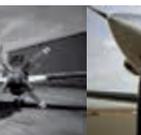
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The new center section of the Howard 500 allowed the huge fowler flaps to be redesigned and enlarged when compared to the stock Ventura flaps.

Phillippi's other HW-500 (N500HP) or vice-versa, based on minor differences between the two machines. Afterward, he deftly started the massive radials as only an experienced round-engine master can. With virtuosity, his hands moved between throttles and mixtures, while his fingers danced between starter, primer and magneto switches, as blue and white smoke belched from the stacks and low-pitched snorts announced the R-2800's reawakening.

I was warned that the brakes were quite sensitive. Maneuvering out of AirVenture parking, I was humbled immediately as I curled three toes of one foot to apply some differential brake pressure and the 500 lurched abruptly in protest. But, by the time we'd reached the runway, I'd adjusted and found her surprisingly nimble to taxi (careful attention to its size notwithstanding), if kept slow to reduce the directional instability inherent to all taildraggers.

For takeoff, one cannot simply firewall the throttles and go. At low speed, the P-factor of the 5,000 HP cannot be overcome with rudder pressure. Throttles must be advanced slowly,

leading with the left by 15 inches MAP or more, to allow the Howard to accelerate and get enough airflow across the twin tails to compensate for left turning tendencies. Only after the tail is flying can matching power be applied to the right engine without fear of a runway excursion.

While the Howard is about the same weight as a DC-3, it has over 40 percent less wing area and double the horsepower. Rotation (V_r) and takeoff decision (V_1) speeds are both 98 KIAS, while the single-engine takeoff safety (V_2) and liftoff speeds are 111 KIAS. However, 130 KIAS is considered a more practical initial climb speed to provide appropriate engine-failure safety margins.

Thanks to Mohr's coaching, the procedure was straightforward and the technique is similar to a soft-field takeoff in any small aircraft. It helps that the Howard's robust landing gear retract in under three seconds, which could be critical in reducing drag in an engine-failure scenario. While there is an auto-feather system, it takes about 10 seconds to fully feather the offending prop. So, the rudder-boost system is critical in single-engine situations, where it can reduce required rudder force by as much as 85 percent.

Kid Gloves

While the two remaining Howard 500's still fly whenever duty calls, they are no longer expected to perform like youngsters. Their pressurization system was state of the art for its time, with 6.75-psi that provided sea-level cabin

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The aft end of the Howard's cabin features a large, fully-enclosed lavatory with a running-water sink.



The stand-up cabin of N500LN accommodates 12 passengers in executive-level comfort. Each set of club seats in an executive-configured Howard 500 cabin included a stowable work table and cup holders to complement the adjustable leather seats.

altitudes at 16,000 feet. Even though they are capable of cruising at FL250, typical cruise is kept in the low flight levels or below. This allows minimal pressurization to be used, putting far less strain on the fuselage, window and door structures. Similarly, the need to use engine "high blower" supercharging or alcohol-injection is rare, greatly prolonging cylinder life and reducing overall engine maintenance. Operating on 100LL fuel slightly reduces the max takeoff MAP permitted, as well. While all systems on Phillippi's two Howard 500's are fully operational, there is full recognition that these machines are pushing 60 years old and they are operated accordingly.

Under the close supervision of Mohr, I climbed at 150-160 KIAS to 14,500 feet. Using sedate power settings, we still achieved near 225 KTAS, while consuming just under 200 GPH (with two pilots, five passengers, and a week's worth of Oshkosh cargo aboard). Flying the Howard is pure joy. The aircraft is relatively quiet due to its slow-turning, geared props. Control harmony is near perfect. The hydraulically-assisted rudders are easily manageable throughout the speed envelope. Aileron and elevator servo tabs provide aerodynamic assistance to keep both controls light while retaining just enough required break-out force to keep them naturally neutralized. Each yoke is equipped with electric pitch trim, yet I found that fine-turning was far easier via the manual trim wheel. Monitoring the engine and fuel parameters is challenging due to the chaotic panel layout,

but after a while your eyes begin to dart around as necessary to gather the desired information.

On descent, engine temps were the primary focus. Mohr coached me on power settings to use and did most of the other engine management tasks (mixtures, cowl flaps, oil cooler doors, carb heats, etc.). He schooled me on appropriate times for gear and flap extension to be stabilized on final. I then slowly decelerated to cross the threshold at 105-110 KIAS. Mohr advised that the combination of big tires and short/stout gear legs made "greaser" landings rare. Sure enough, my landing was no greaser, but the big beauty was not unruly by taildragger standards. I'm sure in more challenging conditions, it wouldn't hesitate to bite if provoked or neglected. Like any taildragger, it requires an engaged PIC all the way to the parking spot.

Passion and Reverence

The time of art-deco, radial-engine bizliners is long past. Therefore, operating a mini-fleet of them for modern-day corporate transport is far from practical. However, Tony Phillippi and his pilots and mechanics are positively reverent toward Dee Howard and the aircraft he created. The majesty and engineering brilliance of the Howard 500 fuel their passion to keep the last two flying for the foreseeable future. Alas, the practicality and passion of such lofty endeavors are mutually exclusive.

T&T



Matthew McDaniel is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 25 years of flying, he has logged nearly 16,000 hours total, over 5,500 hours of instruction-given, and over 5,000 hours in all models of the Cirrus. As owner of Progressive Aviation Services, LLC (www.progaviation.com), he has specialized in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. Currently, he also flies the Airbus A-320 series for an international airline, holds 8 turbine aircraft type ratings, and has flown over 80 aircraft types. Matt is one of only 25 instructors in the world to have earned the Master CFI designation for 7 consecutive two-year terms. He can be reached at: matt@progaviation.com or 414-339-4990.