

HERE COME

Solaris Sigma 230

By Julie K. Boatman

The Solaris Sigma line of aircraft claims a blend of the best production capabilities in both Europe and the United States. Solaris sees this as a way to build an aircraft that sets it apart from others in its class. Take the best technicians you can find at competitive rates, and sell the finished product in a market that will pay a little more for high quality.

By building its production facility in Poland, Solaris will take advantage of highly skilled workers there to create the large components, such as the wings and fuselage, of its Sigma series of composite aircraft. The aircraft shell will then be shipped to the company's finishing facilities in West Palm Beach, Florida, for completion and avionics installation. *Voilà!* Quality at the reasonable—albeit not inexpensive—price of \$244,900.

PHOTOGRAPHY BY MICHAEL P. COLLINS



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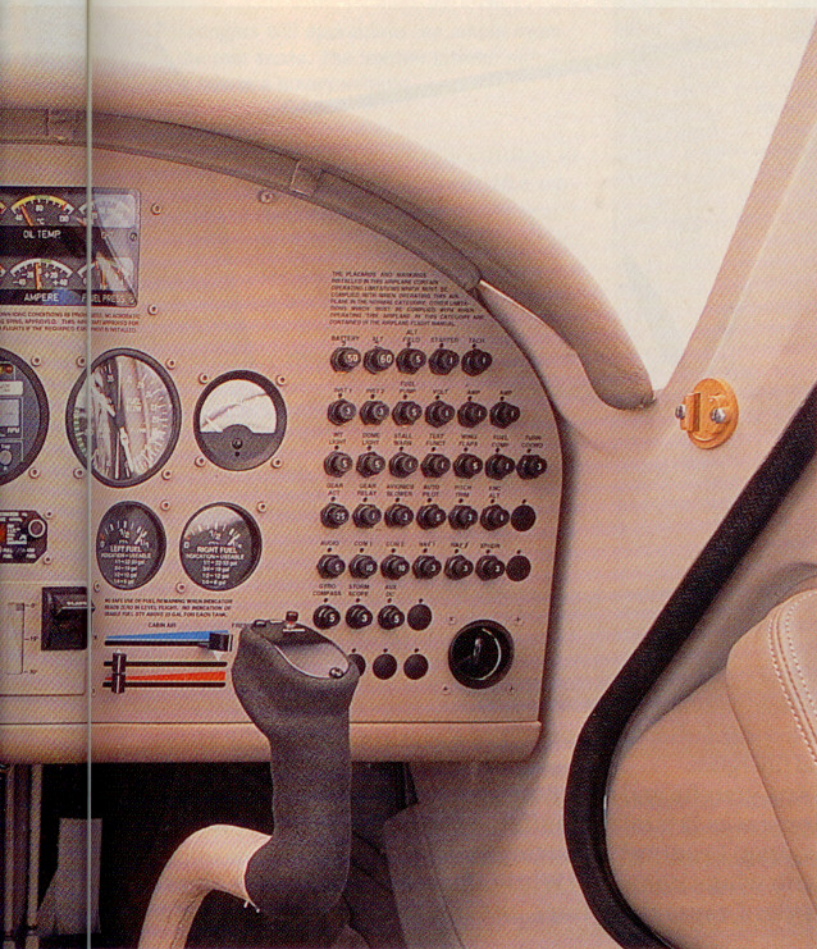
Mercedes-Benz quality at an attractive price

The Sigma 230 is essentially the same airplane as the Ruschmeyer R 90, originally developed by Horst Ruschmeyer Aircraft Production KG of Melle, Germany, back in 1993. Ruschmeyer was "ahead of his time" when he developed the R 90, according to Jim Cook, avionics engineer and Solaris vice president. *Pilot* reviewed the R 90 in 1994 and found it to be a responsive airplane (see "Ruschmeyer R 90-230 RG: Where Composite Becomes Conventional," November 1994 *Pilot*). While changes to the panel and interior styling update the airplane to greet the new century, its handling is still crisp, as the airframe and controls are the same as those of the original design.

Solaris plans a line of aircraft from this design. The currently flying Sigma 230, flown for this article, is targeted for the Euro-







Remote fuel cap release mechanisms and an ergonomic control stick are two of the details that set the Sigma 230 apart.

pean market, with its derated engine (the Lycoming IO-540-C4D5 at 230 horsepower) and four-blade, composite propeller for a lower noise impact—to meet more stringent noise regulations across the pond. While the 230 is available in the United States, the company figures that most U.S. customers will opt for the Sigma 250 or the 310. The 250 has the same engine as the 230 but with higher horsepower (250 hp) and a three-blade, metal propeller. The Sigma 310 takes the line one notch faster by bolting on a Continental IO-550N and cranking up the juice to 310 hp. For the horsepower, judging by flights in

the 230, the 310 should give a normally aspirated Beech Bonanza heart pains on a speed run. A turbocharged version of the 310 is also on the drawing board.

Solaris envisions that 80 percent of its market in the United States will be for the Sigma 310 and 20 percent for the 250. There are currently three or four 230s flying in the United States, with more than 20 operating in Europe. Solaris expects delivery of its first 250 and 310 models to take place by the end of 2002.

Flying vinyl

The fuselage is all composite, with the majority crafted out of a specially formulated FAA-certified vinyl-ester resin with a foam core. The wing and fuselage have gone through 55,000 simulated flight hours during structural testing, for a certificated lifetime of 18,000 hours. The cabin is purportedly so watertight that blasting the fuselage with a fire hose wouldn't cause water to enter the cockpit, according to company officials. The airplane is "as good as we can make it, not as cheap as we can make it," says Cook.

The Sigma 230 has a stainless steel tube running vertically up the center of



the windshield that forms part of the airplane's lightning protection system—in addition to providing rollover protection and support for the doorframes. While some carbon fiber is used around the doorframes for strength, the vinyl-ester resin was chosen for the primary

structure because of its low conductivity compared to traditional fiberglass.

The wingtip design says graceful and fast—the upsweep increases lateral stability and reduces drag. Leading-edge stall strips on both wings, common in aircraft of this class, cause the

portion of the wing behind the strip to stall earlier. The resulting disrupted airflow over the tail surfaces produces a buffet, warning the pilot of the impending stall.

While the exterior exhibits sleek lines, the instrument panel is really

Passengers will appreciate the ample room in the rear seats. The leather interior signals that this is a luxury vehicle.

something special, at least according to Cook, who helped engineer the upgrades to the original design. He's spent the latter part of his career building better cockpits as an avionics engineer. The waiting list at his shop, Palm Beach Avionics, is long, but he jumped at the chance to restructure the Solaris panel. By changing the circuit breaker alignment and relocating the engine instruments, he was able to tweak the locations of gauges and boxes most regularly used in flight. The result is a clean layout and a maintenance dream: The panel is in two sheets that tilt forward, making it easy for a technician to access.

Garmin products highlight the center stack. A GNS 430 and 420 GPS/com duo comes standard and complements the digital GTX 327 transponder and GMA 340 audio panel. A GNS 530/430 duo can replace the 430/420 for an additional \$7,790. An S-Tec System 40 autopilot comes standard, and the optional autopilot system include the S-Tec ST-361 flight director, ST-180 slaved compass/



horizontal situation indicator, and Fifty-Five X autopilot. The Fifty-Five X and the GNS units work together with the GPSS or "roll-steering" feature, which allows the autopilot to fly a GPS course nearly

hands-off—the pilot no longer needs to turn the needle during course changes.

Other options include a Goodrich Stormscope WX-500 and Shadin fuel data computer, which feed more in-

SPECSHEET

Solaris Sigma 230

Base price: **\$244,900**

Price as tested: **\$306,005**

Specifications

PowerplantTextron Lycoming IO-540-C4D5 rated @ 230 hp	
Recommended TBO	2,000 hr
PropellerMühlbauer, 4-blade composite, constant speed	
Length	26 ft
Height.....	8 ft 11 in
Wingspan	31 ft 2 in
Wing area.....	139.3 sq ft
Wing loading.....	21.4 lb/sq ft
Power loading	12.9 lb/hp
Seats	4
Cabin length	9 ft 5 in
Cabin width.....	3 ft 9 in
Cabin height	4 ft 1 in
Empty weight, as tested	2,101 lb
Maximum ramp weight	2,977 lb
Maximum gross weight	2,977 lb
Useful load, as tested	875 lb
Payload w/full fuel, as tested	501 lb
Maximum landing weight	2,977 lb
Fuel capacity, std	66 gal (62.3 gal usable) 396 lb (373.8 lb usable)
Oil capacity	12 qt
Baggage capacity	110 lb, 28 cu ft

Performance

Takeoff distance, ground roll	853 ft
Takeoff distance over 50-ft obstacle.....	1,706 ft
Rate of climb, sea level	1,140 fpm

Maximum level speed, sea level175 kt
Cruise speed/endurance w/45 min rsv, (fuel consumption)

@ 75% power, best economy 8,000 ft	165 kt/3.7 hr (14.3 gph)
@ 65% power, best economy 9,000 ft	156 kt/4.4 hr (11.9 gph)
Service ceiling	20,000 ft
Landing distance over 50-ft obstacle....	1,575 ft
Landing distance, ground roll.....	1,066 ft

Limiting and Recommended Airspeeds

V _X (best angle of climb)	76 KIAS
V _Y (best rate of climb).....	98 KIAS
V _A (design maneuvering)	128 KIAS
V _{FE} (max flap extended)	102 KIAS
V _{LE} (max gear extended)	140 KIAS
V _{LO} (max gear operating) Extend	140 KIAS
Retract	140 KIAS
V _{NO} (max structural cruising)	157 KIAS
V _{NE} (never exceed)	193 KIAS
V _R (rotation)	62 KIAS
V _{S1} (stall, clean)	71 KIAS
V _{SO} (stall, in landing configuration)	57 KIAS

For more information, contact Solaris Aviation, Palm Beach County Airport, 11250-4 Aviation Boulevard, West Palm Beach, Florida 33412; telephone 954/757-5480; fax 954/757-5182; or visit the Web site (www.solarisaviation.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.

formation into the Garmin stack for complete flight management. All lighting switches and dimmer controls are in a row below the center stack.

The interior smells like a new luxury car—it's outfitted in leather. The front seats elevate as they move forward, making the view out the front a little better for those with shorter legs. The aft cabin is 3 feet 9 inches wide, making it one of the most spacious in the class. Flying as a backseater in the Sigma series means riding in style—though we all agree the pilot seats are more fun to occupy. Luxury-car-style features include remote fuel cap and baggage door release mechanisms located inside the cabin.

Full-fuel payload is 501 pounds—enough for *almost* three people with no bags. Other aircraft in the class, such as the Bonanza and the Cirrus SR20, have larger payload capacities by more than 100 lb. The baggage compartment is a reasonably sized 28 cubic feet on the 230, and it holds 110 pounds of cargo. The access door may seem a little on the small side—but only if you're accustomed to the barn doors on the Beech A36 Bonanza. The gull-wing doors on both the pilot and passenger sides open wide and provide good access to the rear seats.



Snappy handling, thanks to pushrod-actuated controls, makes the Sigma 230 fun to fly.

Mercedes in the clouds

Solaris likens the Sigma series to an upper-crust sports car, and that analogy holds true once airborne. On the ground, a couple of quirks, neither of them deal-breakers, keep you on your toes, so to speak. Taxiing the Sigma 230 is straightforward using the steerable

nosewheel, but once you get rolling down the runway, be ready. Though we were briefed about the amount of rudder the Sigma requires on takeoff, we were surprised to find that it took a lot of pressure to keep the airplane tracking straight. Because the nosewheel is linked to the rudder pedals, once you

leave the ground the nosewheel cocks, so it's important to lift off smartly—and stay off. We rotated around 75 knots and settled into a climb.

Visibility out of the Sigma 230 is superior. The side windows wrap upward to expose the sky nearly overhead, lending a great view in turns. The central support

tube that cuts through the windshield is dull gray and fades into the background so that it's barely noticeable in flight. Engine controls are located on a console between the front seats.

A stick instead of a control wheel tips you off to the experience that lies ahead. Solaris changed the stick's shape so that it slightly favors the hand most likely to be used—the left hand in the case of the pilot's side. While the stick rests forward during taxi, it pops up to neutral in flight and feels natural and balanced. The control surfaces themselves are moved by duplicate pushrods; you can see them exposed leading to the elevator where the horizontal stabilizer connects to the empennage. This lends a positive feel to aileron and elevator control. The airplane snaps to attention when introduced to a steep turn, and standard maneuvers are a joy.

The elevators adjust to the current flap position through an interlink to compensate for flap-induced trim changes. The nose pitches down slightly when the first 15 degrees of flaps go in, not unlike other aircraft in the class. A much lower flap speed (102 KIAS) than gear extension speed (140 KIAS) means the gear comes down first to slow the Sigma 230. Flaps typically are added upon entering the traffic pattern.

During a full-power initial climbout from near sea level, we posted 1,100 fpm at 100 KIAS, which stabilized around 800 fpm for the climb to 8,000 feet. Outside temperature on the ground was 27 degrees Celsius. Above 8,000 feet, climb rates dropped slightly but stayed above 500 fpm to 12,000 feet, as high as we flew for our testing.

Up there in cruise, performance was solid. Speed runs conducted at 8,000 feet and full power resulted in 145 KIAS, and 168 knots true airspeed (KTAS), with an outside temp of 14 degrees C. Subsequent legs were flown at 10,000 feet, with average speeds of 137 KIAS and 167 KTAS, and at 12,000 feet, with speeds of 131 KIAS and 164 KTAS. Solaris claims a 175-knot maximum level speed at 100-percent power. Remember, these are speeds with the 230 engine; expected true airspeeds with the 250 and 310 engines should come close to Solaris' projections of 184 KTAS and 215 KTAS, respectively, in the maximum performance cruise configuration.

Slow flight and stalls were explored with an eye toward the relatively high bottom of the white arc on the Sigma series. The wing is a fast one and is not

optimized to fly slowly. As a result, flaps-down stall speed occurs at 57 kt (60 kt indicated for the 310, right at FAR Part 23 limits), and there's a sharp wing drop that accompanies the stall. This isn't unusual for an airplane of this type—Mooneys and Bonanzas are also known for the tendency to roll during a full stall. However, it bears noting that the operating handbook for the 230 lists 5,000 feet agl as the minimum altitude for intentional stalls.

Landing the Sigma 230 is straightforward and fast. Getting the airplane slowed down to the 102-kt flap speed is the greatest challenge, although extending the landing gear helps. Aiming for 100 kt in the pattern and 85 knots on short final works well. Keeping the power in until just before touchdown is critical, as the 230 sinks fast—and the four-blade prop adds drag—when the power comes off. The trailing-link gear cushions the touchdown and makes passenger-pleasing landings easy once you nail the power and speed management.

Aiming high

David Schuldt, Solaris chairman, sees the primary competition for Solaris as Cirrus and Lancair. "Cessna and Piper have pursued different niches. Solaris is like...the sports car of the sky."

"There's a segment of the market that wants to fly a retractable-gear airplane," according to Schuldt. The high end of the market is where the most fun is, and people appreciate quality. "I'd rather pay 10 percent more if the quality represents something I want." The Sigma 230 sells for \$244,900 in Europe, the Sigma 250 sells for \$244,900 as well, and the 310 sells for \$279,900. To put these prices in perspective with the competition, the 200-hp Cirrus SR20 base package lists for \$197,600, and the 310-hp SR22 base package for \$276,600; the 310-hp Lancair Columbia 300 lists for \$299,700, and the turbocharged Columbia 400 for \$349,500. If German-engineered quality is truly what the Sigma 310 represents, you're getting it for a stateside price.

i Links to additional information about Solaris aircraft may be found on AOPA Online (www.aopa.org/pilot/links.shtml).

AOPA

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