NAVAJO CR

How to look good without working at it.

BY EDWARD G. TRIPP

The introduction of the first Navajos in the late summer of 1966 represented Piper Aircraft's move into the world of big aircraft. Big is relative, of course. To most of the uninitiated, the Navajo is a little airplane. After all, even DC-9s are little airplanes.

But to most pilots the Navajo is *big*. And, just as it represented a fundamental change to Piper, moving into a Navajo represents a big change to the average pilot.

In the mid 1960s, the Navajo was one of just a handful of new cabin-class, general aviation aircraft. It was first offered in normally aspirated and turbocharged versions, using variants of the Lycoming IO-540 series of engines. The same family of engines power the three 1981 Navajo models.

The turbocharged model was introduced at a basic price of $97,290. Most that were sold had an equipped price of approximately $120,000. Today, the smallest Navajo lists for what small turboprops cost in 1966.

Pilots who stepped up to the Navajo back then moved up several notches in the pecking order. It was big, looked tough and was cabin class, air-stair door and all.

It helped if other pilots did not catch on to a little secret: The Navajo was—and still is—one of the easiest-to-fly twins around, so long as everything is working properly.

Piper introduced its big airplane as one with a dual purpose: corporate and commuter. It caught on in both markets and continues to show up on the ramps of busy airports around the world in airline colors, quite often with fuzzy-faced youths sporting their first airline pilot stripes.

More than 3,400 Navajos have been sold in the past 15 years. The model has changed and developed, yet has remained very much the same. The normally aspirated version did not last too long; production ended in the 1960s.

PHOTOGRAPHY BY ART DAVIS

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NAVAJO CR

The turbocharged version continues much the same to this day, as the basic Navajo. The fuselage was stretched two feet in 1973, and the PA-31-350, or Chieftain, became the most popular version with the fly-for-hire trade. It has outsold all other Navajo models. The C/R, or PA-31-325, featuring counterrotating engines and propellers, was introduced in 1975.

Piper learned a lot from the Navajo, and the basic design has served the company well in moving it out of strictly light aircraft. First came the not-very-successful Pressurized Navajo, which offered good operating numbers with a lot of operating difficulties.

But pressurization stuck and worked well when the basic airframe was mated to PT6 turboprop engines. The hybrid, called the Cheyenne, flew in August 1969, and the company took another big step up the product ladder.

While the Cheyennes are the top of Piper's line, the Navajo is holding its own quite well. During two periods of slack new-aircraft sales in the past 10 years, several dealers have paid premium prices for used Navajos to supply the steady demand.

Sales of new Navajos during the past two years—with multi-engine piston aircraft sales very depressed—have done better than most. The basic Navajo has suffered the most, with sales slipping to 38 in 1980 from more than 50 in each of the preceding three years.

Whether the form of the Navajo followed function or vice versa, it is a successful blend of good looks, good flying characteristics and utility. It can please both the pilot and the passengers, particularly in a corporate configuration (four to five passenger seats). In the high-density, commuter configuration (six passenger seats or seven for single-pilot operation), things get a bit cramped, and weight and balance calculations become more critical.

The service history of the Navajo is a mixed bag. Some operators refer to it as "The AD Queen." The series, excluding the pressurized, or P, Navajo has been the object of 30 airframe airworthiness directives through last year, 40 on the powerplants, accessories and systems and five relating to procedures. In 1980 alone, 13 directives were issued. We have been unable to determine whether most of these, particularly the airframe ADs, were the result of normal wear and tear on commuter aircraft or whether they were spread

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among the various types of operations.

One AD that was issued last year is, in the minds of practically all operators, unnecessary and operationally unwise. Basically, it restricts the use of flaps for takeoff. Use of 15 degrees had been recommended; the AD increases takeoff ground run by some 20 percent. Most feel this AD was imposed after a commuter crash that was, in the words of one Navajo owner, "purely and simply pilot error."

A high-use Navajo in corporate service might fly 700 hours per year. Many in commuter service exceed 1,200 hours and many more cycles of landing, shut down, start and related systems operation per day. This is not to make excuses for the airplane (particularly since an original design and marketing objective was for this type of use). But commercial use certainly increases the rate of disclosure of any structural or accessory weakness.

Obviously, it is essential for any prospective purchaser of a used Navajo to have a thorough inspection performed on both the aircraft and the airframe and engine logbooks to ensure that all ADs and service bulletins have been complied with.

Moving into a cabin-class airplane is a big step. A pilot moving into the Navajo has every right to feel big time. He needs good eyesight during the walkaround: The top of the vertical stabilizer is 13 feet above the ramp, and the upper surface of the wing is chest high, even for someone taller than six feet.

Stepping up through the air-stair door and hunching through the cabin (unless the boss doesn't want the chauffeur to mingle with the mucky-mucks and orders a pilot's window/door for another $2,860), the pilot finally reaches his six-way adjusting seat. Switches, gauges and circuit breakers to the left; switches, dials and knobs overhead; more of the same arranged across the wide instrument panel, down the center console and back to the fuel selector and the shutoff valves mounted on the main spar between the two front seats. There are dividers to shut the cabin off from the flight deck, and there are no smoking and fasten-seat-belt signs (with optional chimes) to inform the passengers.

It is quite an impressive array to the uninitiated. However, the arrangement is quite good and easy to sort out. And, to the manufacturer's credit, purchas-

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ers of new aircraft can send a pilot through a FlightSafety International transition program, which includes instruction in a cockpit procedures simulator. It is very realistic and highly recommended for new Navajo pilots. This level of training should be made available on more twins and several singles.

The systems are good and procedures are straightforward for this class of aircraft. With the proper mix of options, the capability of the airplane is as much all-weather as can be achieved in a medium twin.

Selecting the operational options is quite a bit simpler on the Navajo than on many smaller aircraft (and even some competitive ones). The standard equipment list is fairly complete. Mixing and matching the avionics is the most trying aspect.

For instance, all flight instruments and a heated pitot/static system are standard. The standard pilot's flight instruments are air-driven. An optional, electrically driven set of copilot's instruments, with a separate pitot/static system, is a $5,470 option. Some autopilot installations change some or all of the pilot's side instruments to electric; and an air-driven copilot set, again with an independent pitot/static system, can be purchased for $3,485.

Most of the remaining operational equipment selections are a heavy-duty battery (highly recommended—the 28-amp-hour, nickel-cadmium option acts as an emergency power pack to drive the number two com, nav and glideslope for a 45-minute escape period in the event of electrical failure), a known-icing package (including a full, electrically heated pilot windshield), heavy-duty Cleveland brakes, a windshield wiper, the 114-cubic-foot oxygen system (which should be standard in such an airplane) and a very useful and inexpensive aid—a voltmeter ($75) to monitor the system voltage.

The operating manual recommends that ampere output be monitored before shut down. If output is greater than 25 amps, a pilot should keep the engines running to charge the system to a point below that value. The voltmeter shows battery condition after shut down and before start is attempted. If the battery state is low, the pilot knows that a start should not be attempted without external power. This saves time and prevents unnecessary drain, which shortens battery life.

Another useful option is the set of

NAVAJO CR

Despite its size, the Navajo is easy to fly, so long as everything is working properly.

The pilot's workload is reasonably low, thanks to good cockpit design.

recognition lights, which are mounted in the wing tips. Both the taxi and landing lights are mounted on the nose gear and cannot be used for recognition in high-density areas until the gear is down. The recognition lights are very useful aids, even at their $420 cost.

Selecting the avionics and related equipment takes a bit more time. There are several basic packages of Bendix, Collins and King equipment, plus a selection of Bendix, Edo-Aire and King autopilot and flight-director systems and pages of additional equipment.

The most recent Navajo that *Pilot* staff members flew is a 1981 C/R (PA-31-325), N4506L. It has a Collins Microline avionics package, including an ANS-351 RNAV, coupled to a King KFC-200 flight control system with yaw damper (another desirable option) and a Bendix RDR-160 color radar. The avionics add $56,000 to the $289,880 base price. (Other options, primarily the above-mentioned operational additions and interior selections, raise the price to $399,200.)

The interior options are what eat up dollars and useful load. There are 13 different interior arrangements that can be ordered, including a potty, dividers, additional seats, hot and cold refreshment centers and tables. Air conditioning alone costs 7,200 in dollars and 94 pounds in useful load.

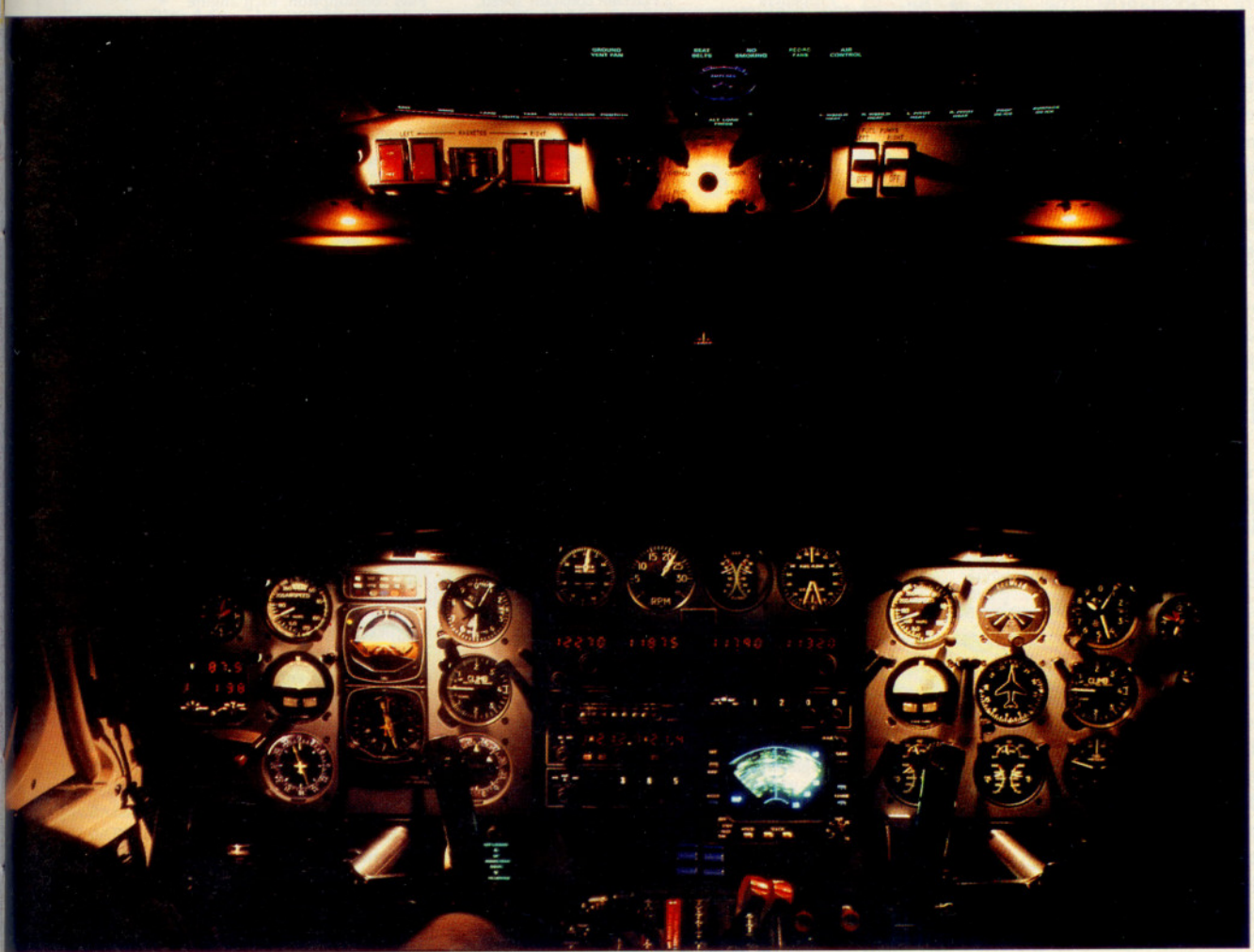
The options in 06L reduce the useful load by 223 pounds, leaving an available payload of 775 pounds with full fuel. That's enough to take four FAA-standard souls (including pilot) and 95 pounds of junk off a relatively short runway (say, 3,000 feet at sea level and standard temperature), with an average-size pilot and sufficient distance to accelerate to rotation speed, fail an engine and stop. The mission could fly for four hours and 30 minutes with legal IFR reserves at a cruising altitude of 12,000 feet and a cruise true airspeed of 184 knots at 65 percent power.

That's pretty good for a medium twin. Careful evaluation of options for utility and weight could improve this quite a bit. Good planning could make it practical even to add the auxiliary nacelle fuel tanks, which add 54 gallons useful, or the average of another one and one-half hours at normal cruise power and mixture settings.

Another way to state it is that the Navajo C/R is just another aircraft when it comes to range versus payload: Something has to stay behind, and the pilot has to calculate very carefully to stay within safe limits.

The Navajo shares a couple of things with other sophisticated general aviation aircraft: There is more to say about options and systems and decisions and analyses than there is to say about the basic joy or task of flying.

For the properly trained and properly prepared pilot—and I do not mean a super pilot—it is a delightful and simple aircraft to fly. Vmc (minimum con-



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trol speed) is lower than the stall speed in landing configuration (71 and 74 KIAS, respectively). Vsse (minimum intentional speed with one engine inoperative) is 87 KIAS. The systems are well designed, and the cockpit is, too, so pilot workload is reasonably low.

Control response and harmony are good, even at slow, slow airspeeds, so that the Navajo feels less like a 6,500-pound airplane than quite a few that are, in fact, lighter.

While the single-engine rate of climb is about average (the factory claims 255 fpm at gross weight), single-engine service ceiling is 15,300 feet.

NAVAJO CR

The Navajo C/R has the good manners that you would expect of twins that weigh much less.

More importantly, the airplane behaves reasonably well if one engine fails during departure and the pilot is trained to handle the situation and prepared to accept it.

In normal flying situations, the Navajo is so well-mannered that it makes pilots look smooth and feel confident in short order. The critical numbers are lower than with many twins, and the control responses are good enough to make critical situations comparatively less so.

We tried it with a couple of low-time multi-engine-rated pilots who had not flown any aircraft as heavy as the Navajo. They nailed the needles during approaches and executed the missed ones without causing a gulp or a clutch up front or panic in the rear. Even slow-flight exercises were handled with grace.

The Navajo is a good combination of internal size for crew and passenger comfort, slow-speed handling and reasonably good cruise performance, excellent visibility and both high-speed and low-speed approach handiness to give it versatility in the outback or high-density areas without pilot strain or passenger discomfort.

It is impressive-enough looking to belie its good manners and make the pilot look like somebody special.

All in all, Piper has gotten a great deal out of the original idea and the original design. And aviation has, too. □

Piper PA-31-325 Navajo C/R

Base price $289,880
Price as tested $399,200

Specifications

Engines	2 Lycoming (Left) TIO-540-F2BD (Right) LTIO-540-F2BD 325 hp@2,575 rpm Recommended TBO 1,600 hr
Propellers	2 Hartzell constant speed, full feathering, 80-in dia, three blade
Wingspan	40 ft 8 in
Length	32 ft 7.5 in
Height	13 ft
Wing area	229 sq ft
Wing loading	28.56 lb/sq ft
Power loading	10.06 lb/hp
Seats	6 to 8
Cabin length	12 ft 11 in
Cabin width	4 ft 2 in
Cabin height	4 ft 3.5 in
Empty weight	4,099 lb
Empty weight (as tested)	4,664 lb
Useful load	2,441 lb
Useful load (as tested)	1,876 lb
Payload w/full fuel	1,340 lb
Payload w/full fuel (as tested)	775 lb
Max ramp weight	6,540 lb
Max takeoff weight	6,500 lb
Zero fuel weight	6,200 lb
Max landing weight	6,500 lb
Fuel capacity, std	1,152 lb (1,100.4 usable)
Fuel capacity w/opt tanks	1,476 lb (1,425 usable)
Oil capacity ea engine	12 qt
Baggage capacity	Forward: 150 lb/14 cu ft Aft: 200 lb/22 cu ft Nacelles (ea): 150 lb/13.25 cu ft

Performance

Takeoff distance (ground roll)	1,500 ft
Accelerate/stop distance (est)	2,370 ft
Takeoff over 50 ft	2,440 ft
Rate of climb, sea level	1,220 fpm
Single-engine ROC, sea level	255 fpm
Max level speed, 19,500 ft @max normal operating power	228 KIAS
Cruise speed, 75% power	
20,000 ft	220 KIAS
12,000 ft	202 KIAS
Fuel consumption, each engine, best economy	96 pph
Cruise speed, 65% power	
20,000 ft	208 KIAS
12,000 ft	190 KIAS
Fuel consumption, each engine, best economy	86 pph
Cruise speed, 55% power	
20,000 ft	171 KIAS
12,000 ft	175 KIAS
Fuel consumption, each engine best economy	71 pph
Range @ 75% cruise w/45-min res, std fuel, best economy	
20,000 ft	940 nm
12,000 ft	910 nm
Range @ 65% cruise w/45-min res, std fuel, best economy	
20,000 ft	990 nm
12,000 ft	970 nm
Range @ 55% cruise w/45-min res, std fuel, best economy	
20,000 ft	1,040 nm
12,000 ft	1,025 nm
Max operating altitude	24,000 ft
Service ceiling	26,600 ft
Single-engine service ceiling	15,000 ft
Absolute ceiling	27,600 ft
Landing distance (ground roll)	
Flaps up	906 ft
Flaps down	1,818 ft

Limiting and Recommended Airspeeds

Vmc (Minimum control w/one engine inoperative)	71 KIAS
Vsse (Minimum intentional one-engine inoperative)	87 KIAS
Vx (Best angle-of-climb)	85 KIAS
Vy (Best rate-of-climb)	100 KIAS
Vxse (Best single-engine angle-of-climb)	93 KIAS
Vyse (Best single-engine rate-of-climb)	97 KIAS
Va (Design maneuvering)	155 KIAS
Vfe (Max flap extended)	127 KIAS
Vle (Max gear extended)	152 KIAS
Vlo (Max gear operating)	
Extend	152 KIAS
Retract	127 KIAS
Vno (Normal operating)	183 KIAS
Vne (Never exceed)	230 KIAS
Vsi (Stall clean)	75 KIAS
Vso (Stall in landing configuration)	70 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, at sea level and gross weight, unless otherwise noted.