BUILD A HIGH-TECH COCKPIT FLASHLIGHT

KITPLANES®

15th YEAR

FOR DESIGNERS, BUILDERS AND PILOTS OF EXPERIMENTAL AIRCRAFT

OCTOBER 1998

48872

Berkut Bounces Back
—Two Pilot Reports

Titan Building, Part 2

Avionics Special:
- Directory
- Reviews
- Build an Intercom

$3.99
CANADA $4.99

10
0 71486 03883 2

www.kitplanes.com

Renaissance Aircraft's

Flying an Eagle

Berkut takes canard airplanes to the next level.

By Vicki Cruse

We've all seen them, those funny-looking airplanes with no tails and an engine in the back. They have a small wing up front, a big swept main wing, tall vertical stabilizers and rudders at the wingtips, and parked on the ramp they look a lot like birds sipping at a watering hole—beak down, tail up. They are often called names such as "flying pickle fork" and "Bullwinkle" (for the famous cartoon moose).

But despite their obvious oddities they have proven capable and effective flying machines. One of the best of these designs to appear on the scene is the high-performance tandem-two-seat Berkut, manufactured by Renaissance Aircraft, Inc. in Santa Monica, California. I had the opportunity to fly this aircraft—my first flight in a canard—and it was an experience worth reporting.

Photo: Alan Staats

The new Lycoming IO-540 powered Renaissance Aircraft Berkut helped take the canard concept to the highest level.

Renaissance President Dave Ronneberg briefs the author before flying.

Berkut

continued

Panel space is at a premium for this cross-country airplane. To cut down on clutter, a Vision Microsystems VM1000 combines multiple engine instruments into a single flat-panel display.

A History Lesson

Canard-type aircraft have been around since the Wright Flyer, and in WW-II the Americans and Japanese experimented with canard pushers with highly swept wings and vertical stabilizers at the outboard ends of the wing. But the popular belief is that canard airplanes really came on the scene

Berkut Bearcat!

By Peter Lert

I'd always been impressed, both with the original 200-hp Berkut, and with the people (notably Dave Ronneberg and Richard Riley) who put out the kits. In recent years, I'd also become good friends with them. Even so, I was flattered when Dave, who'd flown out to my part of Colorado to pick up a car, simply left N600SE, the second prototype IO-540-powered Berkut, at my home field with a breezy note to "play around with it as much as you like and bring it back to Santa Monica sometime in the next couple of weeks."

Perhaps Dave wasn't being entirely foolhardy. I'd had the chance for a couple of brief flights with him back at Santa Monica a few months before, during which I even managed a few creditable landings, *sans* rudder pedals, from the back seat in preparation for demoing the ship to foreign dignitaries, as well as some subsequent front-seat time with Dave and alone.

I'd never really had the chance, though, to use the airplane where it really shines: for a long, high-speed cross-country. Now I was looking forward to those 570-odd n.m. over some of the most scenic country in the Southwest—a flight the Berkut should make in almost exactly 3 hours.

Getting In

There are some significant differences from the prototype 200-hp airplane, which was lost in an apparent G-LOC (G-induced loss of consciousness) accident at an airshow a couple of years ago. One of the most welcome changes is a new electric actuator for the nosegear (the mains remain hydraulic).

Now, rather than attempting the butt-first leap onto the wing perfected by Dave but difficult for those either shorter or less "jockular" than he, one can board comfortably with the nose of the airplane on the ground. In fact, the engine can be started in that attitude. Then, with the flick of a switch (and an optional cry of "hut-hut-hut" *a` la* Peter O'Toole in *Lawrence of Arabia*), the airplane rises gently to its feet, ready to taxi away. Looking around the cockpit also reveals the absence of the big handle for the belly-mounted drag brake; it's now deployed electrically and controlled by a switch on the F-16-like right-hand side stick.

Launch Prep

I made sure to switch on the electric boost pump before takeoff; the first six-cylinder Berkut prototype was totaled in a forced landing on its second flight, due to a failure of the engine-driven pump. Normally, Dave Ronneberg cringes at the idea of a static full-power runup, since it sucks gravel into the wood prop, but given that my home field lies at 9086 feet MSL, I felt it would be justified for a brief moment. With the engine leaned to optimum, the Berkut turned up 2160 rpm due to the combination of high density altitude and a rather aggressively pitched (91-inch) cruise prop.

Not that this hurt climb performance much; with all three wheels in the wells at 120 knots, which is faster than optimum, and with full fuel (or so I thought) and about 40 pounds of baggage strapped into the back seat, we still went though 12,000 feet MSL at better than 1000 fpm. Little did I know that the airplane was getting progressively lighter: I'd failed to secure one of the gas caps properly, and with the airplane pitched to climb attitude, the fuel filler was well below tank level.

At least in Berkut, unlike some of the earlier Ezes, the fillers are outboard of the prop, so if a fuel cap comes off, that's all you lose (rather than a prop blade as well). I didn't even know I'd lost the cap, apparently right on takeoff, although weeks later a friend who'd been hiking in the area told me, "I saw you take off in some kind of weird jet, but were you having engine problems? The contrail was coming from only one side..."

Cruisin'

Leveled at 12,500 feet on a warm September day, the Berkut steamed along at what worked out as 213 KTAS at a very conservative 2500 rpm. Ronneberg habitually cruises at 2700 or more, which allows him to use full throttle at relatively low altitudes; as it was, I was pulled back to about 16 inches of

due to the efforts of designer Burt Rutan.

Rutan's first design was the VariViggen, which went to the drawing board in 1961 and first flew in 1968. This aircraft was a small, tandem two-seat craft built of wood with a delta wing and retractable gear. Only a few were built, and the airplane was not very popular. Rutan started experimenting with a speed-wing version of the VariViggen, and what evolved was the VariEze, introduced in 1974 and awarded Outstanding New Design at Oshkosh that year.

The VariEze used a Continental O-200, the same engine found in a Cessna 150, and plans were made available in 1975. The airplane had fixed maingear and a retractable nosegear. This was the beginning of the canard aircraft we recognize today, and additional designs would soon follow.

After the VariEze came the Quickie in November of 1977. A small, single-place aircraft built from plans, it did not have winglets like the Eze but was a tandem-wing aircraft with both wings the same size. A true biplane, 60% of the weight was on the forward wing. It was originally powered by a tiny 27-hp Onan engine. Like the VariEze, this planform spawned its own line of descendants— the side-by-side Q2, the Continental O-200-powered two place Q-200, the tricycle-gear Tri-Q, and the larger two-place Volkswagen-powered Dragonfly. Rutan even designed a racing version of the Quickie, the Amsoil racer, for the biplane class.

In June 1978, a variant of the VariEze, the Defiant, was introduced. It was originally designed for production, though plans were later dropped. Resembling a larger VariEze with an engine in the front and back, it seated four. A long-term build-

Painted in Air Force trainer fluorescent orange trim, Berkut shows SoCal ground-bound traffic how it s done.

mercury, some 2 inches less than what I might have gotten at full throttle.

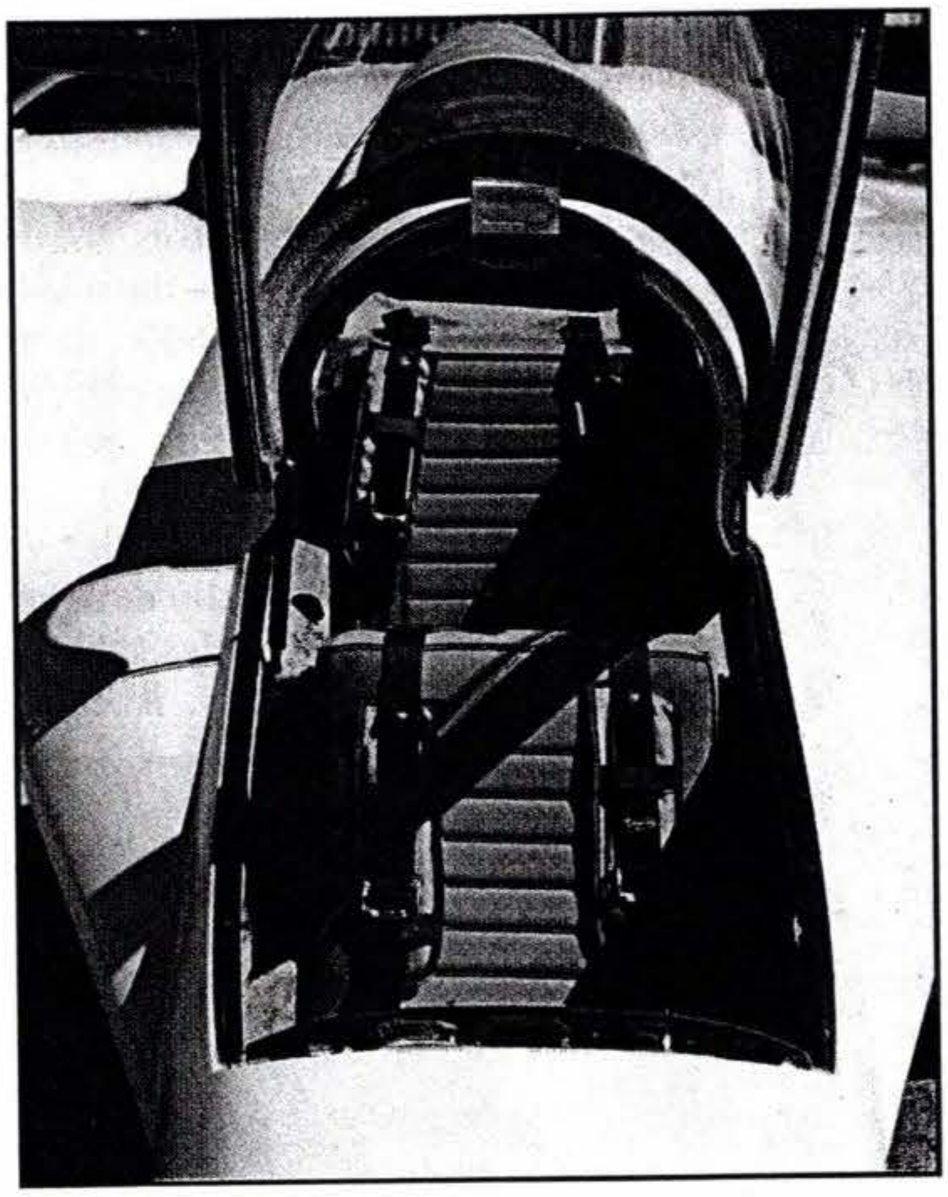
Even with 91 inches of pitch, I had the impression the airplane was a bit "underpropped" for its power— although had I wanted to head up to oxygen altitudes I could have realized an impressive combination of cruise speed and economy. The ride was solid and comfortable, and once trimmed up the airplane could be left alone for long periods of time as Monument Valley, Lake Powell, and the Grand Canyon slipped past.

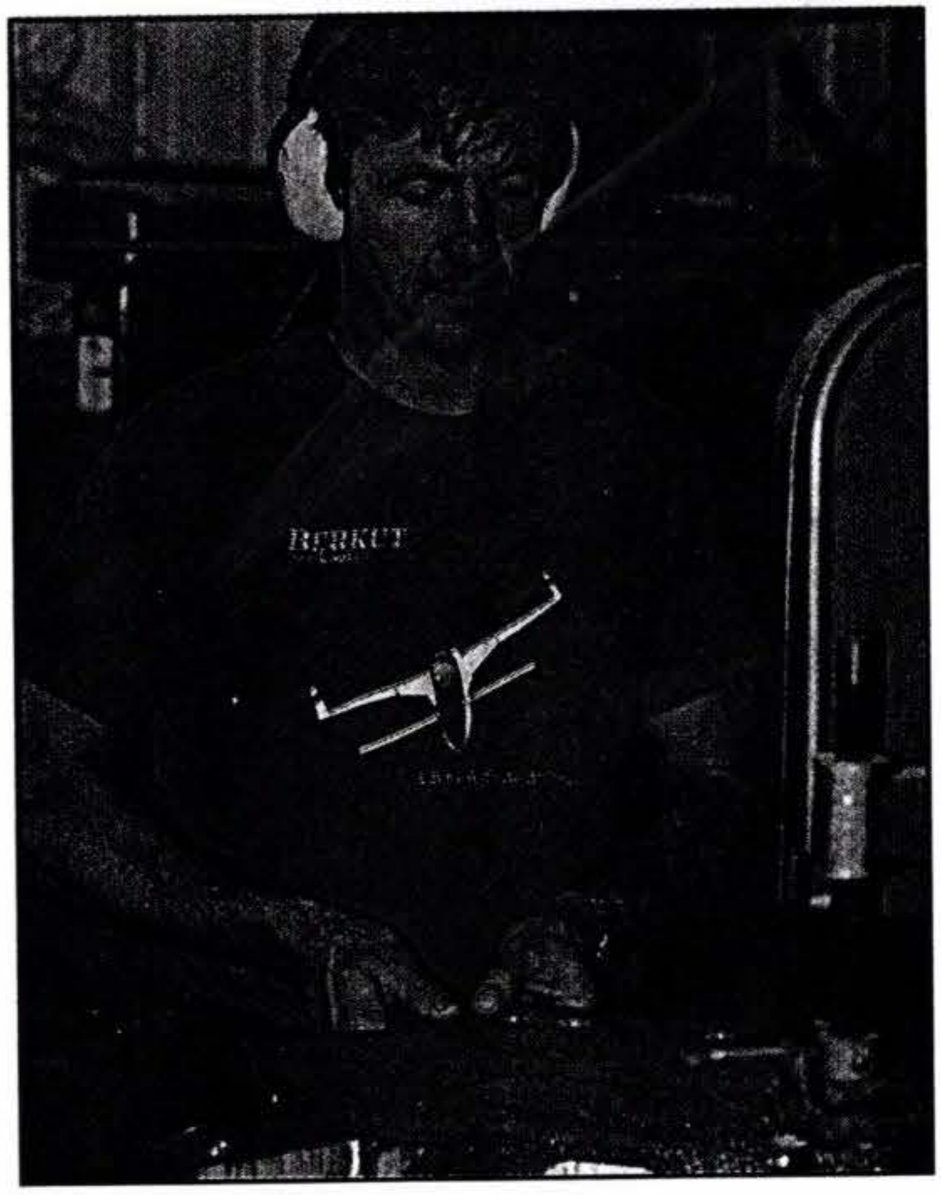
As is common with Berkuts, the last time I'd had my feet on the rudders was during takeoff. *Goose,* in particular (its N600SE registration commemo-

Berkut

continued

The tandem cockpit is snug but comfortable.





ing project, few Defiants were built.

Seeing a need for a more practical bird, Rutan went back to the drawing board and redesigned the VariEze, and in June 1979 he was back, this time with the Long-EZ. The Long- EZ was 15% larger than the VariEze, and it

Bearcat

continued

rates the Navy callsign of Cdr. Rick Fessenden, who lost his life in the prototype's airshow accident), has a roll trim change with respect to airspeed—one I haven't experienced in other Berkuts. Rushed to completion after the loss of the first big-engine airplane just in time to make Oshkosh 1996, it's visibly out of rig. Even so, a flick of the stick-mounted roll trim switch straightens things out in short order; and by the time you read this, "Goose" may have received a set of the new carbon-fiber-skinned wings.

Soaring, Anyone?

I'd been keeping track of fuel consumption primarily by the digital display in the Vision Microsystems VM-1000 integrated instrument package, of which more shortly, but also by occasionally swivelling my head around to look at the two sight gauges on either side of the back seat. As I expected, the level of the tank I was using gradually decreased. Also as I expected, the gauge on the other tank was the solid light blue of 100LL, with its actual surface above the top of the gauge...or so I thought. Actually, what I was seeing was the residual color that had soaked into the plastic tube. A bit south of Las Vegas, with the tank I'd been using down to about a third, I switched to the other...and things got rather quiet.

It didn't take the engine more than a week or so to restart when I switched back to the original tank, and it was at this point, leaning forward and craning back to see the top of the fuel tank, that I realized what had happened. The GPS revealed plenty of airports nearby (as well as the fact that the nearest didn't have any fuel); soon I'd landed at Henderson, Nevada, to tank up.

Merely refilling the tank for which I still had a gas cap would have been sufficient to get me to Santa Monica; for extra security, I put a few gallons in the capless tank, finished my Coke, cut off the bottom of the can with my trusty Swiss Army Hospital, jammed it into the filler neck, and covered it with several layers of *The Force,* also known as gray tape ("...it has a light side, it has a dark side, and it's what holds the universe together").

Display Trouble

Taxiing out at Henderson, the engine instrument display froze up solid. Switching it off and back on brought it back to life but made me wonder if the trouble would recur (it did, but the same procedure worked again). The trouble was later traced to a ribbon cable kinked during installation, rather than a problem with the system itself or any of its sensors, but it makes one stop and think. There's no question that digital electronics are more rugged and more reliable than the mechanical or electromechanical dials we're used to—but a system like the VM-1000 puts all your eggs in one basket.

Since the problem was clearly gauge-related, and the engine had been running fine, I elected to press on to Santa Monica, now only an hour or so away. With a field elevation almost 7000 feet lower than my departure from Telluride, the Berkut shoved me back in my seat, then leaped off the ground and headed eagerly for the forbidden territory of the Las Vegas Class B airspace lying just above.

The remainder of the trip was uneventful, although the Garmin GPSMAP 195 was invaluable in finding my way through the Los Angeles haze without running into any of the various special-use airspace segments (while freeing me to keep my eyes outside for other aircraft). The electric drag brake on the belly was a big help in slowing behind Santa Monica's usual swarm of C-152s practicing flight at minimum speed on 5-mile final. It's a bit disconcerting to use until you're used to it, however: Because it blanks off a good deal of the airflow to one half of the propeller disk, it makes the engine feel like it is running rough.

Choosing

Would I choose the big engine if I were a Berkut builder? That's a hard one to call. There's no question that it climbs better and cruises faster—but until some-

Ronneberg machines parts for Cruse's custom rudder pedals.

used a Lycoming O-235 or O-320. It too had fixed maingear and a retractable nosegear. The Long-EZ would become one of the most popular homebuilt airplanes ever designed, even though the aircraft was never offered in kit form. Long-EZs were built from plans, although a few molded and metal parts were available, as well as materials kits from aircraft supply companies. Complete kits as we know them today were not offered.

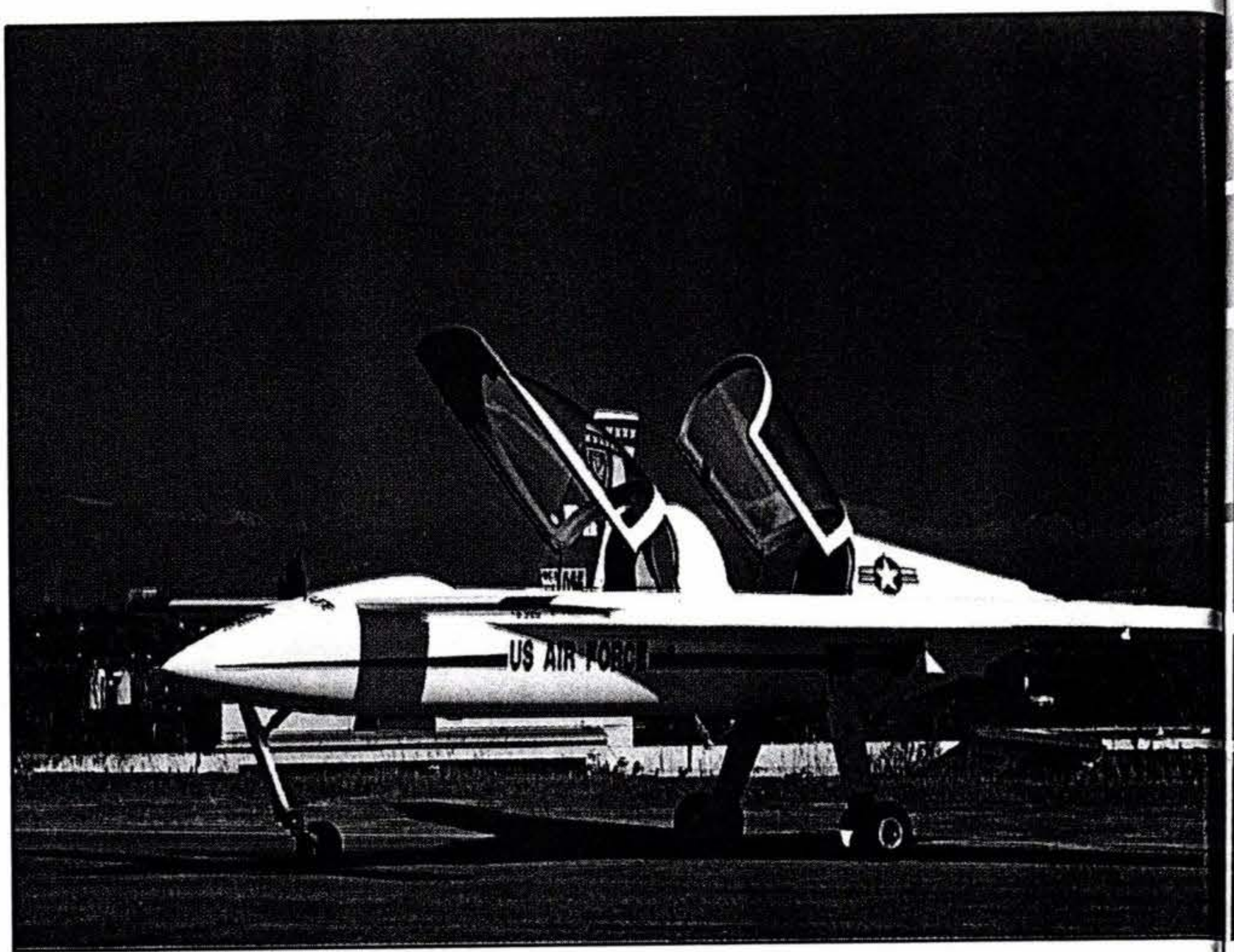
The Long-EZ was the last homebuilt canard design from Burt Rutan, though he went on to design the globe-circling *Voyager* and other airplanes. But even after Rutan left the homebuilt scene, others picked up where he left off. A number of canard aircraft have been

---

one figures out how to repeal the laws of aerodynamics, it only cruises 12 to 15% faster, while burning up to 50% more gas.

There's no question, according to Dave and Richard, that it's way harder to install, and all that weight back there requires careful attention to c.g. Why use the IO-540, then? Well, there are some builders who simply want the performance of the Berkut TS (it stands for *testosterone*); and, paradoxically, one can often find IO-540s for no more, or even less, than comparable IO-360s. (The great proliferation of 200-hp production lightplanes, as well as homebuilts, has put used -360s at a premium.)

Personally, I'd probably still prefer the IO-360—particularly because its lighter weight might allow installation of an (admittedly costly) Hoffmann or MT composite constant-speed propeller. With that, performance would approach that of the -540 powered airplane, while fuel efficiency would be better. And who knows? We're all still waiting for the 300-hp Zoche turbocharged aerodiesel, which will burn jet fuel and weigh even less than the IO-360. But until then, the Berkut—with either engine—continues to match unparalleled handling with performance at the high end of the available range. **KP**



Dual tandem canopies give the Berkut a fighter-like appearance on the ramp.

Berkut

continued

introduced, including the three- and four place Cozy, the four-seat Velocity, Shirl Dickey's speedy E-Racer, the German-built Speed Canard, the new four-seat SQ2000, Steve Russel's four-place Aero Canard, and the Renaissance Berkut.

Bucking Convention

The original premise behind the canard airplane wasn't to have people stand in awe at the sight of a row of odd-looking, awkwardly parked aircraft. No, the main reason for these designs was to design an aircraft that did not stall as conventional aircraft do, and also to use the canard's aerodynamic strengths to increase performance. Because safety is always first in most pilots' minds, and since a canard airplane's main wing doesn't stall, the canard airplane won't spin, making all who fly in them breathe easier.

The canard airplane does this via aerodynamics and geometry. The canard wing is the horizontal stabilizer and elevator mounted up front. Its airfoil, and the angle of incidence at which the canard is mounted, determine the critical angle of attack, or stall speed of the canard wing.

This is all set so the canard stalls before the main wing does. For example, when the nose of the aircraft is pitched up and reaches the canard's critical angle of attack, it will stall while the main wing is still flying. At the stall, the canard's elevator no longer produces pitch input, so pulling back on the stick does nothing. The nose then drops slightly, which reattaches flow to the elevator. Keeping the stick back starts a safe, stable, rocking-horse motion where the nose of the aircraft bobs up and down slightly, but the main wing never stalls.

But there can be problems. Some pilots cite the canard's potential to enter a deep stall as a major fault of these aircraft and a reason to never fly in one. A deep stall is a non-recoverable stall of the main wing. How can this occur in a canard aircraft if the canard stalls first and there is no elevator authority to continue to the nose-up attitude? The answer is to load the aircraft aft of its critical c.g.

Early Long-EZs using an O-320 or O-360 have to watch the flight envelope carefully, and weight often must be added in the nose. This is why EZs and other related tandem canard aircraft are flown solo from the front seat. But deep stalls are not just limited to canard airplanes. Conventional aircraft are subject to similar unrecoverable modes when loaded with a too-far-aft c.g.

A Different Bird

In the late 1970s and early '80s a man named Dave Ronneberg got the home-building bug. Working for Tom Aberle at Compton Airport near Los Angeles, he helped build a Starduster II, several Pittses, a Mong Sport, and he helped restore a Stearman. On his own he buil a Lancair. A fan of composite construc tion, he built seven Long-EZs. Durin the building process he noted what h would like to change and incorporat into one special airplane.

The top items on his wish list wer construction molds for the EZ. Eac Long-EZ required what was effectivel a new pattern, requiring that each air plane be shaped, filled and surfaced t perfection. Ronneberg figured if mold were used, duplicate components coul be created allowing for a time savings o several hundred hours. Being a fairl tall guy (6 feet, 2 inches) he also wishe for more headroom and a longer, wide fuselage. As the saying goes, be carefu what you wish for you just might get it

In 1986, Ronneberg started fulfilling his wishes. Sam Kridell, head of space shuttle design for North American Rock well, used a Cray supercomputer to pro duce a set of full-size templates of the fuselage and bulkheads that Dave had designed over the previous five years. Using these templates, a full-size model of the fuselage was built. It was also around this time that Dave was involved with Rutan and the *Voyager* project. The fuselage model was shelved but not for gotten.

Berkut

continued

The Berkut Is Born

While working for Rutan, Dave continued to dream about his airplane and noted additional changes he would like to see in a canard aircraft. He also toyed with the idea of producing kits instead of an airplane built from plans. Over the next few years the dream became a reality. In 1989 construction began on the prototype bird, now called the Berkut. If you're wondering, a Berkut is a small but vicious predatory Eagle bred by the Kirghizia tribesmen of south-central Russia to hunt wolves from horseback.

The prototype airplane incorporated new features into the canard body. The model of the fuselage built in 1986 was 12 inches longer, 3.5 inches wider, and provided 4 inches more headroom than the Long-EZ. These features were retained in the prototype Berkut. This airplane would emerge with fully retractable gear, designed by Shirl Dickey, designer of the E-Racer. Ronneberg acquired the rights to use Dickey's gear in the prototype and future Berkut kits.

Dickey continues to manufacture the carbon fiber gear for the Berkut. The prototype Berkut used a Lycoming IO-360 engine by Demars rated at 205 hp. Light Speed Engineering's Klaus Savier designed the electronic ignition, which retains a traditional magneto backup.

The Berkut differs from the EZ in a number of other ways. The canopy of the Long-EZ is a single-piece unit, whereas the Berkut canopy is two pieces—a canopy for each person similar to those used on modern two-seat-tandem fighter jets. The Berkut ailerons are 6 inches longer than on an EZ and have a slightly larger chord. The lower winglets and rudder horns have been eliminated by incorporating them into the wing on the Berkut. The strakes (the triangle portions between the fuselage and wing) have a convex upper surface instead of the flat surface found on the EZ.

The Berkut also makes use of carbon fiber and Kevlar in the design. Carbon fiber is found in the canopy frame, wing skin, and in the mainwing sparcaps and the canard sparcaps. Carbon fiber is stiffer and stronger than fiberglass, and in its Berkut application it prevents unwanted flexing, particularly in the wing, making for a much more rigid wing with no weight penalties. Kevlar is used in the belly, under the glass outer skin, to protect the underlying skin in the event of a gear-up landing.

The prototype Berkut was completed in the summer of 1991 and flown to Oshkosh. The reception was outstanding, but Ronneberg was not ready to sell kits just yet. He used the next year to acquire the financing, tooling, and materials necessary for producing a kit, as well as writing a construction manual. At Oshkosh 1992, orders were taken for kits, and deliveries began in January of 1993. Despite the success at Oshkosh, the return home found a financial partner who wanted out of the airplane building business.

According to Richard Riley, vice president of Renaissance, a buyout was agreed upon prior to Oshkosh 1992, but in late '92 the financier changed his mind with regard to the terms of the buyout. A lawsuit resulted, and then, in mid-1995, Rick Fessenden, the company test pilot and airshow pilot, crashed in Santa Paula, California, in the prototype Berkut. Months later, a judgment in the lawsuit was made providing for the financier

Cruse takes the driver seat for one of her first flights in a canard.

to receive a lump sum payment that represented the return of his investment. Ronneberg could not make the entire payment and began planning for bankruptcy.

Vendors with outstanding accounts were paid and all outstanding kit segments were finished and delivered. Experimental Aviation filed for Chapter 7 bankruptcy and under the protection of the bankruptcy court, the final judgment for the lawsuit filed by the financier was never made. With the company in Chapter 7, Ronneberg and Riley continued to provide customer support and constructed composite parts for use outside the aircraft industry.

They could not, however, sell kits. In April 1997, the assets of Experimental Aviation, namely the molds, were awarded to Ronneberg and company. Renaissance Composites was formed, and the sale and delivery of kits resumed.

The Test Ship

The Berkut I was scheduled to fly is based in Santa Monica and is owned by Mishka Kasyan. It is equipped with a 260-hp IO-540. The idea for using a IO-540 in a Berkut had been in the back of Ronneberg's mind since 1991, but nothing became of it until a builder, wanting to use the Berkut for airshows, decided to install an IO-540. Ronneberg provided the cowlings and other necessary parts. Unfortunately, this airplane's mechanical fuel pump seized and the airplane crashed on a highway just off the Santa Paula airport. Fortunately, no one was killed. The IO-540 is now an option for the Berkut and promises to be more popular than the O-360.

The IO-540 turns a Klaus Savier fixed-pitch propeller 67 inches in diameter, with a whopping 105-inch pitch (the IO-360 prop has a 91-inch pitch). The pitch of a propeller is the theoretical distance it would travel forward in one revolution if there were no slip. Therefore, the higher the pitch the bigger the bite of air taken by a prop. This translates into speed. Fixed-pitch propellers can be of three types: climb, cruise and standard, which is a happy medium between the other two. So the higher the pitch, the faster the cruise speed—but you'll need a longer takeoff distance. For comparison, the pitch on a typical Cessna 152 prop is 58 inches with a diameter of 69

Berkut

continued

inches. The prop on the Berkut was designed for cruising fast, and its small diameter in relation to pitch means it turns very fast and grabs a lot of air. On the ground the Berkut's prop limits the engine to 2000 rpm, but rpm builds rapidly as the speed comes up. Full throttle produces 2900 rpm.

This airplane is equipped with a Vision Microsystems Engine Monitoring System, navcom, GPS, autopilot, transponder, and the standard instruments. The panel is small compared with panels in side-by-side seat airplanes, so the Vision Microsystems functions and display are ideal. All of the instruments and switches are easily reachable and none are blocked from view. The fuel selector is low and between your knees, but easily reachable.

Flying It

Dave Ronneberg ran me through the systems of the airplane, a thorough preflight, and then went over the emergency procedures before we went flying. The nosegear uses a unique jackscrew that allows the nose to raise and lower while parked, with a pilot in the cockpit. This unique feature is an attention-getter on the ramp. The maingear uses an electro-hydraulic system, protected by an airspeed sensing cut-out switch. In the air all three gear work together, activated by a single up/down gear switch, but on the ground the switch only controls the nosegear. Once seated in the airplane, the nosegear is lowered, and the bowing Berkut now takes on the flying stance. Once at your destination, make sure the nosewheel is straight by looking through a small window between your knees, retract the nosegear and get out of the airplane. OK, OK so how does it fly?

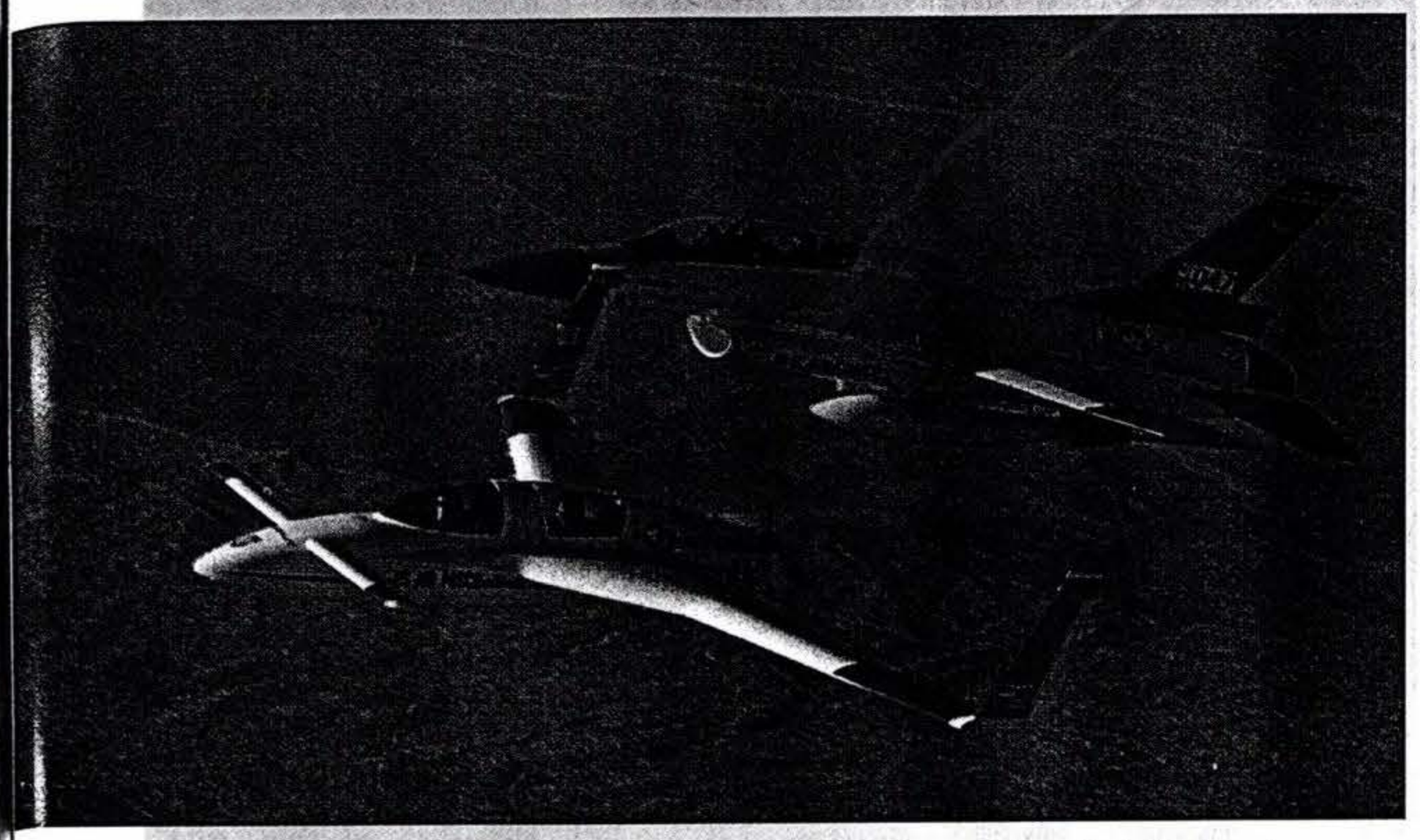
I was fortunate enough to get three flights in the Berkut, and I have my size to thank for it. The factory Berkut is not set up for people 5-foot-2 to fly, therefore my first visit was to take a look at the manufacturing facilities, ask a lot of questions, and be measured for a set of rudder pedals Ronneberg would make for me.

My introductory flight was from the back seat, which includes a throttle and stick but no rudder pedals or instruments. Getting into the back cockpit requires a bit of a hop, butt first onto the strake then swinging your legs into the cockpit. Yet it's roomy, comfortable, and legroom is plentiful. A four-point harness is installed in this aircraft. One of the biggest complaints about the EZ family is baggage space; the Berkut also has this problem. Baggage may be placed in the strakes, which are quite cavernous but only 8 inches tall at the opening. With two people on board, baggage can be placed at the feet of the backseat passenger since there are no rudder pedals to contend with.

This flight showed the power of the Berkut and allowed me to get used to the stubby control stick on the right arm rest. The backseat passenger in this particular airplane does not have a trim control, so changes must be conveyed to the person in the front. Builders, however, may opt for trim on the back control stick. Trust me, trim is necessary on this airplane. Your wrist gets tired fast if you don't trim the airplane. We attempted a few landings to get me used to the speeds involved and the orientation of the airplane in the pattern. From the backseat I couldn't see the instruments, nor could I see out the front very well.

Next we flew the airplane to get used to what it feels like; essentially the feeling is fast, very fast. We went through the stall series and since this was my first time in a canard aircraft, it was interesting to feel what a canard stall is really like. The best comparison I can make is much like a rocking chair. At the stall

A Bird of a Different Color

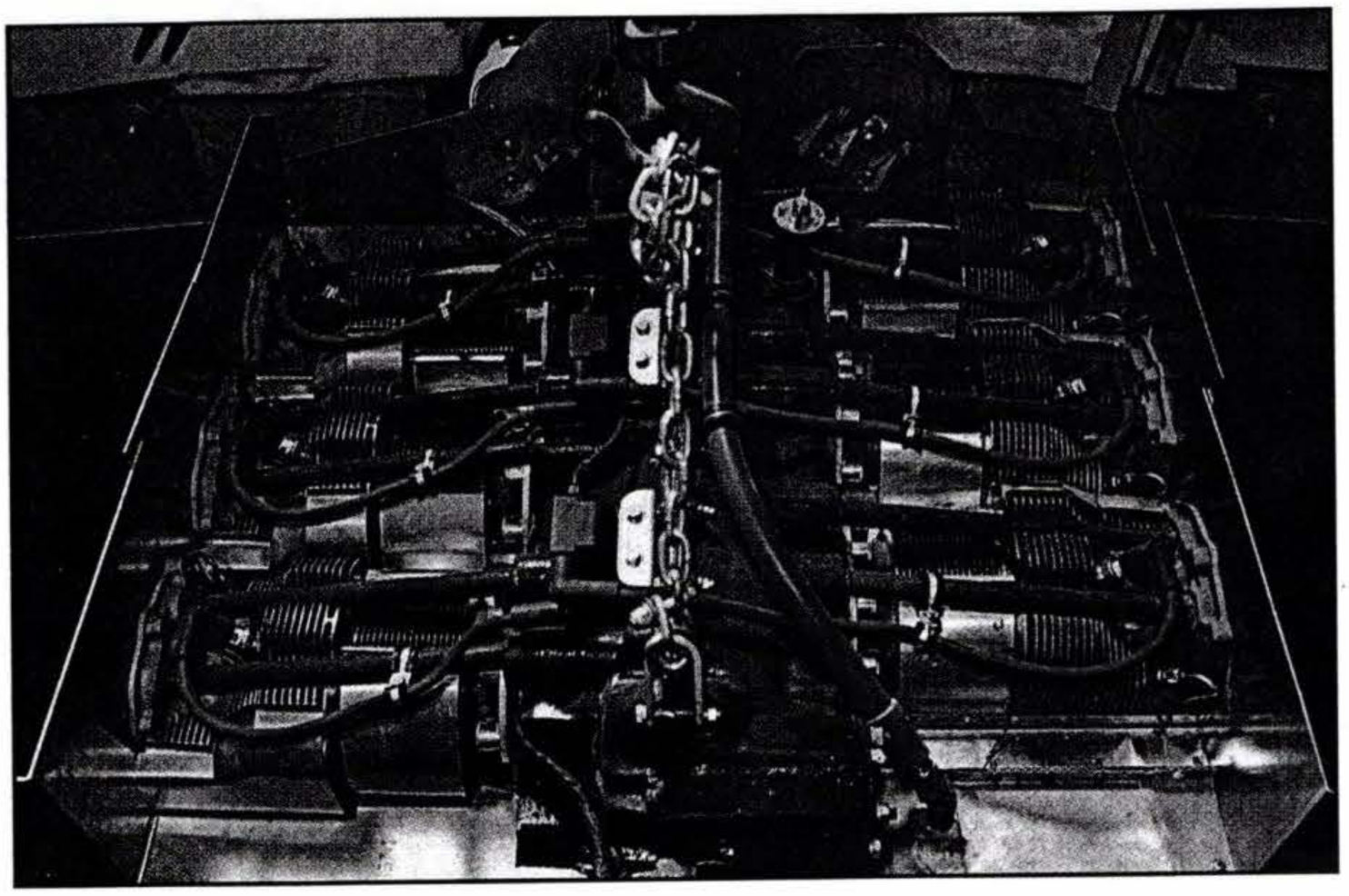


The airplane tested for this article has a unique paint job with dayglow orange vertical stabilizers and wingtips and the stars and bars of the U.S. Air Force. It's modeled after the F-15s and -16s of the test squadrons at Edwards AFB, but this Berkut is no wannabe warbird.

Every student who graduates from the Air Force Test Pilot School at Edwards must fly and evaluate 30 different aircraft during the six-month term at the school. The planes range from helicopters to fighters, the Stearman biplane to the P-51, a Taylorcraft to a T-6, from business jets to the lumbering Shorts cargo turboprop (think of a step van with wings). The Air Force can't keep that diverse an inventory just for student evaluations, so the school brings in privately owned airplanes to fill in the gaps and widen the student's experience.

Like an Air Force Reservist, the Berkut puts in two weeks per year training the next generation of test pilots. In return, the school gives the owner a "fam" or familiarization flight in the back of one of their airplanes. In the past, Berkut designer Dave Ronneberg has flown in an F-15, and office manager Diane Moser got a ride in a T-38. This November, the Berkut 540 will be making its first trip to Edwards, and owner Misha Kasyan will ride in an F-16.

The photo above is not a computer composition. The pilot of the F-16 is Berkut builder and Edwards TPS instructor Maj. Norman Howell, taking his last flight as an active duty Air Force officer. He's now a reservist and flies full time as a C-17 test pilot for Boeing Tanker and Transport division. The photo was taken from a Lancair IV-P flown by Doug Witeman. *—Richard Riley*



The six-cylinder, fuel-injected Lycoming IO-540 provides plenty of power.

Berkut

continued

the nose visibly drops about 2 feet, and if you keep the stick back it comes back up again and then drops until you release the back pressure and fly away. One cycle of nose up and down takes about 2-3 seconds. Power-off stalls will result in an altitude loss of less than 50 feet through two cycles or bobs of the canard. Add in a little power—1200 rpm—and no altitude is lost. You can slowly turn the airplane in the stall configuration, but the controls are more mushy than in normal flight, as they are with most airplanes. With the first flight under my belt we flew back to Santa Monica and I awaited word to come back and try out my new rudder pedals.

Front Seat Anxiety

I must admit, I almost dreaded the day I got the call to come back to Santa Monica and try out the pedals. I went back knowing that I was going to have to fly the Berkut from the front seat and that Dave, sitting in the back, would not have rudder controls, brakes, avionics or instruments. I was intimidated by this airplane from the start: It's fast, really fast. I haven't flown 1000 different airplanes nor do I have 13,000 hours, so if I could fly this airplane then most pilots ought to be able to as well, which was part of why Dave was giving me that seat…to prove a point.

I currently fly a Christen Eagle, and more than half of my 400 hours is in that airplane. Dave told me that I would have no trouble flying the Berkut. He also said there was no way he wanted to fly my airplane in exchange. It turns out the two airplanes have some things in common. The pattern speeds are identical, both have no flaps and are slowed on touch down by bringing the nose up. Still, I had a lot of anxiety going into the first flight from the front seat. The rudder pedals built for me were 14 inches in front of the existing pedals and connected to them with a steel tube. The pedals in the Berkut are slightly different from the norm; they are independent of one another. Pressing on the right rudder does not move the left pedal at all, and the rudders only swing outward of the winglets. For brakes, keep pressing the pedals and the brakes take effect just as the rudder hits full deflection. Although it sounds a bit strange, it takes only a few tries at braking to get used to it. In addition to modifying the pedals for me, about 35 pounds was added to the nose to compensate for the c.g. shift with me in the front. The Renaissance crew went to a lot of effort to make this airplane flyable for me.

Flying It from the Front

After putting a few cushions in my seat and strapping in, the next task was starting the airplane. Crack the throttle, mixture full forward, turn on the magneto, flip on the battery, and push the start button. If it cranks six times before starting, stop, turn on the boost pump for about two seconds, open the throttle a bit more, and hit the start button. Once it fires, turn on the electronic ignition, throttle back and you are ready to raise the nose. Flip on the master switch and lower the nosegear. The nose rises to full extension and stops.

The airplane taxis with ease and getting used to the brakes is a piece of cake. Steering is by means of a full-castering nosewheel and differential braking on the mains. The runup is done on the fly because the prop has so much pitch that if you run it up while standing still, it will suck up rocks (or even sand) and blast the surface of the prop, especially the leading edge. That's also the reason you start the beast with the nose down. Since there is no constant-speed prop, a simple mag check is all that's needed. A check of the engine instruments and everything is ready to go. Pull up to the hold-short line, lower the canopies, latch them and you're set.

The Eagle Takes Flight

Dave told me I'd need a little right rudder on takeoff but advised that I use it sparingly. We were cleared for takeoff. On the centerline I pushed the throttle about half way to avoid sucking rocks into the prop. At about 40 knots, full throttle is applied and I applied a bit of right rudder. Rotation occurs at 70-75 knots, and the climb is steep. Rudder inputs were unnecessary from here on out. In about one and one-half minutes the airplane had quickly climbed to 4000 feet, and the throttle was brought back to 2700 rpm. I lowered the nose and started trimming the airplane using the switch on the stick. We were at 200 knots quickly and ready for smooth flying, tremendous visibility flight.

Once trimmed, the airplane is easy to fly. It doesn't take long to get used to the side stick on the right. In addition to the trim button, the stick also includes the push-to-talk and a switch to raise and lower the belly brake. Dave suggests holding the stick from the base and resting your arm on the arm rest. This takes away the tendency to overcontrol the airplane. Rolling the airplane from side to side is easy. The sensitivity of the control is not overly light and it's not hard, but just right. Pitch, on the other hand, is less sensitive than roll. When attempting a tight turn you can feel the stick forces increasing the more you pull. In a 360° turn, the tendency is to begin to let off the pull because your arm gets tired. This stability characteristic is brought over from the Long-EZ and allows for a lower workload. This is especially nice during cross-country flights—a forté of the Berkut.