Fleet First

Even a full month after taking delivery of the first Cirrus SR20, Walt Conley was still ecstatic with his new airplane. "It's outstanding!" he gushed a few weeks after the limelight had faded. "It's the best value in general aviation. I just love that airplane." ■ Although the media attention surrounding the first delivery of the sporty all-new aircraft has diminished, Conley and his airplane are still celebrities everywhere they go. At each stop on the numerous trips he's made since taking delivery on July 20, the FBO is emptied every time he pulls up. People crowd around the airplane to *ohhh* and *ahhh* over the wraparound instrument panel with its multiple color moving maps; the big, comfortable cabin; and the swooping lines of the fuselage. They ponder the merits of the rocket-powered parachute system that is standard equipment on the SR20; they admire the engineering that allows the economical 200-horsepower engine to deliver a 160-knot cruise speed,

The first Cirrus SR20 finds a home

BY THOMAS B. HAINES

PHOTOGRAPHY BY MIKE FIZER

despite the fixed landing gear. "I can't get anywhere on time. No matter where I go, people stop me and want to talk about the airplane. It's amazing that everyone knows the airplane," Conley remarked.

For Conley, who lives near Minneapolis in Plymouth, Minnesota, the delivery was the culmination of a many-year search for an airplane that delivered new technology and new performance. As a partner in a Grumman Tiger, he was already flying one of the most efficient general aviation aircraft ever built—and one of the latest designs, despite its dating to the mid-1970s. In his search for new performance and comfort, Conley evaluated several kit aircraft designs in the early 1990s. Everything from the Wheeler Express to the Seawind amphibian piqued his interest. Another design of interest to Conley: the Cirrus VK30, a four-place pusher kit marketed by Cirrus Design from its inception in 1987 through 1992. It was then that the Cirrus founders, brothers Dale and Alan Klapmeier, decided to move into production of certified aircraft. Their first design, the SR20, debuted in the summer of 1994.

Shortly after unveiling the new project, the Klapmeiers announced that they would be moving the company from Baraboo, Wisconsin, to Duluth, Minnesota. The announcement made the Minneapolis news, and Conley was watching. He soon climbed into the Tiger and flew north to Duluth to visit the company. He was impressed with the SR20's design—only in mock-up form at that point—and with the Klapmeiers and their plans. At that point, the aircraft was scheduled to be certified and into production by the end of 1996. Conley put down a deposit and waited to see what would happen.

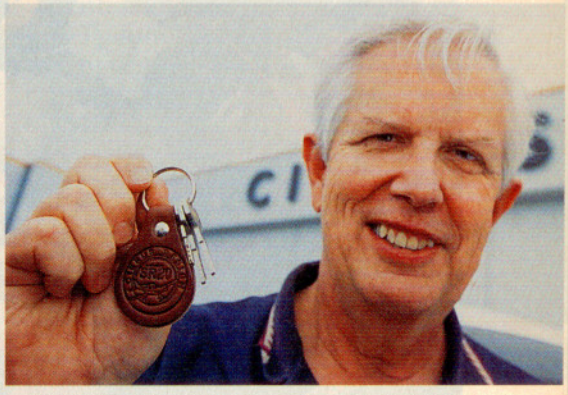
It's quite easy to make good landings: Gradually pull the power back and allow the aircraft to settle to the ground, holding the attitude.

Soon a new factory sprang up along Runway 9/27 at Duluth International Airport with the words "Cirrus Design" emblazoned on the side. Meanwhile, another manufacturing facility was under construction in Grand Forks, North Dakota. There, employees began setting up procedures for building flat surfaces, such as wings and elevators. Several prototype aircraft were developed and flown thousands

of hours as the design was refined.

At first, Cirrus planned to offer a unique rocket-powered parachute as an option. The parachute is designed to lower the aircraft to the ground in such a way that those inside would survive. However, the 1,800-foot-per-minute descent rate beneath the deployed parachute will most likely destroy the aircraft upon impact. Still, as a last-ditch effort in the event of a loss of control, it's not a bad safety net. Later, the Klapmeiers decided that the parachute would be standard equipment.

Development and certification of the parachute system took many months and many tests, including dumping barrels loaded with wet sand to simulate the weight of an SR20 out of the back of a cargo airplane and deploying the chute. Ballistic Recovery Systems (BRS), the parachute manufacturer, and Cirrus worked together closely on the project. Eventually, the system, dubbed CAPS—for Cirrus Airframe Parachute System—earned FAA approval and is aboard Conley's aircraft. BRS has similar systems flying on many models of ultralights. It recently announced plans to solicit investments from Cessna 172 owners to help fund certification of a parachute system for that model as well.



Walt Conley proudly shows off the keys to the first Cirrus SR20. Building yachts, like the one at left, first got Cirrus founders Dale and Alan Klapmeier interested in composite materials.

Hidden in an area in the aft fuselage, the parachute and its rocket, along with the extra structure to accommodate the system, weigh less than 80 pounds. To deploy the parachute, the pilot pops off a cover in the cabin ceiling to reveal a red T-handle. A pull forward and down on the handle ignites the rocket motor and propels it out through the skin of the aircraft, pulling the parachute with it. A riser controls how fast the canopy opens. Wide straps buried just below the composite exterior skin of the fuselage—running beneath the door openings—are ripped free by the force. In the end, the fuselage

is suspended by the straps, which are attached to the firewall and the aft cabin. The system requires almost no maintenance—just an inspection and repacking of the chute every 10 years and perhaps replacement of the rocket motor.

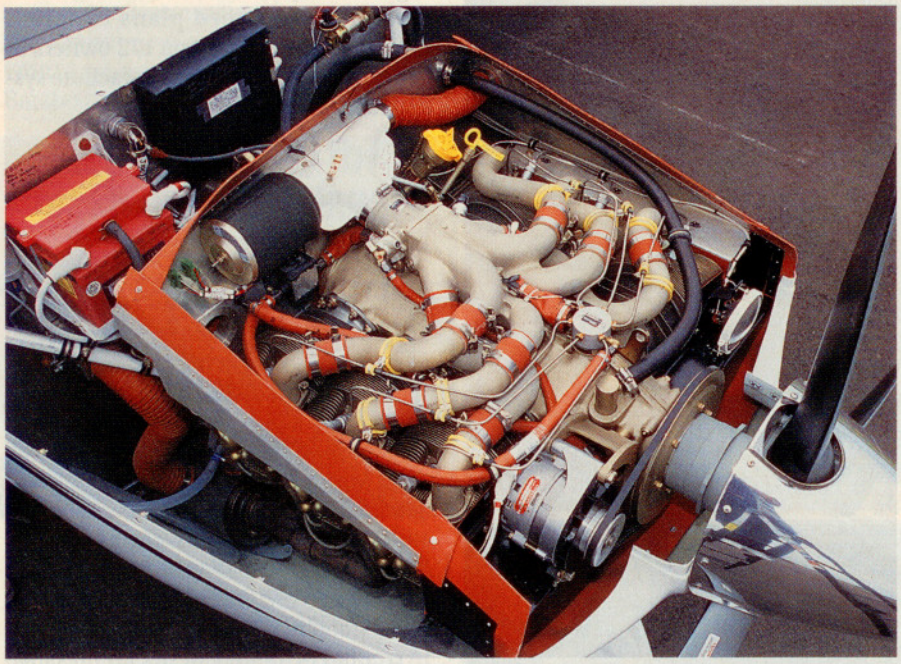
It is such technology as CAPS that kept Conley interested and his deposit in the Cirrus bank account as 1996 became 1997. Meanwhile, other potential customers took notice as well, enthralled by the other attributes of the new aircraft. To improve the chances for survival in any accident, Cirrus paid special attention to the cockpit and seat design to help it absorb as much force as possible in a crash.

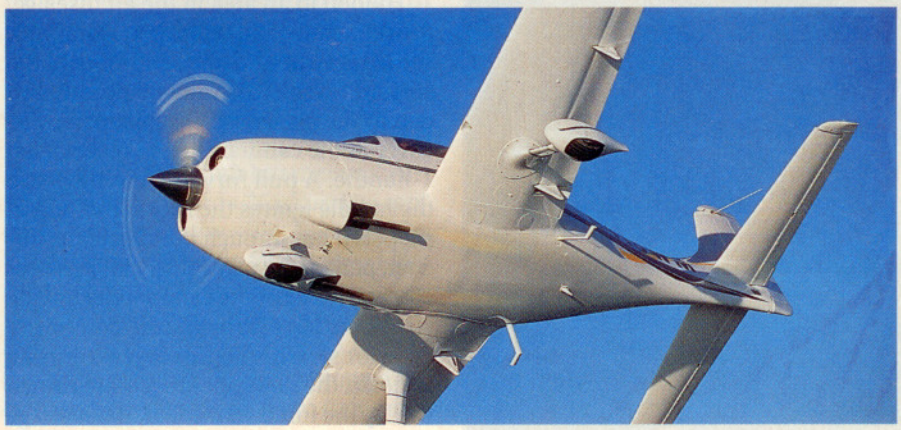
The panel is farther forward than on most aircraft, helping to keep those in the front seats from hitting it during a crash. In addition, Cirrus eliminated the conventional yoke in favor of sidestick control yokes that sprout from each side of the panel near the cabin sidewalls. The move greatly improves visibility of the panel area and reduces concerns about hitting the yoke during a crash.

The Klapmeiers believe that the SR20's avionics and navigation systems will improve situational awareness. At the top center of the SR20 stack is a large-screen moving map from Arnav Systems. The map shows the aircraft's position relative to navaids, airports, and special-use airspace. It can also display checklists and emergency procedures. Eventually, the system may be able to depict weather delivered to the aircraft via datalink.

For navigation, the SR20 carries a stack of Garmin avionics. The base package includes a Garmin GNS 430 IFR GPS nav/com that also includes a color moving map. Below that is the GNC 250XL GPS/com. Also standard are an S-Tec System Twenty single-axis autopilot and a Garmin transponder and audio panel. More elaborate avionics packages are also available, all the way up to one that adds $32,800 to the base price of $179,400. It features dual Garmin 430s, an S-Tec 55 two-axis autopilot, a Century horizontal situation indicator, and a standby alternator.

The 200-hp Continental IO-360-ES utilizes both tuned induction and exhaust to extract every horsepower while keeping fuel flows down.

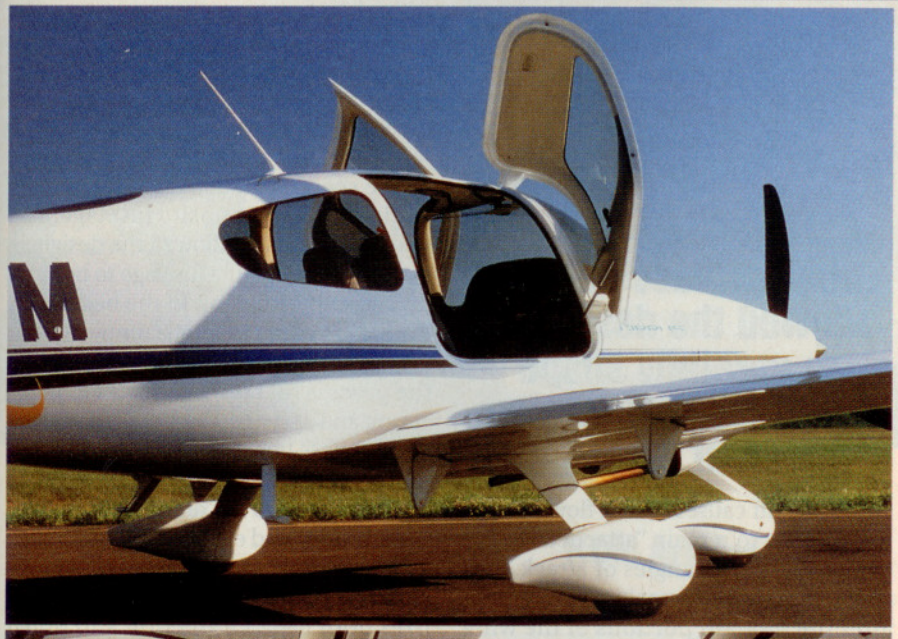


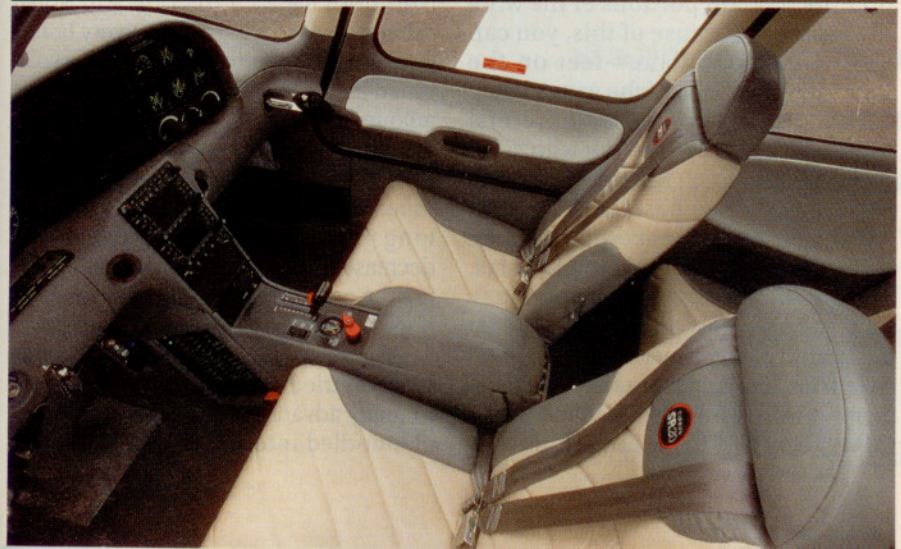


A standby vacuum system is standard, as is a clever standby power supply for the electric turn coordinator. During certification to the latest amendments to Part 23 of the Federal Aviation Regulations, the FAA decreed that an aircraft battery could not be adequately relied upon to power the turn coordinator in the event of an alternator failure. So, to meet the requirements for a redundant power supply, Cirrus engineers designed a backup power supply for the TC. A pair of nine-volt batteries behind the panel can power the TC for a couple of hours. After an electrical failure, the pilot can flip a toggle switch next to the TC to move it from the ship's power supply to the nine-volt batteries. The pilot can replace the batteries himself, just as with an ELT battery.

Besides the new technology, it was the cabin size that attracted Conley, who stands six feet, four inches tall and simply doesn't fit into many GA aircraft. But with a 50-inch-high cabin that is 49 inches wide, he has plenty of room. "I try on cars before I buy them, so you can believe that I was concerned about fitting into my airplane," Conley remarked.

Indeed, the big cabin is comfortable. High-quality seats made of dense foam provide a solid ride. Leg- and headroom in the aft seats are also very good. Large windows provide an excellent view for all aboard. Backseat passengers can easily keep up with the navigation, thanks to the large Arnav display in the panel. A four-place intercom is standard, with separate music inputs for front- and backseat passengers. Power jacks for active noise-canceling headsets are also included, tucked away in the center console between the front seats. Four-point harnesses attach to all four seats. Conley chose the cloth interior; leather adds





$3,300 to the price tag. And, leather or not, the SR20 can actually carry four people in those four seats.

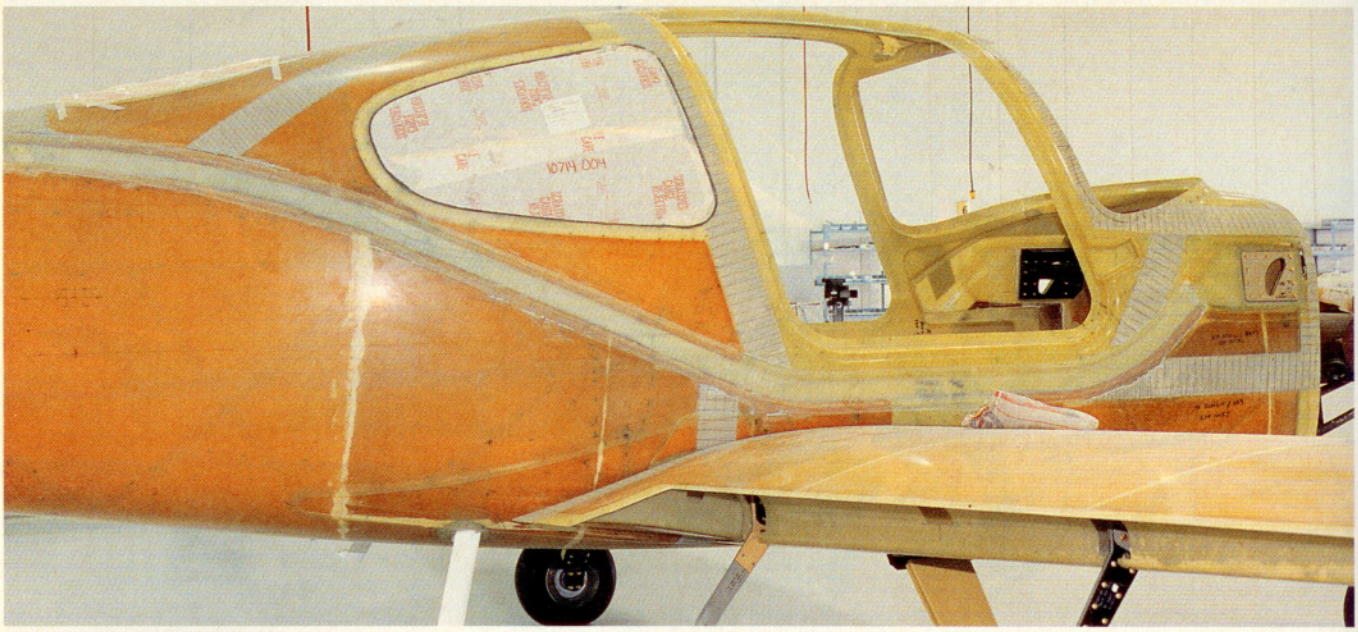
With a maximum gross weight of 2,900 pounds and a standard empty weight of 1,875 pounds, the SR20 can carry its full 56 gallons of usable fuel and four 170-pound adults. Cirrus hopes to earn approval for a 100-pound or more maximum gross weight increase for all SR20s, even those already delivered.

Cabin entrance and egress are easy, thanks to the two large doors that open up and forward. Baggage goes in through a waist-level door on the left side.

In his flights, Conley routinely sees fuel burns of 9 to 9.5 gph in cruise, which is better than the advertised 10-gph rate. The SR20 routinely turns out cruise speeds of 160 kt at full throttle and 2,500 rpm. At maximum cruise, which is 2,700 rpm, the speed jumps to more than 160 kt. "It does everything as advertised, or more," Conley noted.

Our test flights in Conley's airplane closely mirrored his results. We saw cruise speeds of 157 kt true on 10 gph at 2,500 rpm and 5,500 feet. At 2,700 rpm, the speed increased to 160 kt. At those figures, endurance stretches to 4.8 hours with IFR reserves. No-wind range equals 768 nm.

While unusual in appearance, the side stick feels completely natural in flight. For takeoff, elevator trim is set using a scale on the stick. Dial in up or down nose trim with the electric system until

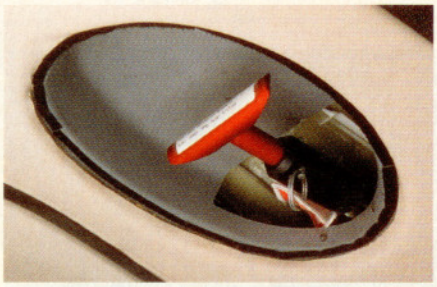


the takeoff position on the scale shows under a marker near where the yoke goes into the panel. The SR20 has no manual trim system and no trim tabs. Trim is controlled by a thumb switch. Movement of the switch actuates an electric servo that moves a centering spring cartridge in the flight control system. When the spring has relieved the force on the yoke, you release the button. It sounds more complicated than it is, and in fact it creates a very smooth and efficient flight control system. The process is similar to those employed in helicopters. The servos in the SR20 trim system are the same as those used in the S-Tec autopilot system, which reduces overall weight and complexity.

With takeoff trim set, you advance the single power lever, which actually controls both throttle and propeller rpm. Again, it's a simple, mechanical system. Through the first few inches of lever travel, you are opening the throttle. The last bit of travel brings in the prop governor to move the rpm from 2,500 to 2,700 for takeoff. Rolling down the runway, you don't actually pull back on the stick to rotate as much as you squeeze your elbow into the armrest at about 65 kt. That movement rotates the nose up to the proper climb attitude. Leave the power lever alone during the climb. An altitude-compensating fuel pump manages the fuel flow throughout the ascent. At level-off, you can nudge the power lever back to 2,500 rpm, lean the mixture, and you're done. There are no cowl flaps to mess with.

The SR20 has a very solid, stable feel to it in flight. At slow speeds, the unusual leading edge cuff comes into play to prevent the aircraft from easily entering a spin. Cirrus certified the SR20 in the "spin resistant" category, thanks to the cuff. The cuff causes the air flowing over the ailerons to remain "attached" to the wing at very high angles of attack. As a result, the ailerons remain effective even after the inboard portions of the wing have stalled. Because of this, you can easily fly the airplane—feet on the floor—despite much of the wing's being stalled. You'll be descending at several hundred feet per minute, but with complete aileron control. The intent is to prevent the common base-to-final-turn stall-spin accident by allowing the pilot to simply roll wings-level even in a stall. There is plenty of natural buffeting to alert even the most distracted pilot that the aircraft is entering a stall. It's a good system and a significant safety enhancement. It will be interesting to follow the safety record of these aircraft as they come into service.

Straps for the parachute are embedded in channels just below the skin (above). Pop off the cover and then pull the red handle (below) to deploy the chute.



The fiberglass material allowed the designers to carefully shape the aerodynamically efficient fuselage.

For landing, the pilot has a choice of three settings for the slotted flaps: none, 16 degrees, and 32 degrees. The SR20 will develop a high sink rate with the power off, so the trick is to come across the fence with a bit of power at the proper attitude, and then—over the numbers—gradually pull the power back and allow the aircraft to settle to the ground, holding the attitude. It's quite easy to make good landings.

Part of the reason for the SR20's stellar cruise speeds on such a small, efficient engine is the composite fuselage. The fiberglass material allowed the designers to carefully shape the fuselage to be aerodynamically efficient. In the beginning, the airplane was to be all composite, but Cirrus engineers discovered fairly early in the process that it was difficult to make strong and stiff flight control surfaces out of fiberglass because of the tight spaces inside, particularly at the trailing edges. As a result, the SR20 has aluminum ailerons, flaps, rudder, and elevator.

The engine itself delivers other efficiencies. The Continental IO-360-ES utilizes both tuned induction and tuned exhaust to efficiently extract every horsepower while keeping fuel flows down. A tuned induction system delivers an equal amount of air at the same velocity to each cylinder, allowing efficient and consistent combustion from cylinder to cylinder. A tuned exhaust system—evidenced by the long parallel stacks along the belly—decreases exhaust back pressures, allowing the engine to efficiently deliver rated horsepower with minimal fuel burn.

Overall, the SR20 combines a unique blend of tried-and-true systems married to many advances in safety and avionics, all bundled into a robust and efficient

airframe. The result is just the airplane that a fellow named Walt Conley was looking for when he first started his search for a new airplane nearly a decade ago. More than 352 others with orders in place are anxiously awaiting their chance to experience the SR20. If they are like Conley, they won't be disappointed in this newest member of the general aviation fleet. □

Links to additional information about the SR20 may be found on AOPA Online (www.aopa.org/pilot/links.shtml). E-mail the author at thomas.haines@aopa.org

Cirrus SR20
Base price: $179,400

Specifications

Powerplant	Continental IO-360-ES, 200 hp @ 2,700
Recommended TBO	2,000 hr
Propeller	Hartzell two-blade, 76-in diameter (three-blade, 74-in diameter, optional)
Length	26 ft 3 in
Height	9 ft 3 in
Wingspan	35 ft 3 in
Wing area	135 sq ft
Wing loading	21.5 lb/sq ft
Power loading	14.5 lb/hp
Seats	4
Cabin length	10 ft 10 in
Cabin width	49 in
Cabin height	50 in
Empty weight	1,875 lb
Max gross weight	2,900 lb
Useful load	1,025 lb
Payload w/full fuel	689 lb
Max takeoff weight	2,900 lb
Fuel capacity, std	60 gal (56 gal usable) 360 lb (336 lb usable)
Oil capacity	8 qt
Baggage capacity	130 lb, 32 cu ft

Performance

Takeoff distance, ground roll	1,310 ft
Takeoff distance over 50-ft obstacle	1,865 ft
Rate of climb, sea level	900 fpm
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	
@ 75% power, best power	160 kt/4.8 hr
6,500 ft	(60 pph/10 gph)
Service ceiling	16,000 ft
Landing distance over 50-ft obstacle	1,960 ft
Landing distance, ground roll	1,000 ft

Limiting and Recommended Airspeeds

V_X (best angle of climb)	81 KIAS
V_Y (best rate of climb)	94 KIAS
V_A (design maneuvering)	135 KIAS
V_{FE} (max flap extended)	100 KIAS
V_{NO} (max structural cruising)	185 KIAS
V_{NE} (never exceed)	200 KIAS
V_R (rotation)	65 KIAS
V_{S1} (stall, clean)	65 KIAS
V_{SO} (stall, in landing configuration)	57 KIAS

For more information, contact Cirrus Design, 4515 Taylor Circle, Duluth, Minnesota 55811; telephone 218/727-2737; fax 218/727-2148; or visit the Web site (www.cirrusdesign.com).

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.

A date to remember

Reflecting on a five-year aircraft project

The July 20 first delivery of the SR20 proved to be a bittersweet day for Cirrus founders Dale and Alan Klapmeier. The brothers have spent all of their adult lives working toward the day when they would own a successful aircraft company. The October 1998 awarding of the type certificate at AOPA Expo in Palm Springs, California, was certainly a banner day in the five-and-a-half-year project to build the SR20, but the day of the first delivery was the sure sign that the young men had made their dream come true.

The brothers first became familiar with composite materials when working as teenagers in their uncle's yacht-building business. They later started rebuilding a wrecked airplane and then built a Glasair kit airplane before launching Cirrus Design. Their first project was the VK30, a high-performance, four-place pusher design. They soon turned their attention to the production market with the development of the SR20.

In the end, the SR20's design, certification, and startup phase has cost some $70 million, much of it coming from private investors. Going into it, the brothers thought they would need $40 million to $50 million and three years to complete the project, according to Alan Klapmeier. To date the company has 352 orders for the SR20 and is averaging about one new order per business day so far this year. The backlog is worth some $65 million. Alan Klapmeier predicts that the company will deliver 15 aircraft by the end of the year and 100 aircraft over the next 12 months. About 260 employees now work under the Cirrus Design banner, in two factories—one in Duluth and one in Grand Forks, North Dakota. The company also owns a paint shop in Hibbing, Minnesota.

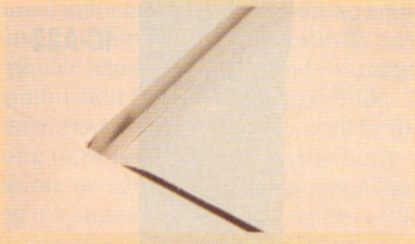
Beyond the numbers, the project has taken a toll on the brothers, their families, and their finances. Test pilot and former astronaut Bob Overmyer died in March 1996 while test flying a new wing design for the VK30. Overmyer was also a columnist for *AOPA Pilot*. The accident rocked the young company, but the SR20 project, which Overmyer was originally hired to work on, continued.

Another test pilot, Scott Anderson, died in March of this year when the SR20 he was flying crashed in a prison yard just south of the factory. After weeks of investigation, the National Transportation Safety Board determined that the leading edge of the right aileron skin had become caught on top of the trailing edge of the right wing skin. Post-crash tests show that the composite wing and aluminum flight control twist at different rates under the loads, allowing the aileron skin to slip up over the wing skin. Once the skin was latched into place, Anderson had only marginal control over the aircraft. He managed to return to the airport but lost control of the aircraft after an attempted landing. The test aircraft was not equipped with the ballistic parachute that is standard on production SR20s.

Employees, the media, and his brother, Dale, look on as Cirrus President Alan Klapmeier reflects on the SR20 project.

To prevent a similar accident from occurring, Cirrus closed the leading edge of the ailerons and increased the gap between the trailing edge of the wing and the leading edge of the aileron. The engineers also increased the gap between the trailing edge of the horizontal stabilizer and the leading edge of the elevator, even though that did not play a part in the accident.

And so, while the July 20 delivery was a joyous event for the Klapmeiers, it was also a day for them to reflect on the long and trying road to certification and first delivery of their aircraft. —*TBH*



As a result of a flight-test accident, Cirrus increased the space between the trailing edge of the wing and the leading edge of the aileron.