

N410RV. The engines, exhaust systems and props are identical: IO-540-D4A5, 'system 3' exhaust, Hartzell 80" blended airfoil. The results are in Table 1.

In Table 2 are results of an earlier comparison between Randy DeBauw's N610RV (the second RV-10 completed by a customer) and our own N410RV. At the time, both airplanes were equipped with the IO-540-D4A5, 'system 2' exhaust, and a standard Hartzell propeller.

TABLE 1: N104ME/N410RV COMPARISON

	TRUE AIRSPEED	DENSITY ALTITUDE	AIRCRAFT WEIGHT
N104ME	208.6 mph	8664 ft	2268 lb
N104ME	206.8 mph	9527 ft	2268 lb
N410RV (KK)	208.5 mph	8079 ft	2201 lb
N410RV (KK)	208.9 mph	8094 ft	2175 lb
Van's Literature	201 mph	8000 ft	2200 lb

TABLE 2: N610RV/N410RV COMPARISON

	TRUE AIRSPEED	DENSITY ALTITUDE	AIRCRAFT WEIGHT
N610RV	198.0 mph	8280 ft	2251 lb
N410RV (KK)	201.7 mph	8616 ft	2203 lb
N410RV (RV)	203.1 mph	7771 ft	2148 lb
Van's Literature	201 mph	8000 ft	2200 lb

RV-10 PROP EVALUATION

I was getting ready to fly an RV-9A ride when I heard an engine running and looked up and saw a beautiful red and white RV-10 taxiing into Van's parking lot. My prospective customer was promptly left in a few minutes of lurch, as everyone in sight gathered around the newcomer. Other than Randy DeBauw's RV-10, which was test flown at Aurora, this was the first builder-completed Ten to visit the factory.

It turned out to be the work of Vic and Carol Syracuse, from Locust Grove, Georgia. While they climbed out and greeted Van (who was as interested as anyone to see a new RV-10) I gave the airplane a quick look. Doors fit well, elevators float smoothly, fairings look good. Nice job. That three-blade MT prop sure gives it a different look...I wonder how that works? So did Van, I guess, because when I returned, he was climbing in the driver's seat of N64VC and Ken Krueger was preflighting N410RV. A few minutes later they were off to compare prop performance. Here's Van's report:

As reported elsewhere in this newsletter, we have had the opportunity to evaluate our prototype RV-10 with two different Hartzell props and three different exhaust/muffler system. Interesting comparative data has been recorded and evaluated. Recently, we had the opportunity to conduct an in-flight comparative evaluation of our currently configured RV-10, and a homebuilt RV-10 equipped with an MT three blade propeller

We have always favored side-by-side in-flight com-

parisons because this method neutralizes atmospheric factors. Unfortunately, in this instance where propeller performance is the objective, we have to contend with the possibility of differing engine and airframe factors affecting results.

BASELINE AIRCRAFT: N410RV – built by Van's Aircraft. This is the original RV-10, built from kit parts to kit plans. It is equipped with a factory stock Lycoming IO-540-D4A5 with the standard dual magneto ignition and a 'system 3' exhaust system. Rated HP as listed in Lycoming literature is 260 @2700 RPM. The propeller is the latest 80" Hartzell Blended Airfoil prop.

COMPARISON AIRCRAFT: N64VC – built and flown by Vic Syracuse. N64VC is a homebuilt RV-10 which exhibits a level of finish workmanship comparable to our professionally-built factory prototype. Its engine is also a Lycoming IO-540-D4A5, but in this case it was provided by an engine overhaul shop specializing in "performance-enhanced" engines. It has 9.5 to 1 compression (rather than the stock 8.5 to 1) and an ignition system consisting of one magneto and one Lightspeed Plasma electronic ignition. In addition, it has been specially balanced and the induction system had been ported and polished. The engine supplier stated that it developed 310@2800 RPM on a dynamometer test. (This is probably the place to remind you that the RV-10 was designed and tested for a maximum of 260 horsepower. As spelled out in the feature article in the sixth '04 issue of the RVator, more powerful engines may cause higher speeds which would impinge on the safety margin built into the RV-10. This could result in unsafe operation and possibly flutter — see also the article on first '05 issue...ed.)

The propeller is a 3-blade MT MTV-12-B/193-53 with the typical MT composite-over-wood-core blades.

EVALUATION CRITERIA

Because of limited time available for test comparisons, we performed only one flight in which we endeavored to measure relative performance in a common cruise condition. The tests were conducted at 8500 ft. pressure altitude, because that is near the optimum cruise altitude and because it is the lowest altitude which produced smooth air at the time of the test. Engines were operated at full throttle, 2500 RPM, and leaned to best power. Both aircraft were flown at approximately 2400 lbs.

Results: In side by side level flight, N410 RV required a power setting of 0.3 in. MP less than Vic's N64VC. At full throttle, N410RV slowly pulled away, demonstrating a speed advantage of just over 1 mph. Pretty darn close.

Vic and Carol Syracuse, Locust Grove, GA



OUR EVALUATION

The engine in N64VC probably produces more power than the engine in N410RV. How much more is the question. The higher compression ratio most definitely will add some power. The electronic ignition can add power under certain conditions, especially at quite high altitudes where its automatic timing advance would be beneficial in maintaining optimal power output. The engine balancing should contribute to lower internal energy losses. The polished induction components should promote more mass flow, a greater combustible charge and thus greater power output.

DATA ANALYSIS

Best Case: N64VC's power output is at least as great as that of N410 RV. On the basis that both engines were developing the same power, the 3-blade MT prop causes a 1+ MPH speed loss.

Randy DeBauw, Lake Oswego, OR



Worst case: On the basis that the engine in N64VC was capable of developing 310 HP @ 2800 rpm, it should result in a 12 mph greater top cruise speed with a given prop. Factoring in the test conditions, N64VC should have been 10 mph faster than N410RV, not 1 mph slower as we found it to be. **This would mean an 11 mph speed loss because of the MT prop.**

Conclusion: The Hartzell 2 Blade Blended Airfoil prop is more efficient

and delivers more speed than the 3 Blade MT. Exactly how much more speed could not be precisely determined because of the uncertain HP rating of the engine on which the MT prop was installed.

Now, don't kill the messenger: We only report the data. If the engine is developing the claimed power, then either the prop and/or the airframe is deficient. If the MT prop is as efficient as the Hartzell and the airframe is aerodynamically clean (as it appears to be), then the power output can't be as high as the shop claims. It might be some combination of the two. Either way, someone's ox will be gored, so don't blame us.

WHO CARES?

We do; just for the benefit of that bit of technical knowledge. But we don't expect everyone to care. Performance data is just one factor to be considered when making a propeller choice. It is a choice, *not* the sole basis for a choice. We have always thought that the Hartzell 2-blade metal prop in 410RV was very smooth, but the three-blade MT is noticeably smoother still. Some people really, really, really like the appearance of a three-blade prop. How much are these non-measurable qualities worth?

In the real world, performance is not the only parameter affecting a prop choice.