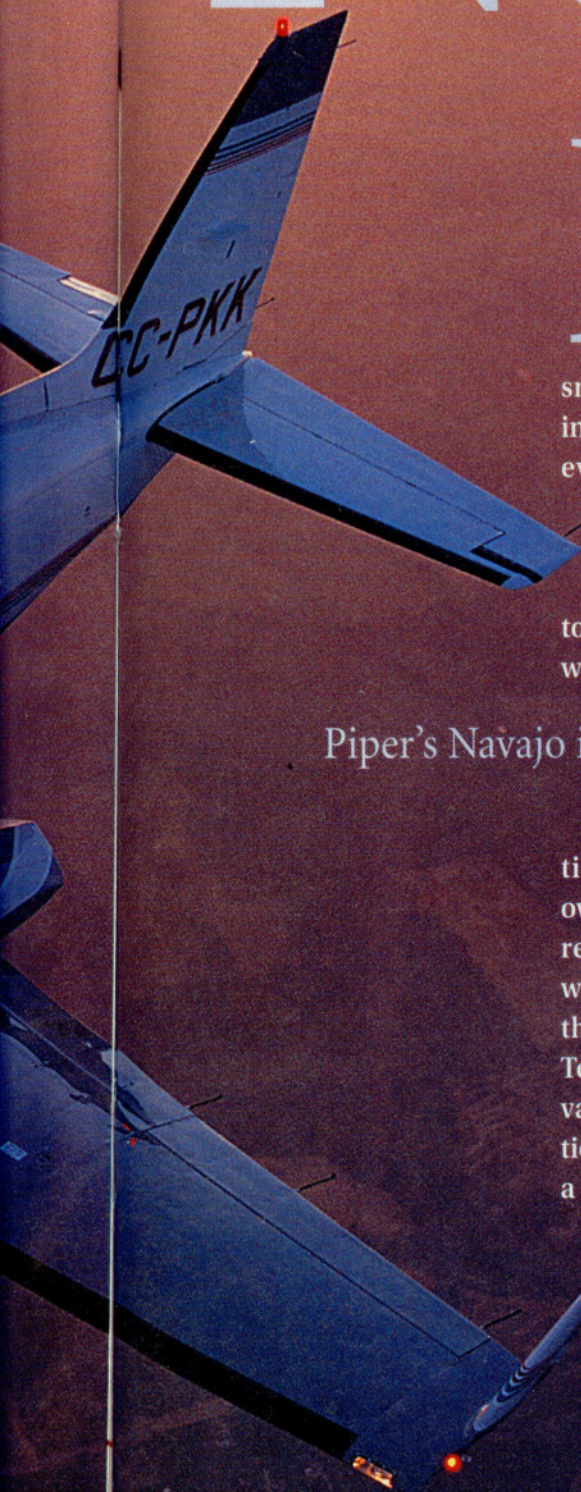




Born-again Navajo

BY PETER A. BEDELL



Piper's Navajo has long been a favorite of charter and corporate operators, as well as individual owners who need the combination of a large cabin accessed by an airstair door, piston-engine fuel economy, and a look that's snazzy enough to appeal to the most discriminating passengers. The Navajo fits this role so well that even though the average airframe time is racing toward the five-figure mark, demand and value continue to be high. ■ Fatigue cracks, corrosion, and overall wear and tear are taking their toll on the fleet. For the Navajo, a recent rash of airworthiness directives (ADs) affecting the tail sec-

Piper's Navajo is getting long in the tooth, but Colemill sharpens those fangs to create the Panther

tion have added a few gray hairs to the heads of owners and operators. But with no new airplanes to replenish the fleet, owners are forced to comply with the rules and upgrade their Navajos to keep them flying. ■ Colemill Enterprises of Nashville, Tennessee, has probably done more to raise the value of the Navajo fleet than any other modification shop. Its Panther conversions raise the value of a Navajo by a whopping \$149,000, according to the aircraft price guide *Vref*. And every Panther owner that we spoke with has been pleased with the experience of dealing with Colemill

PHOTOGRAPHY BY MIKE FIZER

as well as the performance of the airplane after the conversion.

At first glance, the Panther-converted Navajo looks—well—distinctive. The snarling cowlings and long spinners of the stock Navajo are replaced with a blunter nacelle with deeper inlets to scoop more cooling air. New four-blade Hartzell Q-tip propellers sprout from fatter spinners. The outer half-inch of the blade tips are bent back 90 degrees to reduce cabin and overflight noise, but some might think the airplane was brought well into the landing flare with the gear up. The look of these props even prompted one FAA field inspector to mistakenly ground a Q-tip-prop-equipped airplane for that very reason. Finally, there are those Zip Tip winglets that are said to provide additional lift, more stability, and reduce the yawing tendencies of Navajos in rough air. The whole package draws attention on the ramp and is generally well-received by pilots and passengers.

But what you see on the outside just scratches the surface of the Panther conversion. For most operators, functionality and safety count for more, and Colemill delivers in those departments as well. Under the nacelles are either factory-new or -remanufactured 350-horsepower Lycoming TIO-540-J2B engines. Short-body Navajos, the overwhelming majority of which came stock with 310 or 325 hp, will enjoy a boost in power, while the long-body Chieftain retains its 350 hp in the Panther II conversion. Panther Navajo engines lose the D suffix from their designators, because they use individual mags in place of the troublesome dual magneto.

Also on the engines are all-new accessories: starters, alternators, vacuum pumps, engine mounts, hoses, belts, and anything else you'd expect from a thorough firewall-forward treatment. Woodward prop governors, which Colemill says are more dependable and easier to overhaul, are added, as well as unfeathering accumulators and electronic synchrophasers. Early model Navajos get fitted with two inline electric fuel pumps that constantly provide 12 psi of fuel at the throttle body to keep each engine running smoothly on the ground and at high altitude. Besides adding redundancy in the event of an engine-driven or emergency pump failure, these inline pumps eliminate the need to use the emergency pumps for starting.

Also on the safety front is the option of closing the cowl flaps for takeoff in cooler weather. The Panther's cowl



Not your ordinary Navajo, Colemill's Panther conversion puts 350-hp Lycomings inside the redesigned nacelles. Four-blade props and the winglets make it the most noticeable on the ramp.





inlets are 10 square inches larger than stock and allow more air to enter the cowl than the original setup. Colemill says that on all but the hottest days, the cowl flaps can be closed for takeoff and initial climb. Meanwhile, cylinder-head temps remain in check while drag is reduced, resulting in a better rate of climb. This can be the critical difference in single-engine performance. Using SimCom Training Centers' Chieftain simulator in Orlando, Florida, we were able to increase single-engine rate of climb by 50 feet per minute (fpm) by closing the cowl flaps on both nacelles. SimCom, which offers Navajo initial and recurrent simulator training, says that the closing of each cowl flap provides a 25-fpm increase in the single-engine climb rate of Navajos.

Colemill claims a 400-fpm single-engine climb rate at maximum gross weight and standard conditions—a marked improvement over the 250-fpm climb rate of the stock airplane in similar conditions. Of course, for the short-body Navajos, 40 extra horsepower per side helps a lot in this department. Panther owners we spoke to raved about single-engine performance, and pointed out that the stock Navajo's lackluster performance with one engine caged was a big reason for going to Colemill in the first place.

Faster climbs also result in lower block-to-block flight times. Turbocharged Navajos are generally poor performers in cruise at lower altitudes, so the sooner you can climb, the sooner you can go fast. Since Navajos are unpressurized, you'll usually find them between 9,000 and 12,000 feet. Those on Part-135 air-taxi flights are usually at or below 10,000 feet because of oxygen requirements.

AOPA Pilot took one of Colemill's Panther Navajos and wrung it out to see what kind of speeds could be achieved. In a cruise-climb configuration with 38 inches of manifold pressure and 2,400 rpm, we saw a 1,000-fpm climb at 130 kt indicated as we passed through 5,000 feet. If the nose were pulled up to the 105-kt best-rate-of-climb speed, the rate would have been better but the view out the windshield would be nothing but nose. Fuel burn throughout the climb was 70 gallons per hour total. It was a humid 95 degrees Fahrenheit on the ground that day, and I elected to leave the cowl flaps open and quickly turned on the air conditioning after takeoff. Our load was about 500 pounds below the 6,500-pound max takeoff weight of this converted PA-31-325.



The biggest benefit of the winglets is the ability to show lights when the gear is retracted.

Colemill says that on a standard day at gross weight, you can get better than a 2,000-fpm climb out of a Panther. CHTs remained in the 350-degree range throughout the climb, which is better than what I saw the last time I flew a stock Navajo in such conditions.

Level at 9,500 feet, where the temperature was a much-warmer-than-standard 57 degrees Fahrenheit, we set up a 65-percent-power cruise at 33 inches of manifold pressure and 2,200 rpm. The speed settled on 192 kt at 40 gph with a mixture setting of 100 degrees F rich of peak turbine inlet temperature. At 15,500 feet and 75-percent power (35 inches and 2,400 rpm), the Panther turned in a true airspeed of 211 kt on 48 gph. At 65-percent power at that altitude, true airspeed dropped to 201 kt while fuel burn dropped to 40 gph. Like most turbocharged airplanes, the higher the Navajo gets, the better the speed will be, but with an unpressurized cabin it's unlikely that the airplane will see widespread duty in the flight levels.

Also impressive about the Panther are the reduced noise and vibration levels inside and outside of the airplane. Even though the props are closer to the cabin (Colemill discards the hub extension used on stock Navajos), cabin noise is dramatically reduced. Flights can be comfortably made with headsets off in the Panther cockpit. Back in the



cabin, it is quieter still. Passengers from one charter operation who rode in the Navajo before and after the conversion commented to the operator "that the airplane was noticeably quieter with those winglets." Winglets, of course, had nothing to do with the reduced noise; it's the result of the Q-tip props.

What's also important is the fact that the four-blade props lower overflight noise, making the Panther a better neighbor than its stock brethren. In Europe and California, where noise restrictions can ground airplanes at certain times of the day, Panthers can con-

tinue to operate.

We asked Bill Gibson, owner of Gibson Aviation Inc., an East Coast charter outfit, why he chose to go with Colemill instead of simply hanging a couple of factory-remanufactured Lycomings on two Navajo Chieftains. "Mostly it was the downtime," said Gibson, whose 1974 Chieftain reached TBO a few years ago. "I was looking at a solid month of downtime going the traditional route, whereas Colemill said they could do it in two weeks. A bonus was the fact that I could also get the four-blade props and the winglets with the built-in landing lights,"



Colemill estimates that the Panther conversion provides a 10-percent increase in performance across the board. The redesigned cowl inlets (below) allow Panther owners to take off with the cowl flaps closed, boosting single-engine climb rate by about 50 feet per minute.

said Gibson. Stock Navajo landing and taxi lights are mounted on the nose gear, making them useless for recognition purposes when the gear is retracted. Gibson's 1974 Chieftain also lacked the inline fuel boost pumps, a mod that he said would cost about \$3,000 to install in the field. "Colemill included the installation of those pumps with the cost of the conversion. Throw in the Shadin fuel computer, digital TIT gauge, the electronic prop synchrophaser, and the increase in airframe value, and it looked like a worthwhile investment," he said.

"I brought it in by noon on a Monday and picked it up at noon on Friday of the following week," said Gibson. "They were able to do it in less than the quoted two weeks, and they did a real nice job on the engine installation." Gibson was most impressed that Colemill was able to turn his airplane around so quickly, in spite of a

tornado that nearly destroyed the facility just weeks prior to his leaving the airplane (see "Pilot Briefing," June 1998 *Pilot*).

After the conversion, Gibson reported a marked increase in climb rate when the airplane was heavy, even though Chieftains don't get an increase in power with the Panther II conversion. "I wasn't sure if that was a result of the fact that I had new engines or whether it was the props and winglets, until I brought the second

airplane to them." When Gibson's other Chieftain had two props at TBO, he had Colemill do the Panther III conversion, which includes everything except the engines. "When I got that airplane back, I realized that the better climb performance of both airplanes was a result of the props and winglets rather than having new engines."

Now, Gibson has some of the major maintenance on his remaining Navajo done by Colemill. "They know Navajos better than anybody in the business," he said. Gibson is taking his Chieftain to Colemill for the elevator hinge kit that eliminates a recurring AD. Gibson isn't the only Colemill customer who travels a distance for the service. You may have noticed that the airplane pictured on these pages is of a foreign registry. CC-PKK is registered in Chile and was converted to a Panther and sold to the owner in



1992. It was flown back to Colemill recently for a 1,000-hour inspection, during which technicians complied with all ADs and service bulletins, removed and inspected the landing gear, and inspected and treated the entire airframe for corrosion. To top it off, the owner had Colemill line up paint and interior jobs while the airplane was in the United States.

"We have a lot of customers who come a long way to see us," said Ralph Peeler, Colemill's vice president of sales and marketing. Colemill has converted Navajos based as far away as Australia.

This spacious cabin is in a 1974 Panther II-converted Navajo Chieftain.

Conversion of a Navajo to a Panther currently starts at \$149,000, depending on whether you get the optional winglets or the extended wingtips with landing lights. According to *Vref*, used Navajo average prices range from \$133,000 for a 1967 PA-31-310 to \$317,000 for a 1983 PA-31-325. Chieftains range from \$203,000 for a 1973 model to \$380,000 for a 1984 model.

The Panther conversion is no small investment. Another charter operator



and longtime Navajo pilot we spoke with said that he did not feel the conversion was worthwhile unless you had an old airframe (which lacks the inline boost pumps) with run-out engines and

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1978 Colemill Panther Navajo (PA-31-325)
 Market price, stock PA-31-325: \$237,000
 Price as tested: \$386,000

Specifications

Powerplants	2 Lycoming TIO-540-J2B, 350 hp
Recommended TBO	1,800 hr
Propellers	Hartzell four-blade, Q-tip, constant speed, full feathering, 74-in dia
Length	32 ft 7 in
Height	13 ft 0 in
Wingspan	40 ft 8 in
Wing area	229 sq ft
Wing loading	28.4 lb/sq ft
Power loading	9.3 lb/hp
Seats	6-8
Cabin length	10 ft 11 in
Cabin width	4 ft 2 in
Cabin height	4 ft 3 in
Empty weight	4,099 lb
Empty weight, as tested	4,654 lb
Maximum ramp weight	6,540 lb
Maximum takeoff weight	6,500 lb
Useful load	2,441 lb
Useful load, as tested	1,846 lb
Payload w/full fuel	1,349 lb
Payload w/full fuel, as tested	754 lb
Maximum landing weight	6,500 lb
Zero fuel weight	6,200 lb
Fuel capacity, std	192 gal (182 gal usable)
	1,152 lb (1,092 lb usable)
Oil capacity, ea engine	12 qt
Baggage capacity	650 lb, 62.5 cu ft

Performance

Note: These figures are for an unmodified PA-31-325 C/R; Colemill estimates that the Panther conversion boosts all performance figures by 10 percent.

Takeoff distance, ground roll	1,000 ft
Takeoff distance over 50-ft obstacle	2,250 ft
Accelerate-stop distance	2,370 ft
Rate of climb, sea level	1,220 fpm



props, and lacked newer instrumentation such as the Shadin fuel computer and digital TIT gauge.

Colemill also performs similar conversions to Beech Barons and Bonan-

Single-engine ROC, sea level	250 fpm
Maximum level speed, 24,000 ft	228 kt
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption, ea engine)	
@ 75% power, best power	220 kt/3.8 hr
20,000 ft	(120 pph/20 gph)
@ 65% power, best power	208 kt/4.3 hr
20,000 ft	(108 pph/18 gph)
@ 55% power, best economy	180 kt/5.7 hr
16,000 ft	(96 pph/16 gph)
Maximum operating altitude	24,000 ft
Service ceiling	24,000 ft
Single-engine service ceiling	15,300 ft
Landing distance over 50-ft obstacle	1,521 ft
Landing distance, ground roll	906 ft

Limiting and Recommended Airspeeds

V _{MC} (min control w/one engine inoperative)	71 KIAS
V _{SE} (min intentional one-engine operation)	87 KIAS
V _X (best angle of climb)	85 KIAS
V _Y (best rate of climb)	100 KIAS
V _{XSE} (best single-engine angle of climb)	93 KIAS
V _{YSE} (best single-engine rate of climb)	97 KIAS
V _A (design maneuvering)	155 KIAS
V _{FE} (max flap extended)	127 KIAS
V _{LE} (max gear extended)	152 KIAS
V _{LO} (max gear operating)	
Extend	152 KIAS
Retract	127 KIAS
V _{NO} (max structural cruising)	183 KIAS
V _{NE} (never exceed)	230 KIAS
V _{SI} (stall, clean)	76 KIAS
V _{SO} (stall, in landing configuration)	74 KIAS

For more information, contact Colemill Enterprises, Post Office Box 60627, Cornelia Fort Airpark, Nashville, Tennessee 37206; telephone 615/226-4256; or visit the Web site (www.colemill.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.

zas, as well as the Cessna 310. In total, the company does about a dozen conversions per year in addition to all of the maintenance work it performs. While many shops have mechanics qualified to work on Navajos, they may come across only one or two a year. On the other hand, shops such as Colemill that specialize in Navajos see dozens of Navajos annually. Not only do Colemill technicians know *where* to look for problems, they have probably performed the required repairs to several airplanes, so owners don't have to pay

to train a mechanic on *their* airplane. Owners of aging twins can rest assured that as long as there are shops like Colemill, the fleet will soldier on. One of Colemill's Panthers has more than 17,000 hours and looks as graceful sitting on the ramp as does a customer's with only 2,000 hours on the Hobbs. □

i Links to additional information on Colemill's conversions and the Piper Navajo can be found on AOPA Online (www.aopa.org/pilot/links.shtml). E-mail the author at pete.bedell@aopa.org

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