



Columbia 400

Fifty years ago the last of 1,400 Mercedes-Benz 300 SL "gullwing" coupes rolled off the production line. The gullwing coupe instantly garnered attention and gained a nickname based on the way the passenger doors opened up, hinging from the top so that they looked like the wings of a gull.

The Columbia 400 is similar to this classic car in many ways. Its doors also hinge from the top. Like the Mercedes, the Columbia 400 possesses a sleek and slippery form that looks fast and sporty. The 400 may follow the path set by the Mercedes 300 SL and become a classic, but not because of a limited production run. No, the Columbia factory in Bend, Oregon, is humming, and every day three happy buyers are flying away from Bend in their new Columbias.

The year 2006 was marked by lots of good and a little bad news at Columbia. Sales of the company's two models, the 310-

A whole lot of **get up** and **go**

A speedy model sure to become a classic

BY STEVEN W. ELLS

PHOTOGRAPHY BY RICHARD VANDERMULLEN



The twin 10.4-inch LCD screens of Garmin's G1000 fully integrated navigator/communicator/autopilot system bookend the vertically mounted audio control panel. Engine data is displayed on the left side of the MFD. The "go-around" button is located directly above the black throttle knob. Large air-conditioning and airflow outlets add to cabin comfort.

horsepower normally aspirated 350 and the turbocharged and intercooled 400, reached new levels. Airframe static fatigue testing had to be suspended when the test airframe proved to be so strong that the test tooling broke, and the company has continued to upgrade and better its airplanes with innovative features. All this good news was offset by a freak hailstorm that whipped across the Bend airport one June day and pelted a ramp full of Columbia's finest with a barrage of golf-ball-size hailstones before moving on. Had a similar storm dumped its load on a ramp full of aluminum airplanes, the damage would have amounted to millions of dollars. Out of this potentially catastrophic situation came a reinforced confidence in composite construction, since an in-depth damage assessment program revealed no more than cosmetic damage.

Another dark cloud swept across Columbia just before this magazine went to press when unexplained failures of Garmin's GRS 77 attitude heading reference system (AHRS), which helps drive the primary flight display (PFD) in the G1000 avionics system, forced

Columbia to lay off nearly 2,000 employees and suspend deliveries of its 350 and 400 models for nearly two weeks in August. Garmin announced a solution to the GRS 77 problem within a week and Columbia was again up to full production with all employees back at work by August 27.

Columbia 400

The Columbia 400 is a true twenty-first-century airplane that melds a tough composite-construction airframe, one of Teledyne Continental's latest powerplants, and Garmin's sophisticated and user-friendly G1000 integrated avionics and autopilot system. The result is an airplane with excellent speed and high-altitude performance with a comfortable and well-appointed cabin that's loaded with features never seen in this class of airplane just a few short years ago.

There's the fully automatic computerized climate control system that is guaranteed to drop cabin temperatures by a full 20 degrees Fahrenheit within five minutes after engine start. Just set the desired temperature and forget it. Other recent improvements include

two-position rudder pedals; an increase in usable fuel from 98 to 102 gallons; a key-fob-controlled remote door lock and door entry system; and a rudder-hold button that, when pressed, holds the rudder pedals in position. This simple feature takes the place of a more complicated rudder trim system.

One tough airframe

Columbia's weather-borne headaches are past, the composite construction is further vindicated, and Columbia production is booming. The company delivered 185 airplanes—146 Columbia 400s and 39 Columbia 350s—in 2006, and that number will certainly be exceeded this year if all goes well.

Columbia's airplanes are certificated to the very strenuous set of requirements spelled out in FAR Part 23, which requires safety items such as an integral roll cage. Older airplanes were certificated under less strenuous CAA guidelines.

In addition to the rigors of Part 23 certification, Columbia chose to certify all its airplanes to the tougher Utility category guidelines (plus 4.4 Gs and minus 1.76 Gs) instead of the more common standard category requirements.

Dual-spar wing construction, an impact-resistant five-sixteenths-inch-thick windshield, carbon-fiber construction of the rudder and ailerons, and a no-single-failure-point philosophy that dictated three attach points for each aileron and the rudder and four-point attachments for each flap are indications of Columbia's dedication to this standard.

The powerplant

Columbia's stable of 400-series airplanes includes the 400, 400i, 400SL, and 400SLX. They are all powered by the same engine—a six-cylinder, fuel-injected, Teledyne Continental Motors (TCM) TSIO-550-C engine featuring cross-flow heads and a tuned top-down induction system. Boost is provided by twin turbochargers pushing compressed air cooled by twin intercoolers to the cylinders. The engine produces 310 horsepower at 35.5 inches of manifold pressure and 2,600 rpm. TCM's new Platinum engines—with tighter balancing and manufacturing tolerances than new non-Platinum engines as well as other features such as matched fuel-injection nozzles—are options on the 400 and 400i and standard equipment on the 400SL and -SLX.

Systems such as Columbia's electric E-Vade anti-icing, speed brakes, a built-in oxygen system by Precise Flight, two reclining SportSeats by Oregon Aero, four Bose noise-canceling headsets with single-point power plugs, and the climate control system previously mentioned are standard equipment on the 400SLX. The TKS fluid-based anti-icing system has recently been added to the options list.

Columbia 400s are equipped with Avidyne's Entegra suite of avionics and S-Tec Fifty Five X autopilots, and the other three models all sport Garmin's G1000 integrated avionics and autopilot systems. The demonstrator airplane



Both side-stick controls incorporate autopilot disconnect, press-to-talk, control wheel steering, and aileron and elevator trim. The black trim plate behind the yoke contains a red button for engine priming and the magneto switch. The circuit breakers nestle against the side panel.

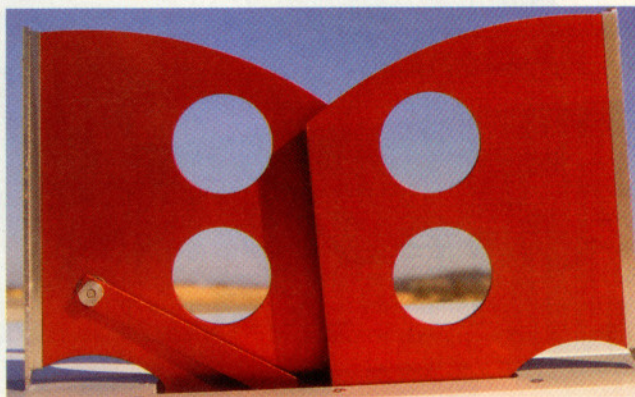
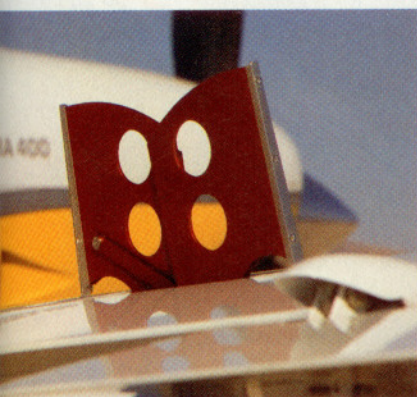
flown for this trip was a brand-new 400SLX—the Hobbs meter displayed 16 hours when we took off. During 12 and one-half hours' flying west, and three landings later, the airplane, engine, and avionics systems performed faultlessly.

The G1000 system controls, primary flight display, and multifunction display (MFD) provided a quantity of engine and flight display information that was truly encyclopedic. One button push revealed a Trip Statistics page—this airplane had flown 3,679 miles at an average true airspeed of 183.6 knots since new. After climbing to altitude and leveling off, we set cruise power to approximately 82 percent at 31.5 inches of manifold pressure and 2,450 rpm. Columbia sales associate Jon Dennis gave the red

mixture knob a pretty positive tug aft to get the fuel flow down to approximately 20 gallons per hour. Then he pushed the "lean assist" button on the MFD, which caused the lower-left portion of the engine monitor page to magically grow in size on the MFD screen. The left and right turbocharger turbine inlet temperatures (TITs) were displayed in sliding-pointer and numerical formats. The pilot's operating handbook (POH) specifies that best power rich-of-peak settings be set by adjusting the TITs to 1,625 degrees F. Lean-of-peak (LOP) operations are approved—the POH recommends that you operate LOP below 65-percent power.

Setting LOP mixtures is easy. Pulling the mixture knob leans the mixtures, increasing the TITs until they peak. The Garmin system automatically marks peak TITs with a solid blue line on the sliding temperature scale indicators. TITs can then be leaned further to what the POH terms the "best economy" setting of 50 degrees lean of peak. The POH notes that cruising with lean-of-peak mixture settings will reduce the engine power output by 8 to 12 percent. A Columbia engineer explained that 85-percent power when rich of peak becomes the equivalent of 75-percent power when the mixture is leaned to 50 degrees lean of peak.

One of the advantages of lean-of-peak mixtures is lower exhaust gas temperatures (EGTs) and cylinder head



The Precise Flight speed brake system instantly adds drag without creating pitch changes. This helps pilots to descend quickly and slow Columbia's slippery airframes. The brakes can be deployed at any speed below V_{NE} .

SPECSHEET

Specifications

Powerplant	Teledyne Continental TSIO-550-C
Recommended TBO	2,000 hr
Propeller(s)	Hartzell 78 inch diameter 3 blade
Length	25 ft 1 in
Height	9 ft
Wingspan	36 ft
Wing area	141.2 sq ft
Wing loading	25.5 lb/sq ft
Power loading	11.61 lb/hp
Seats	4
Cabin length	11 ft 7 in
Cabin width	4 ft 1 in
Cabin height	4 ft 1 in
Empty weight	2,485 lb
Empty weight, as tested	2,573 lb
Useful load	1,115 lb
Useful load, as tested	1,027 lb
Payload w/full fuel	479 lb
Payload w/full fuel, as tested	391 lb
Max takeoff weight	3,600 lb
Max landing weight	3,420 lb
Zero fuel weight	3,300 lb
Fuel capacity, std	106 gal (98 to 102 gal usable)
	636 lb (588 to 612 lb usable)



Columbia 400

Base price: \$485,900

Price as tested: \$607,900

Oil capacity10 qt
Baggage capacity120 lb, 20 cu ft

Performance

Takeoff distance, ground roll1,200 ft
Takeoff distance over 50-ft obstacle
.....1,800 ft
Max demonstrated crosswind component
.....23 kt
Rate of climb, sea level, 3,600 lbs
.....1,285 fpm
Max level speed, 25,000 ft235 kt
Cruise speed/endurance w/45-min rsv, std
fuel (fuel consumption),
9,000 ft
@ 75% power, best power mixture.....
.....193 kt/3.7 hr
(126 pph/21 gph)
@ 65% power, best power mixture.....
.....180 kt/4.75 hr
(102 pph/17 gph)
@ 55% power, best power mixture.....
.....170 kt/ 5.9 hr
(84 pph/14 gph)
Max operating altitude.....25,000 ft
Service ceiling.....25,000 ft
Absolute ceiling.....25,000 ft

Landing distance over 50-ft obstacle
.....2,580 ft
Landing distance, ground roll1,200 ft

Limiting and Recommended Airspeeds

V_X (best angle of climb)82 KIAS
 V_Y (best rate of climb)110 KIAS
 V_A (turbulent air penetration speed)
@ 3,600 lbs.158 KIAS
 V_{FE} (max flap extended) 40 deg extension
.....117 KIAS
 V_{NO} (max structural cruising)181 KIAS
 V_{NE} (never exceed)230 KIAS
 V_R (rotation)65-70 KIAS
 V_{S1} (stall, clean)72 KIAS
 V_{SO} (stall, in landing configuration)
.....59 KIAS

For more information, contact Columbia
Aircraft Manufacturing, 22550 Nelson Road,
Bend, Oregon 97701.

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

temperatures (CHTs). The highest CHT and EGT seen during LOP high-power operations were well within the normal operating temperature ranges. When leaning is complete, one tap on the lean-assist button returned the MFD display to normal. The resulting true airspeed at 11,500 feet was 191 knots with a 17-gallon-per-hour fuel consumption. The lean-assist function (and running the big Continental lean of peak in general) is just one example of how Columbia, TCM, and Garmin have combined their efforts to create the latest and most capable version of Columbia's sleek, competent, and comfortable high fliers.

Altitude flying

We flew the trip from Lakeland, Florida, west to Paso Robles, California, at relatively low altitudes because of the prevailing westerly headwinds. Between 11,500 and 14,500 feet, at a lean-of-peak mixture setting, true airspeeds averaged between 189 and 195 knots. Although these speeds are slower than the best-power-mixture speeds in the POH for these altitudes, logging these speeds at LOP mixtures is a testimony to the wide operating spectrum of the air-

plane. Pilots either can choose to fly a typical 500-nm trip lean of peak at 189 knots and 17 gallons per hour or can elect to fly faster at best power mixtures (1,625 degrees F TIT on the rich side of peak). For the same manifold pressure and rpm settings—which yield 207 knots while consuming 24 gallons per hour when flying ROP—LOP settings will burn 31 percent less fuel yet you arrive only 14 minutes later.

The Columbia 400 is one of the three players in the “this airplane is the fastest production single for sale today” competition, and it does get up and go. The 400 is certified up to 25,000 feet, and the POH tells owners that they can expect 235 knots true airspeed at 85-percent power with best power (rich of peak) mixtures that result in a 25-gallon-per-hour fuel-consumption rate. The airplane flown for this report didn't quite live up to the book speeds.

The “fastest at 25,000 feet” advertising line is intriguing, but prudent fliers probably won't fly their Columbia, or any of the other fastest single contenders in a “let's go as fast and as high as possible at any cost” mode. That mode of operation uses too much fuel, and there are some serious hazards (such as hypoxia) that are ever present when flying a nonpressurized airplane above 18,000 feet for extended periods.

Bill Hammack is the owner of Columbia 400 serial number 3. He has flown his 400 for more than 450 hours and will tell you that one of the things he loves about his 400 is its ability to climb quickly above hazardous weather or an icing band. He chose N236RS as the registration number because it achieved 236 KTAS during his demo flight. Hammack calls it his “rocket ship.”

“I typically fly between 10,000 and 12,000 feet so I don't have to wear oxygen. I always see 200 knots true airspeed. On my typical 700-nm trip I get, within a little bit, the same performance I used to get with my King Air C90,” says Hammack.

Weight and balance

The 400SLX (model LC41-55FG) flown for this story has an empty weight of 2,573 pounds. Maximum takeoff weight is 3,600 pounds. A full fuel load is 106 gallons (98 usable on this model). The 400 series of airplanes has a zero-fuel weight of 3,300 pounds. This means that

Continued on page 74

Gullwing doors and Columbia's new paint schemes add to the 400's ramp appeal (left).

An **unusual** path

Learning to fly in a Columbia 350

BY CHARLES H. STITES

For convenience in scheduling, many student pilots have chosen to buy an airplane in which to learn to fly, so there's nothing special about Mike Sawaia's decision to do the same. What is unusual is that he chose to spend more than \$340,000 for an almost new Columbia 350, knowing that his insurance company would demand a premium of more than \$6,000, and that he'd be subject to a minimum of 50 hours of dual before being allowed to solo.

But the owner of an industrial machinery business who travels most of the East Coast and Midwest says it was an easy decision to begin his primary training in the Columbia, "I knew I'd be more comfortable in the airplane a lot quicker. And I wanted to be as good as I could be in the airplane, thinking ahead to the day when I'd be doing it on my own," said Sawaia.

Being comfortable in the airplane was more than a casual consideration for this student pilot with only three hours in a Cessna 172 before buying the Columbia. Sawaia readily admits to having a fear of flying before his training began. He says that the first four or five lessons were "pretty difficult" for him, but that soon passed as he built time in an airplane he feels is so stable and capable, qualities that helped him get over the anxiety he had previously experienced in the air, and allowed him to solo exactly at the 50-hour mark required for insurance reasons.

Along with his choice of a trainer, he credits flight instructor Steve Merritt with the success he's had with adapting to this very high performance single. "I chose to work with only one instructor, and Steve's a great one. We've done a lot of cross country work

into different airports, and that has proven the airplane's utility."

Of Sawaia's progress in such a demanding trainer, Merritt, who has soloed approximately 100 students (and now one in a Columbia) says, "Mike was ready to solo at 25 hours including about 10 hours cross country.

But with the insurance requirement, I soloed him at 50, and all three touchdowns were within 25 feet of each other." In fact, Merritt claims that, "because of its higher wing loading making it more stable and airspeed responsive, and its excellent longitudinal stability, teaching landings was easier in the Columbia than in the trainers."

As he approaches his check ride, Sawaia, (whose brother-in-law George is also learning to fly in the Columbia), says that he has no regrets in making such an investment in time and money. His fear of flying has evaporated; he's looking forward to the efficiency of using the airplane in his business; and he feels he "bought the best single engine airplane available" leaving him satisfied with his leap of faith in taking this unusual path in learning to fly.

Charles H. Stites is an aviation photographer and writer.



Steve Merritt and Mike Sawaia



Mike Sawaia brings his Columbia 350 in for a landing.

the maximum cabin load of passengers and baggage for this particular 400SLX can't exceed 727 pounds (3,300 less 2,573). The remaining 300 pounds to get to the maximum certified takeoff weight must be loaded as fuel. Columbia does not print lean-of-peak performance charts in the 400 POH, but the difference between the ROP fuel-burn figures in the POH and the LOP fuel burns noted during the flight mentioned earlier showed that LOP operations in general result in approximately 25 percent lower fuel consumption and a 10-percent reduction in speed.

The options page

The Garmin G1000 avionics system and GFC 700 attitude-based integrated autopilot system worked flawlessly. All of the pilots I spoke with told me that it's the best autopilot they had ever used. Another innovative Garmin feature on the Columbias is the Remote Access Data Entry GCU 476 keypad controller, which is mounted just forward of the center-console armrest. The keypad falls readily to hand and allows alphanumeric entries to be made without reaching forward. Although I first thought it was an over-the-top option, after using it, I'm now a be-

liever. All the other twenty-first-century avionics options such as E-Plates from Jeppesen, E-PROX terrain awareness and warning system, T-Watch traffic advisory system, SatWX satellite weather data-link, SatRadio Entertainment, and the E-Monitor engine monitor and fuel totalizer are standard equipment on the 400SLX. The optional equipment lists for the other 400-series models allow buyers to customize their airplane to best fit their mission.

There's another unique safety feature of the autopilot and airplane. This combination is capable enough to permit a pilot to execute a go-around by executing three simple steps. They are: pushing a go-around button located immediately above the throttle knob; adding full power; and pitching up so that the deck angle matches the flight director command bars. A 900-foot-per-minute climb results—and that was with the speed brakes deployed.

Columbia has paid a lot of attention to pilot and passenger comfort. For the 2008 model there are three different thicknesses of seat cushions by Sport-Seats from Oregon Aero that are standard equipment on the 400SL and 400 SLX. The wide cabin doors close with a


satisfying clunk and pneumatic door seals quiet the cabin. The cabin fit and finish is excellent.

One new feature for 2007 is a wider range of paint colors and a new paint design. The Columbia Web site (www.flycolumbia.com) has white papers on subjects such as mission flexibility and aircraft ownership for the first-time buyer, and is also packed full of information about financing packages, tax and financing options, and insurance requirements. You can experiment with the interactive airplane color charts.

The 1957 Mercedes-Benz 300 SL gullwing coupe is highly sought after by car collectors. If an eye-catching design that's coupled with cabin comfort, speed, exceptional avionics, a smooth-running, powerful engine, and safety are the keys to this type of technological admiration, then the Columbia 400 will be in high demand in 2057.

ACFA

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