



Sixth Sense

Piper's big single has room for more

BY MARK R. TWOMBLY

The Archer had been a good choice for a first-time aircraft buy. The fixed landing gear and fixed-pitch propeller kept things simple for the low-time private pilot, yet 180 horsepower provided adequate climb power, cruise speed and useful load. But the owner's young family was growing up. Two children

had become two teenagers, and the once-manageable baggage load had expanded to beyond-gross-weight dimensions. In addition, the Archer was leased back to the local FBO, Frederick Aviation in Frederick, Maryland, and was always being flown, it seemed. C. Warren Vest, AOPA 768885, had to schedule weeks ahead to use his own aircraft. It was time to move up. But to what?

A four-place retractable offered more speed, but no real increase in useful load. As with the Archer, fuel would have to be traded for people and bags. Vest's answer: Six seats to routinely carry four adults, their belongings and a full load of fuel.

The candidates included a 200-series Cessna (206, 208 or 210), Beech A36 Bonanza or Piper PA-32-301 Saratoga. Vest's partiality for low-mounted wings and club seating narrowed the choice to an A36 or PA-32. Beech lost the competition when Vest began crunching num-



Worthy attributes trail behind the Saratoga's Pinocchio nose: long endurance, generous useful load, smooth handling, cozy cabin and competitive price.

A quartet of Saratogas, from the plain-vanilla fixed-gear (above) to normally aspirated retractable (right), turbo retractable (below) and fixed-gear turbo (left), represent years of tweaking Piper's wide-body workhorse.

bers. The Bonanza has the edge in speed, but the Saratoga has a longer range and more useful load. The bottom line, however, was price: For the same money, Vest found he could buy a newer, better-equipped Saratoga.

Used Saratogas average from \$67,000 for a mid-time, average-equipped, 1980 fixed-gear model, to about \$157,000 for a 1985 turbocharged retractable, according to the *Aircraft Blue Book—Price Digest*. Asking prices depend heavily on avionics equipment and engine time. Piper built 390 normally aspirated retractable-gear Saratogas between 1980 and 1986, 390 retractable-gear turbos, 316 normally aspirated fixed-gear Saratogas and 111 fixed-gear turbocharged



models, for a total of 1,207.

Introduced in Piper's 1980 product line, the PA-32-301 Saratoga was the successful culmination of years of tweaking the stretched Cherokee design. The six-place PA-32-260 Cherokee Six first appeared in 1965, the sixth in a burgeoning, three-year-old family of

jected 300-hp IO-540. Piper sold thousands of Cherokee Sixes to freight haulers, air taxi operators, small companies and individuals. It could even be ordered with floats.

The Cherokee Six was in continuous production for 14 years, succumbing in 1979 to its retractable-gear clone, the

eration of the wide-body Cherokee incorporated several significant design changes. First, the stabilator was moved back down to the original, conventional position. Second, the homely constant-chord Cherokee wing, often called the Hershey-bar wing because its stubby rectangular shape is reminiscent of the chocolate bar, was retained only on a seven-foot one-inch-long inboard section of each wing. The outboard wing panels taper. Overall wingspan increased three feet four inches, but wing area is virtually the same as that of the Lance and original Cherokee Six. The Saratoga's higher aspect-ratio wing compared to earlier models yields better climb and cruise performance as well as higher service ceilings.

The change in wing planform, coupled with Frise ailerons, produced a significant improvement in handling. The ailerons are hinged somewhat aft of the leading edges so that when the ailerons are deflected, the leading edges protrude into the slipstream. The effect is reduced control pressure. Roll control is ball-bearing smooth. Delightful control harmony comes as something of a surprise in a Saratoga. The Cherokee Sixes and Lances gained a reputation as being airborne trucks, and not because they were adept at hauling people and things.

In 1978 and 1979, the last two years the Lance and Cherokee Six were produced concurrently, it was possible to choose among four versions of the Piper six-place single: a 260- or 300-hp fixed-gear conventional-tail Six or a normally aspirated or turbocharged 300-hp retractable T-tail Lance II. Piper cleared up the confusion with the Saratoga. Four models were offered: normally aspirated and turbocharged fixed-gear Saratogas and normally aspirated and turbocharged retractables. Each is powered by a fuel-injected 300-hp Lycoming IO-540 with a 2,000-hour TBO.

The TIO-540-S1AD in the two Turbo Saratoga models has a fixed wastegate. Care must be exercised when applying power on takeoff to avoid exceeding the maximum allowable manifold pressure of 36 inches. Critical altitude, the highest altitude at which maximum continuous power is available, is 16,000 feet, according to Piper's specifications. Seventy-five-percent power is available up to the Turbo Saratoga's maximum certificated altitude of 20,000 feet. The Turbo Saratoga cowl is six inches longer and has louvers on the top to exhaust



PA-28, Cherokee-derived models.

The Six is the workhorse of the Cherokees. It shares the basic Cherokee airframe and cockpit design and configuration, but has a longer wingspan with a fixed landing gear. Also, the fuselage is four feet four inches longer and seven inches wider than PA-28 models. Passengers or freight could be loaded into the 10-foot five-inch-long cabin through a wide door at the aft end of the cabin. A second utility door adjacent to the passenger cabin door was later offered.

The Six's extended cabin was balanced by an elongated nose housing a forward baggage compartment and a carbureted 260-hp Lycoming O-540 engine or, beginning in 1966, a fuel-in-

jected 300-hp IO-540. Piper sold thousands of Cherokee Sixes to freight haulers, air taxi operators, small companies and individuals. It could even be ordered with floats.

The T-tail was not well received. It looked handsome and eliminated pitch trim changes with flap extension or retraction, but runway handling was adversely affected. Rotation speeds were higher compared to a conventional-tail Lance, and pilots complained that it was difficult to precisely control pitch at liftoff and touchdown.

Piper's response to the critics, and to the lackluster sales performance of the Lance II in comparison to other six-place singles, was the Saratoga. This latest it-

heat, but its most distinguishing trait is the fish-mouth intake scoop/landing-light bay below the prop spinner.

Standard propeller on a Saratoga is a two-blade, 80-inch-diameter Hartzell, but the optional three-blade, 78-inch Hartzell increases takeoff and climb performance. There is a five-minute limit on takeoff power with a two-blade propeller but none with a three-blade.

The standard Saratoga interior included six forward-facing vinyl and cloth-covered seats and vinyl side panels. An optional jump seat can be shoehorned between the two center-row seats. Vest's Saratoga SP is equipped with most of the passenger cabin options offered by Piper: cloth-covered seats arranged in two facing rows, headrests, writing table, curtains, fold-down armrests and a small plastic-foam-lined refreshment cooler situated between the aft-facing center-row seats. The only major option missing is air conditioning. The 70-pound air conditioning system includes a condenser mounted on a scoop that drops from the belly into the slipstream when the air conditioner is turned on, exacting a speed and range penalty. The air conditioner must be off for takeoff and landing. A microswitch on the throttle automatically turns the system off, retracting the condenser scoop, when the throttle is pushed to the stop for full power.

Most of the left side of the aft fuselage opens up to admit people or bulky cargo. Capacity of the aft baggage bay is 100 pounds. Another 100 pounds can be stowed in the forward baggage hold between the windshield and firewall. Total volume of the two baggage areas is 24.3 cubic feet. Passenger seats can be removed for even more cargo space.

Seat backs on rear seats recline, and on long flights two passengers can lean back, put their feet up and enjoy the ride, stirring only to rummage in the cooler. The engine is far forward and noise level in the cabin is noticeably lower than in four-place aircraft. Passengers will not be able to hear whispers, but they do not have to shout to be heard either. Individual overhead air vents and reading lights are provided for each seat. A 17-inch center of gravity range allows for flexible loading, but the forward center of gravity limit can be exceeded with two heavy front-seat occupants, full fuel and no additional passengers. The aircraft becomes noticeably more sensitive in pitch when passengers

are occupying the rear seats.

The Saratoga cockpit will be familiar to anyone who has flown a late-model Warrior, Archer or Arrow. Power levers are grouped in a control quadrant with gear selector switch (only on the retractables, of course), tachometer and combination fuel flow/manifold pressure gauge to the immediate left. The control yoke partially blocks the pilot's view of power instruments. Analog, pointer-type engine monitoring and fuel quantity gauges are arrayed in a line below the flight instruments. The fuel tank selector lever is located at the base of a pedestal housing the parking brake, microphone jack and nose trim knob. Fuel management is a simple matter: Right, Left and Off. The Saratoga holds 107 gallons of fuel (102 gallons usable) in four wing tanks. A single filler port

Tapered outboard wing panels and retractable gear distinguish the Saratoga from the Six; the difference between it and the Lance is the low-mounted stabilator.

serves the two interconnected tanks in each wing. Inboard tanks hold about 35 gallons each, and a flush-mounted fuel gauge in each wing indicates fuel quantity in the inboard tanks. The gauges are useful in metering a partial fuel load to stay within gross weight limits if the





cabin is full. The wing-mounted fuel gauges should be checked against cockpit gauges to ensure accuracy.

Saratogas were equipped with four-position manual flaps actuated by a long, lever-action bar located between the front seats. In 1985 electric flaps were made available.

Two features that PA-28 pilots will find different are the generous 48.75-inch width of the panel—there is ample space for a triple stack of avionics—and the cluster of electrical switches on the left side panel just ahead of the vent window. The cluster contains battery-alternator, fuel pump, strobe, landing light and pitot heat switches.

There are no quirks in the operation of the Saratoga's systems with the exception of the retractable gear. The SP shares the Arrow's idiot-proof automatic

gear extension system. The landing gear is held in the retracted position by hydraulic pressure. When airspeed drops below about 103 knots at idle power or 81 knots with full power, a flexible diaphragm located beneath the cabin floor relaxes, moving a small lever that releases pressure in the hydraulic system. The gear then free falls to the Down position even though the gear selector switch is in the Up position. The automatic extension system can be overridden by pulling up a small lever located between the front seats at the base of the flap handle. Pushing down on the override lever also opens the hydraulic system, allowing the gear to free fall in the event the electrically actuated landing gear hydraulic pump fails.

Piper's automatic gear system undoubtedly has saved some pilots from

the embarrassment and expense of inadvertent gear-up arrivals, but it also can be a hazard in the event of a power loss in flight. If the override lever is not immediately engaged, the gear will extend and significantly increase drag and reduce potential glide distance.

Recently, Piper issued a service letter advising owners of Arrows and retractable Saratogas to disable the auto extension system. The reason cited by Piper was criticism of the system from "so-called experts." A \$150 kit, available from Piper Service Centers, disconnects the diaphragm from the hydraulic system so that the gear will extend only if the selector switch is placed in the Down position or the emergency extension lever is pushed. The kit takes an estimated four to six hours to install. Piper considers the modification mandatory, but owners are not legally obligated to comply. (See "Pilot Advisory: The Auto Gear Goes Manual," p. 68; also "Pilot Advisory: What is a mandatory service bulletin," March 1986 *Pilot*, p. 121.)

The only airworthiness directive affecting the airframe is 81-24-07. Within 50 hours time in service after the November 20, 1981, effective date of the AD, owners had to install a kit that modified the nose gear downlock mechanism. The AD was precipitated by several incidents in which towing, rough field operations or poor maintenance had resulted in damage to the nose gear downlock hooks, leading to inadvertent nose gear retraction.

Piper offers factory flight training for Saratoga owners and pilots. Three-day initial and recurrent training schools are held at regular intervals at the Piper Training Center in Vero Beach, Florida, and at Piper-affiliated FBOs around the country. The cost for initial training at Vero Beach, which includes classroom sessions on aircraft systems and at least five hours of flying, is \$400. Field training sessions cost \$250. Upon successful completion of a course, the pilot is signed off for a biennial review and instrument competency check, if applicable. Beginning in 1988, a one-day course on maintenance tips for owners will be offered as an optional add-on to flight training. For more information about Piper's training school, contact Robert D. Scott at the Piper Training Center, 2926 Piper Drive, Vero Beach, Florida; telephone 305/567-4361.

Despite the Saratoga's imposing physical dimensions and 3,600-pound



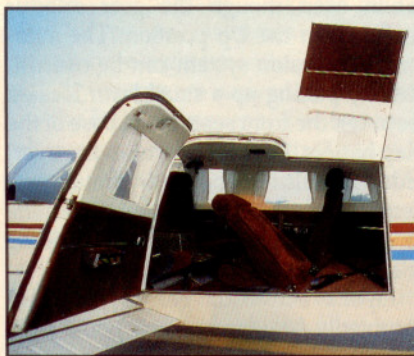
gross weight, pilots used to smaller aircraft should have little trouble adapting, thanks in large measure to simple systems and smooth handling characteristics. Making the transition to a Saratoga is mostly a matter of getting comfortable with the large cockpit and Pinocchio nose. Nosewheel steering is sensitive, especially with a weighty passenger load, and a heavy right foot is needed to counter torque on the takeoff roll and during climb out. A bit of tap dancing on the rudder pedals and a clockwise turn or two of the nose trim knob helps.

The big Lycoming powers a heavily loaded Saratoga off the runway in short order. Prior to one midday, midsummer flight in Vest's SP, takeoff calculations showed that, with five aboard and 80 gallons in the tanks, the aircraft was about 160 pounds shy of maximum gross weight. Using a modified version of the recommended normal takeoff procedure (no flaps, hold the brakes until rpm stabilizes at 2,700, then rotate at 80 KIAS) the Saratoga was off in about 800 feet. With just one aboard and full fuel, a short-field takeoff using two notches (25 degrees) of flaps and a rota-

tion speed of 61 KIAS resulted in an estimated 400- to 500-foot ground roll.

The nose blocks most of the view forward at the best angle of climb speed (80 KIAS) and best rate (91 KIAS). Piper recommends 105 KIAS for enroute climb. Even at that speed, constant S-turns are required to see what is ahead. Also, there are no cowl flaps on a Saratoga, so engine temperatures tend to edge toward the red line on warm days and steep climbs. A workable compromise for adequate engine cooling, forward visibility and a 700- to 800-fpm enroute climb rate is 110 to 115 KIAS.

What the Saratoga offers in useful load, it lacks in speed. A normally aspi-



rated A36 Bonanza, which has the same horsepower but weighs 50 pounds more than a Saratoga, cruises about 10 knots faster. The book cruise speed figure for a Saratoga SP operated at 65-percent economy cruise power at 8,000 feet msl and standard temperature is 148 KTAS. Increasing the power to 75 percent raises cruise speed to 155 KTAS, but it also increases fuel flow from 13.8 to 16 gph.

Both the turbocharged and normally aspirated Lycomings can be leaned to peak EGT at 75-percent power or less for maximum economy. Adjusting the mixture to 100 degrees rich of peak for performance cruise adds only two to six knots true airspeed but increases fuel flow by at least two gallons per hour. At 75 percent power and optimum altitudes, the normally aspirated and turbocharged retractable-gear SPs have nine and 11-knot cruise speed advantages, respectively, over the two fixed-gear models. The retractable gear adds about 70 pounds to the empty weight and shaves an equal amount from useful load, but the weight difference may be negligible depending on how the aircraft are equipped. Standard empty weight of

SARATOGAS

	Piper PA-32-301 Saratoga	Piper PA-32-301T Turbo Saratoga	Piper PA-32R-301 Saratoga SP	Piper PA-32R-301T Turbo Saratoga SP
Base price: 1980-1985:	\$66,700-\$104,400	\$74,900-\$107,650	\$80,200-\$128,300	\$88,400-\$142,100
Current market value:	\$67,000-\$130,000	\$69,000-\$115,000	\$73,000-\$150,000	\$75,000-\$157,500
Specifications				
Powerplant	Lycoming IO-540-K1G5; 300 hp @ 2,700 rpm	Lycoming TIO-540-S1AD; 300 hp @ 2,700 rpm	Lycoming IO-540-K1G5; 300 hp @ 2,700 rpm	Lycoming TIO-540-S1AD; 300 hp @ 2,700 rpm
Recommended TBO	2,000 hr	1,800 hr	2,000 hr	1,800 hr
Propeller	Hartzell constant-speed, 2-blade, 80-in diameter	Hartzell constant-speed, 2-blade, 80-in diameter	Hartzell constant-speed, 80-in diameter	Hartzell constant-speed, 80-in diameter
or	3-blade, 78-in diameter	3-blade, 78-in diameter	3-blade, 78-in diameter	3-blade 78-inch diameter
Length	28 ft 2 in	28 ft 2 in	28 ft 2 in	28 ft 2 in
Height	8 ft 2 in	8 ft 2 in	8 ft 2 in	8 ft 2 in
Wingspan	36 ft 2 in	36 ft 2 in	36 ft 2 in	36 ft 2 in
Wing area	178 sq ft	178 sq ft	178 sq ft	178 sq ft
Wing loading	20.2 lb/sq ft	20.2 lb/sq ft	20.2 lb/sq ft	20.2 lb/sq ft
Power loading	12.0 lb/hp	12.0 lb/hp	12.0 lb/hp	12.0 lb/hp
Seats	6-7	6-7	6-7	6-7
Cabin length	10 ft 5 in	10 ft 5 in	10 ft 5 in	10 ft 5 in
Cabin width	4 ft 1 in	4 ft 1 in	4 ft 1 in	4 ft 1 in
Cabin height	4 ft 1 in	4 ft 1 in	4 ft 1 in	4 ft 1 in
Empty weight	1,920 lb	2,000 lb	1,986 lb	2,073 lb
Max ramp weight	3,617 lb	3,617 lb	3,617 lb	3,617 lb
Gross weight	3,600 lb	3,600 lb	3,600 lb	3,600 lb
Useful load	1,697 lb	1,617 lb	1,631 lb	1,544 lb
Payload w/full fuel	1,083 lb	1,005 lb	1,019 lb	932 lb
Max takeoff weight	3,600 lb	3,600 lb	3,600 lb	3,600 lb
Fuel capacity, std	642 lb (612 lb usable) 107 gal (102 gal usable)	642 lb (612 lb usable) 107 gal (102 gal usable)	642 lb (612 lb usable) 107 gal (102 gal usable)	642 lb (612 lb usable) 107 gal (102 gal usable)
Oil capacity	12 qt	12 qt	12 qt	12 qt
Baggage capacity	200 lb, 24.3 cu ft	200 lb, 24.3 cu ft	200 lb, 24.3 cu ft	200 lb, 24.3 cu ft
Performance				
Takeoff distance, ground roll	1,183 ft (1,013 ft*)	1,110 ft (960 ft*)	1,183 ft (1,013 ft*)	1,110 ft (960 ft*)
Takeoff distance over 50-ft obst	1,759 ft (1,573 ft*)	1,590 ft (1,420 ft*)	1,759 ft (1,573 ft*)	1,590 ft (1,420 ft*)
Max demonstrated crosswind component	17 kt	17 kt	17 kt	17 kt
Rate of climb, sea level	990 fpm	1075 fpm	990 fpm	1,120 fpm
Max level speed, sea level	152 kt	178 kt (182 kt)	164 kt	191 kt
Cruise speed/Range w/45-min rsv, std fuel (fuel consumption) (altitude)				
@ 75% power, best economy	148 kt/823 nm (96 pph/16 gph) (6,500 ft)	160 kt/780 nm (99 pph/16.5 gph) (20,000 ft)	157 kt/865 nm (96 pph/16 gph) (6,500 ft)	171 kt/844 nm (99 pph/16.5 gph) (20,000 ft)
@ 65% power, best economy	144 kt/911 nm (83 pph/13.8 gph) (10,500 ft)	148 kt/845 nm (84 pph/14 gph) (20,000 ft)	151 kt/937 nm (83 pph/13.8 gph) (10,500 ft)	160 kt/920 nm (84 pph/14 gph) (20,000 ft)
@ 55% power, best economy	133 kt/960 nm (71.4 pph/11.9 gph) (14,000 ft)	132 kt/860 nm (73.8 pph/12.3 gph) (20,000 ft)	141 kt/983 nm (71.4 pph/11.9 gph) (14,000 ft)	145 kt/950 nm (73.8 pph/12.3 gph) (20,000 ft)
Service ceiling	14,000 ft	20,000 ft	16,700 ft	14,000 ft
Absolute ceiling	15,900 ft	20,000 ft	18,350 ft	20,000 ft
Landing distance over 50-ft obst	1,612 ft	1,700 ft	1,612 ft	1,640 ft
Landing distance, ground roll	732 ft	900 ft	732 ft	650 ft
Limiting and Recommended Airspeeds				
Vx (Best angle of climb)	80 KIAS	80 KIAS	80 KIAS	80 KIAS
Vy (Best rate of climb)	91 KIAS	91 KIAS	91 KIAS	91 KIAS
Va (Design maneuvering)	134 KIAS	134 KIAS	134 KIAS	134 KIAS
Vfe (Max flap extended)	112 KIAS	112 KIAS	112 KIAS	112 KIAS
Vle (Max gear extended)	—	—	132 KIAS	132 KIAS
Vlo (Max gear operating)	—	—	132 KIAS	132 KIAS
Extend	—	—	132 KIAS	132 KIAS
Retract	—	—	110 KIAS	110 KIAS
Vno (Max structural cruising)	154 KIAS	154 KIAS	154 KIAS	154 KIAS
Vne (Never exceed)	197 KIAS	197 KIAS	197 KIAS	197 KIAS
Vs1 (Stall clean)	60 KIAS	60 KIAS	60 KIAS	60 KIAS
Vso (Stall in landing configuration)	57 KIAS	57 KIAS	57 KIAS	57 KIAS

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.

* indicates performance with 3-blade propeller

a Saratoga SP is 1,986 pounds. Vest's SP, which is equipped with a King KFC 200 autopilot, WX-10A Stormscope, Northstar Loran C, King KNS-80 RNAV, Insight Instruments EGT/CHT gauge and Shadin digital fuel computer, weighs in at 2,275 pounds.

Endurance is the Saratoga's long suit. At 6,000 feet and 65-percent economy power, it will fly for nearly six and a half hours before dipping into IFR reserves, according to Piper's specifications. No-wind range under those conditions is about 920 nautical miles. Few people choose to make such long legs, but having the capability extends the Saratoga's IFR flexibility by bringing far-flung alternates within reach.

Steep descents can be a problem unless the aircraft can be slowed to 132 KIAS, the maximum gear-operating and gear-extended speed. The 112-KIAS flap extension speed is low and of little help in getting down quickly.

Recommended approach speed is 95 KIAS. Adding one notch (10 degrees) of flaps and nose-down trim in the traffic pattern cranks the ample proboscis down and out of the pilot's line of sight. The final approach glidepath is easily controlled with slight adjustments in power. To get the full effect of the Saratoga's heft, deploy the flaps the full 40 degrees, pull the power back to idle and peg the airspeed indicator at 79 knots for a short-field approach. Just be sure to time the flare precisely because the airplane will sink mightily. Arrest the sink rate too soon and you risk a stall and long drop to the runway. Wait too long and risk a hard landing. Unless it really is a short field or your technique is tack sharp, try adding a touch of power in the flare just as the stall warning buzzer goes off, sending shock waves throughout the passenger cabin. The burst of propwash over the wing delays the onset of the stall, buying time to gently ease wheels onto pavement.

In the minds of many, the Saratoga is unexciting. It lacks sex appeal, especially when held up to a to a 36-series Bonanza. Too bad. Such a cursory judgment ignores a host of worthy attributes: Roomy, comfortable cabin, generous useful load, two baggage holds, extra-long range, commodious instrument panel, pleasing handling, competitive price and four models from which to choose. All it takes to recognize the beauty of the Saratoga's practicality is a sixth sense. □

