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DENNEY AEROCRAFT KITFOX IV



Of basic airplanes and easy flying, Dan Denney remembers.

SWEET

BY MARC E. COOK

all it the confection method of airplane design. Tasty, bitesized, and, as one cookie maker is wont to point out by saying "Pepperidge Farm remembers," a bit nostalgic. No question, the homebuilt Denney Aerocraft Kitfox, whipped up in Nampa, Idaho, and cooked in your own kitchen, is for those who like the taste of flying to be sweet and simple. A fabric-covered fuselage, topped by a generous helping of bestrutted wing, surrounds two adventurous souls; even the crustiest pilot soon finds himself with a mouthful of grins upon shaking of the Kitfox's stick.

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Since its 1984 introduction, the Kitfox has been selling by the baker's dozen; apparently its yesterday's-wings flavor and shortbread simplicity have whetted many a pilot's appetite. At press time, more than 1,300 of the kits had emerged from the factory, and of those, more than 600 have risen to flight; that is a completion record even Betty Crocker could be proud of and one that easily bests the best in the experimental-aircraft world. Part of the high completion rate surely has to do with the low build time—approximately 500 hours, according to the company.

An idea originally cooked up by Dan Denney and partner Dean Wilson in 1981, the Kitfox design first took form as the bite-sized kit-built Avid Flyer. Denney helped pen the Flyer and, seeing the company heading in directions not of his liking, split off to build the Kitfox. Denney's own airplane, he says, represented a significant evolution of his original recipes. The first Kitfoxes scampered from Denney's den in 1984; the company three years later broke camp and set down in

PHOTOGRAPHY BY MIKE FIZER

Nampa. Denney has had to expand its headquarters three times since, the final time to make room for a shop to build completed Kitfoxes for overseas consumption.

Whith the company's sales burning up the spreadsheets, one might assume product improvement would take a back burner to new paint schemes and brochures. Not so with the Kitfox. Denney and crew have folded into the Kitfox's stout basic design a number of alterations and additions, which in part explains why the current iteration carries the Kitfox IV name, introduced when the III was barely a year old.

Starting with the first models of Kitfox, improvements came fast and furious. By 1985, the Model II had been introduced, featuring a maximumgross-weight increase from 800 to 950 pounds, a wider cockpit, stronger wing spars, and a revised main gear location. The fuselage received the taffy-pull treatment, stretching by 1 inch ahead of the two side-by-side seats and 6 inches behind; this improved pitch stability and provided a smidgen more legroom. Engine choices expanded, too, from the original 50horsepower 502 Rotax two-stroke to the then-new 60-hp liquid-cooled 532.

Also in 1985, what could have been a mistake in the choice of enginesthe company opting to try an unusual six-cylinder radial—was turned to an advantage. The company completed a round cowling-replete with small blisters to clear the radial's valve gear-to house the radial when the decision was made to stick with only the Rotax motor. Soon, the customers clamored for the cute new cowl. claiming the classic look was what they were after. And although you can have an in-line twin or an opposed four under the hood, today all Kitfox snouts are round.

With the Model III came a larger vertical fin and numerous structural changes—including an I-beam insert to the main wing spar—that allowed the maximum gross weight to once again increase, this time to 1,050 pounds, where it stands today. Denney also tried its hand with the opposed-four, four-stroke KFM engine; it turned out to have marginal factory support and myriad other problems and was dropped in favor of the even newer Rotax 912 four-cylinder. (And should you wonder of the Rotax's factory support, understand that the Canadian engine maker is owned by Bombardier, parent company of Canadair and Learjet, and has twostroke engines in countless motorcycles and snowmobiles.) Of the kits being sold today, more than three quarters go out with the two-stroke; more about the differences later.

Through the seasoning of the Kitfox, a host of small changes and improvements was made, but the current model, the IV, probably can lay claim to being the spiciest 'Fox of the litter. An all-new wing has been fitted, with a far flatter bottom than the moderately cambered wing from the III, resulting in a claimed 22-knot faster cruise and improved climb and lowspeed performance. (The Denney crew is so ebullient that about the only thing they don't credit the wing with is enhanced karma.)

Roll control on all Kitfoxes has come from flaperons-combination flaps and ailerons, in other words. (The Nampa contingent can count itself in good company in liking this design-the Concorde is similarly equipped.) New for the IV are widerchord flaperons mounted to stiffer hinges and manipulated by a revised control system. Before, the flaperons moved symmetrically to control-stick movement, a design compromise made to accommodate the wings' quick-folding feature. (In the IV, you must unpin a control rod before you can fold the wings, which adds all of a minute to the procedure.)

Such a layout promotes adverse yaw, especially in an application with so much control area (the flaperons are nearly full span), and makes flying the III with absolute coordination tougher than day-old cannolis. Think of the Kitfox as a low-aspect-ratio glider, and you'll have a head start, but even so, the first few hours aboard will have you scratching your head and wondering what ever happened to your feet. Pilots used to the adverse yaw of a Cessna 150 will be challenged by the earlier Kitfoxes.

With the IV, Denney has pasted together a control system providing differential flaperon control, and the differences are dramatic. Though not completely tamed, the airplane's adverse yaw has been reduced from perplexing to palatable. Now the Kitfox can be called a genuinely well-bal-



Different Rotax engines are optional on the Kitfox. In the yellow airplane is the 582LC, 60-hp two-stroke engine, while the red airplane houses the new 80-hp 912 four-stroke.





SWEET & Simple



anced handler, with good pitch stability, excellent control authority, and spritely roll rate.

Close inspection of the tail feathers might lead one to believe the elevator trim tab has been left out of the soup. Not so. Adjusting the flap portion of the flaperons—via a small handle between the seats—so dramatically varies the wing's center of lift that it acts as pitch trim. It's simple, and it works. Overall, the stick forces are so slight in all flight regimes that trimming hardly seems necessary. Sideby-side seating rules out any center of gravity extremes, too, so the airplane does quite well on this trim arrangement.

Cruise performance is little different from one engine to another. On the III, recommended cruise, according to the company, comes at 74 knots, a feat achievable with either the 65-hp two-stroke or the 80-hp fourstroke, and with a fuel burn of about 2 gallons per hour. With the IV, cruise speeds have risen to 91 knots with the 65-hp engine and 96 knots on the 80hp motor.

To accommodate the speedier cruise, V_{NE} has been raised from the Kitfox III's 87 knots to 104 knots, and the company expects that number to rise after a second round of flutter and flight testing is completed. Standard tankage is 9.75 gallons, but you can opt for wing tanks that bring the total to 36; with that tankage, you can stay aloft longer than most people can stay awake.

The major differences in engine choice come in climb and takeoff performance. On the cool morning we flew the two-stroke, the Kitfox climbed at an easy 700 feet per minute at an airspeed that can only be called a severe cruise-climb. To keep the nose on the horizon means climbing at about 12 knots faster than recommended best-rate climb speed, to say nothing of the view at best angle. Ground roll, as advertised, was about 200 feet.

The evening before, while photographing the red airplane seen here (it's the four-stroke), we flew formation on a Cessna 150. During initial climb-out, the Kitfox's climb gradient utterly embarrassed the Cessna's, although in outright speed, the Wichita wonder easily boxed the Kitfox's ears. (Again, no surprise: The Kitfox has 80 percent of the Cessna's horsepower and just 65 percent of the weight at



maximum gross.)

Racing production airplanes isn't at the top of the Kitfox's menu, though; viewing the countryside at close range is. Here, the Kitfox excels. With its combination of light controls and panoramic view, the airplane is an absolute joy to fly low. In fact, during one evaluation flight, Dan Denney watched quietly as we climbed through 3,500 feet before pointing to the altimeter and asking, "Where are you going?" Point taken, we pulled the power off and headed downhill to check out a small lake near the Nampa airport.

Generous plexiglass provides the panorama; you can even opt for clear doors to add window area. Standard, there's the huge greenhouse, and in cruise flight, the cowling sits low on the horizon, so the view out the front remains unobstructed. A new windshield for the IV is thicker and more aggressively raked. You're only blind into turns, as is typical of high-wing airplanes, and mostly blind during the landing flare.

Cabin comfort for two is good. New doorframes on the IV bow out at the shoulders to provide a few inches of additional space, and they're welcome inches. Comparing cabin space to that of a 150, the Kitfox scores well, with better shoulder- and headroom and about the same hipand legroom as the Cessna.

Approach and landing in the Kitfox provide few surprises. Thanks to its highdrag profile, you can enter the downwind at V_{NE} , reduce power moderately, and come to approach speed (with a stall speed of 30 knots, 40 knots works well) before passing the

numbers. From there, a steep, poweroff approach drops you down like a lead bagel.

One deceptive feature of the Kitfox is that in cruise the nose rests well below the horizon, but on landing, you must be ready to hike it *waaay* up there for the proper attitude. As they say, the second time's the charm, right? Soft main gear damping, large tires, and low landing speeds add up to a rather easily tamable taildragger; about all one has to watch for when transitioning from production aircraft are the light control forces and the consequent tendency to overcontrol. With a bit of stick time, though, a pilot



will find that the Kitfox doesn't bite.

This assertion is backed up by a fair accident record for the Kitfox. Only one fatal accident has occurred—in Europe—and it was an apparent suicide. Another accident that resulted in injuries to pilot and passenger resulted from a loss of power after takeoff and the pilot attempting to return to the field; the airplane stalled and crashed short of the runway. Otherwise, the Kitfox has fallen prey to the usual low-time, test-flight incidents, with a number of ground loops, none of which have resulted in injuries.

A characteristic of the Kitfox that you will not find with production airplanes is the raft of factory-supplied options. You can have the 'Fox on floats, skis, or tundra tires; you can have any of several cargo pods or lockers (in the wings or slung from the belly like a drop tank); you can buy accessories from heaters to gascolators to avionics from the factory. In fact, if it fits on a Kitfox, chances are the company has tried it or now offers it.

Such a fast-food pace of product development has served to broaden the Kitfox's appeal. You can make it as simple or as capable as you want. Available now are, for example, slick little composite floats, and soon to come are amphibious floats; both are made by Aerocet, a company headed by Glasair designer Tom Hamilton. The floats and the 'Fox are by all accounts the best combination since Mrs. Fields discovered macadamia nuts.

Perhaps the final ingredient in the Kitfox's success is cost. The basic airframe kit runs \$9,345, to which you add an engine option. Starting with the basic Rotax 582LC with the "Type B" gearbox, you add \$5,740, or you can Should the thought of a two-stroke engine give you indigestion, you can opt for the liquid-cooled four-stroke Rotax 912 for \$11,050. Not only is the four-stroke costlier, it's 40 pounds heavier than the two-stroke installation; it does have the advantage of being significantly torquier than the two-stroke. It will probably have a much greater TBO than the 582LC as well; Denney estimates that it could be as high as 1,000 to 1,200 hours, according to field experience gained thus far.

Building a Kitfox shouldn't put a torque lock on your free time, though. The company's estimate of a 500-hour build time seems accurate, judging by the number of Kitfox builders that have completed airplanes within that time frame. You can even save 100 hours' labor by opting for powder coating of the fuselage (a \$700 option), in which case the factory does much of the finishing work, like reaming out mounting holes and tabs. Either way, you don't have to do any welding, and, according to the company, only standard hand tools—along with a small



move up to the 582LC with Rotax's new "Type C" gearbox, which employs a rubber drive damper and slightly taller gearing, for \$6,350. Both twostrokes come with an electrical system, dual electronic ignition, wooden propeller, and oil injection system. (Denney also has a new engine mount for the 582LC that, along with the "Type C" gearbox, significantly reduces the twin-cylinder's shakes.) Rotax doesn't publish a recommended TBO for either the 582LC or the 912; the two-stroke has through experience shown to need a top-end overhaul at about 500 hours, at a cost of about \$150.

assortment of power tools like a drill press and belt sander—are required. Apparently, many builders are meeting or beating that build time, although there are a few who have spent as long as 1,200 hours putting together the ultimate (and ultimately gorgeous) Kitfox.

Don't let the fact that a few chefs have spent many hours in the kitchen cooking up a Kitfox keep you from trying the recipe. Denney Aerocraft has worked hard to see that everything is in the kit—from soup to nuts, if you will—and that factory support will be there when you need it. In fact, in speaking with a number of Kitfox builders, that issue of help from home plate ranks high in their praise of the product, second, of course, to the airplane itself. So much so, in fact, that a few of the builders are coming back for seconds—and at least one is working on a third. All of which suggests that building and flying a Kitfox has left a good taste in these builders' and many pilots'—mouths.

Denney Aerocraft Kitfox IV Base price: \$20,395

Specifications	
Powerplant Rotax 912 fe	our-stroke,
horizontal	ly opposed
four-cylinder: 80 hp @	5.500 rpm
Propeller GSC wood, three-blad	e. ground-
adjustable, 68-ju	n diameter
Length	17 ft 8 in
Height	5 ft 8 in
Wingsnan	32 ft
Wing area	130.8 sq ft
Wing loading	$\frac{130.0 \text{ sq ft}}{02 \text{ lb/sq ft}}$
Power loading	3 12 lb/bp
Soate	3.12 ID/IIP
Cabin width	2 6 2 10
Cabin width	311311
Cabin height	3 ft 5 in
Empty weight	485 ID
Max ramp weight	1,050 lb
Max takeoff weight	1,050 lb
Useful load	565 lb
Payload w/full standard fuel	507 lb
Fuel capacity, std 9.75 gal (9.75	gal usable)
58.5 lb (58.5	lb usable)
Fuel capacity, w/opt tanks	36 gal
(35.5	gal usable)
216 lb (213	lb usable)
Baggage capacity 501	lb, 4.5 cu ft
Performance	
Takeoff distance, ground roll	200 ft
Takeoff distance over 50-ft obstacle	500 ft
Max demonstrated crosswind comp	onent
	15 kt
Rate of climb, sea level	1.300 fpm
Max level speed, sea level	100 kt
Cruise speed/endurance w/45-min	rsv.
std fuel	101,
(fuel consumption ea engine)	
@ 75% power best economy	4 kt/2 3 hr
8 000 ft (13 2 pp	h/3.2 (mh)
Service coiling	15 000 ft
anding distance over 50 ft obstack	15,000 ft
Landing distance over 50-11 Obstacio	250 ft
Landing distance, ground ron	250 It
Limiting and Recommended All	rspeeds
$V_{\rm X}$ (best angle of climb)	39 KIAS
V _Y (best rate of climb)	56 KIAS
V _A (design maneuvering)	70 KIAS
V _{FE} (max flap extended)	70 KIAS
V _{NO} (max structural cruising)	74 KIAS
V _{NE} (never exceed)	104 KIAS
V _R (rotation)	30 KIAS
V _{S1} (stall, clean)	33 KIAS
V _{SO} (stall, in landing configuration)	30 KIAS

For more information, contact Denney Aerocraft Company, Nampa Municipal Airport, Nampa, Idaho 83687; telephone 208/466-1711.

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.