AZTEC

Keeping up with the times

Why don't they build something new?
Why change just for the sake of change?
Why change something that works?

The Aztec, often called general aviation's DC-3, is a good example of the latter philosophy, despite the fact that it has been changed (or tweaked here and there) to hold market appeal, increase utility and to keep up with the times.

The design began with the twin-tailed Stinson twin, which was in development when Piper acquired the Stinson Division of Consolidated Vultee in December, 1948. The prototype made its first flight in March, 1952, but was never produced. In most respects, with the exception of the tail, it is the precursor of the Aztec's little brother, the Apache.

The original 150-hp Apache was introduced in 1954. Over its life span 1,231 aircraft were sold and 816 of the 160-hp version, introduced in 1958, were made. The original 5-place Aztec was announced in 1960 and was followed by the Apache 235 (which many call the short-nosed Aztec) in 1962.

The empennage of the Aztec differs from the Apache, save for the 235, in that it features a stabilator and counter-balanced rudder. The wing, fuselage and landing gear are the same.

The first Aztec had a gross weight of 4,800 pounds, which has been increased to 5,200 pounds, and cost $49,500.

Just as the J-3 was the basic trainer for thousands of civilian pilots, the Apache and Aztec have been the transition aircraft for a great number of multi-engine students.

The Aztec fills a multitude of other roles as well. It has comparatively good short field performance which, coupled with its generous cabin and baggage space, has made it a favorite with air taxi firms.

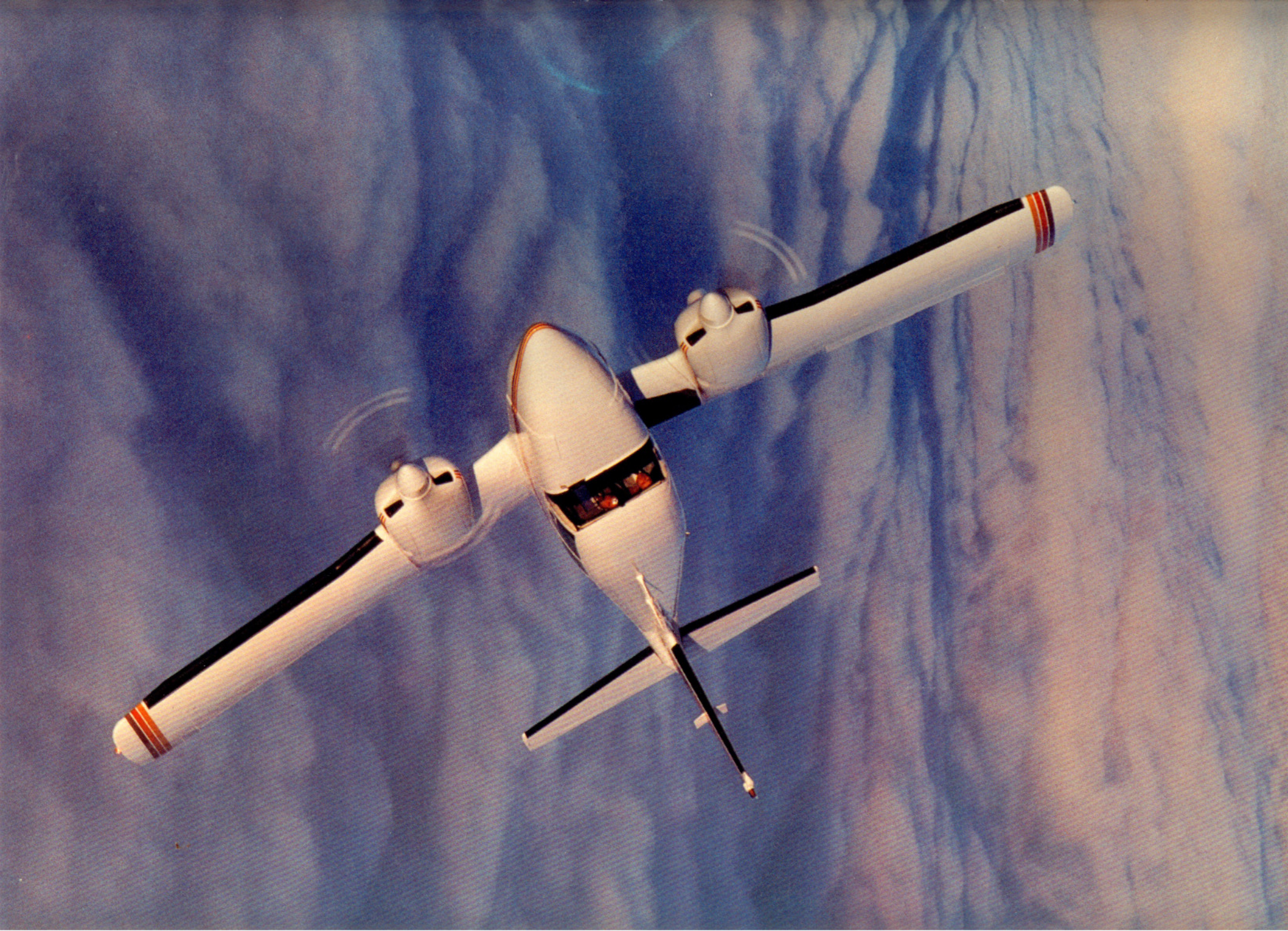
Too many operators have developed the attitude that the airplane, thanks in part to its fat pillow wing (the airfoil is a modified USA-35B of ancient vintage à la J-3), will haul anything one can load into it and still close the doors. It's a credit to the ability and basic gentleness of the design that more haven't ended up running off the end of runways, into trees or worse, when the rules of weight and balance have been ignored. For all its capacity and lifting ability, however, the Aztec is as much a compromise as any other aircraft. Judicious planning and judgment must be applied to select the right balance of payload and range.

Operators must be careful when carrying full fuel with only the pilot and copilot seats occupied, because calculation of weight and balance shows that the aircraft can be out of forward CG.

The basic systems of the Aztec have remained unchanged over the years, while the panel has been modernized and the capability of the aircraft has been improved.

The B model featured a longer nose, including a baggage bay, standard seating for six and an aft baggage area practically large enough to sit in. The base price in the

PHOTOGRAPHY BY ART DAVIS



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fall of 1962 was $52,990.

Turbosupercharging was offered for the first time with the C model, introduced in 1965. It was followed by the E model in 1971; the basic change was the extended nose which made radar installation easier and substantially increased room for avionics and baggage.

A most significant aerodynamic modification was introduced in 1975 on the F model. The horizontal stabilator was changed to incorporate external balance horns and greater surface to correct undesirable pitch instability at cruise and to deal with the large pitch excursions with flap extension and retraction for which the airplane was dubiously famous.

Left alone, the earlier Aztecs would range over several hundred feet at cruise, up and down. It was annoying at best and disorienting during times of distraction, emergency or bad weather. Pitch forces with flap extension or retraction were high. This could be overcome with large amounts of trim via the overhead (1930 Ford-type) hand crank, but it increased pilot workload and produced some wild excursions during approaches, particularly with transitioning pilots.

The stabilator modification improved some things but degraded others. Most of all, it didn't feel like an Aztec. Pitch control "feel" was vague in certain configurations and at certain airspeeds, and forces required during the flare were high.

Another change introduced on the F model contributed to the change in flying characteristics. Optional wingtip fuel bladders were offered, which increased total capacity from 144 to 184 gallons. The additional 120 pounds at each wing tip greatly increased lateral instability under certain conditions—particularly with unbalanced fuel loads at low speed, during departure and approach.

Pilots used to the feel of earlier model Aztecs were particularly surprised. Our first flight in an F model was an instrument departure during conditions of low ceiling and practically no visibility. Fortunately, a pilot who was fully qualified in the F was in the right seat, since we had made the foolish assumption that this airplane flew just like any Aztec. During departure, the combination of greatly different pitch sensing and lateral instability—dutch roll, really—made us think something was drastically wrong with the airplane. It was behaving so differently from our expectation that we were wandering everywhere but where we should have been.

It took quite a few hours to accept the fact that the F model was very different from the Aztecs in which we had flown hundreds of hours. We flew some of the most frightening approaches and made some of the worst judgments and landings we had ever made—including our earliest student flights.

Pilots with no Aztec experience probably would have flown the airplane a great deal better, since they would not have been expecting a particular set of flight characteristics.

Quite a few pilots must have been bothered by the difference since Piper has made another change, one which changes the horizontal stabilator back to what is basically the previous shape and area. The external horns, which had been hit with an AD because of cracking, fastening and bushing problems, and which reduced cruise performance slightly, have been removed. Damping is now provided by internal balance weights, bob weights up forward on the elevator instead of in the stabilator, and a lower-tension downspring.

A downspring was originally added to the E model, but pitch forces at the flare were high. Tension was reduced on the F model, in part due to the larger area of the stabilator.

Pitch forces are still high during the flare, particularly if sufficient trim isn't used, but feel is more predictable. Also, pitch stability at cruise is better than the earlier models.

There have been a few other changes on the 1980 model. Old-time Aztec pilots use a precautionary technique during takeoff because the standard configuration included a hydraulic pump only on the left engine (the critical engine). There is a manual hydraulic pump in the bottom center

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of the pedestal. The procedure is to extend the pump as part of the pre-takeoff check and instruct the copilot or right seat passenger to pump like crazy upon command.

As with any multi-engined aircraft, acceleration and climb ability is nonexistent to demandingly-marginal under the best conditions and even worse with gear and/or flaps extended. The manual hydraulic pump on the Aztec was the only hope of flying in the event of a left engine failure under most conditions.

Accessory manufacturers were fairly quick to offer a retrofit kit to provide a hydraulic pump for the right engine. Now Piper provides dual hydraulic pumps as standard equipment. In the process, the company has removed the formerly standard "last worst case" gear lowering system: the CO_2 cartridge which was mounted in the floor in front of the left seat which could be used to blow the gear down in the event of a total hydraulic failure.

The old preflight system included extension of the flaps with the manual hydraulic pump and retraction after engine start to ensure the engine-driven pump was working. The process is still worthwhile, in part because there is only one flap actuating rod per side. If the rod-end bearing should jam, twisting forces under air loads could snap the rod. The asymetric flap condition which results can be very

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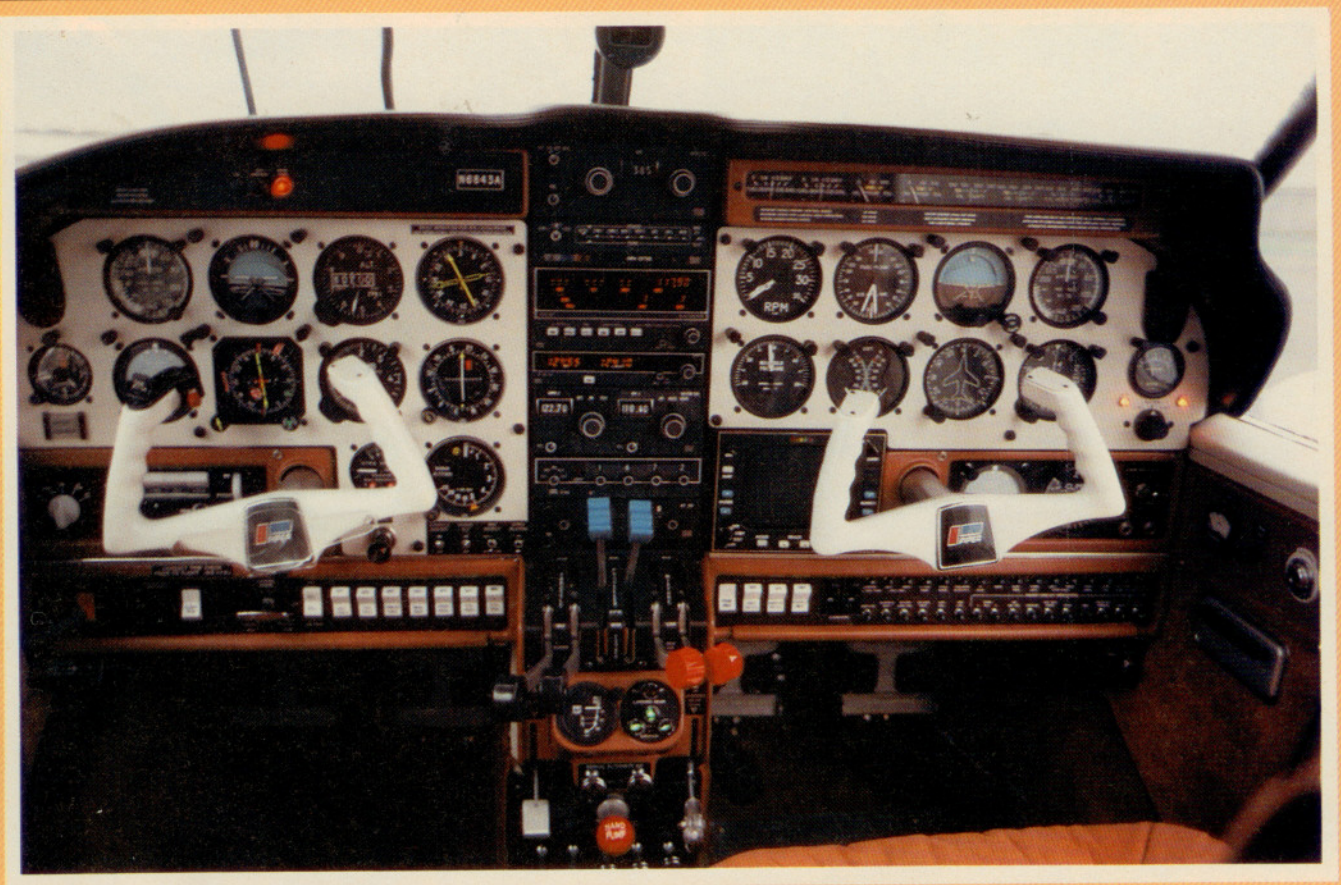

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exciting, even if the pilot keeps the airplane under control and right side up. The rods should be checked to ensure the rod-end bearing will move.

Now, however, the operating manual and check list recommend that flaps be retracted after the first engine is started before flight, and after the first engine started is shut down after flight, to ensure that both engine-driven pumps are operating.

A couple of other changes have been made to the F model for 1980. The ice light, mounted outboard on the left engine nacelle, has been recessed; a minor aerodynamic improvement consistent with the little changes made here and there over the years. The other change, which we usually treat lightly, represents a substantial improvement in comfort for tall pilots: new seats.

Long-legged pilots flying the Aztec were uncomfortably close to the edge of the instrument panel with the seat in its rearmost position. The new seats are thinner yet more comfortable, and provide more leg room up front.

Space for middle and rear seat passengers in the Aztec has always been relatively good. The generous head room, large windows and relatively upright seats have helped a lot of non-flyers feel secure and comfortable in the Aztec compared to several other light twins. The front and rear seats are individual buckets; the rear seat is a bench, but large enough not to be an afterthought. The space and seating arrangement have helped gain acceptance for the airplane as transportation.

From the standpoint of the pilot, the Aztec is a comfortable, confidence-building and relatively undemanding airplane. While cruise speeds have increased over the years with certain minor aerodynamic cleanup, approach, landing and other critical airspeeds have stayed relatively low.

With gear and flaps extended at gross weight, the airplane stalls at 55 knots. Vmc is 64; best single-engine rate of climb is 88. Stall speeds are down close to those of most single-engine airplanes and stalls are docile. Lower critical speeds translate into more time to react to problems.

True single-engine emergencies are just that: emergencies. Here again the relatively low critical speeds help. Full Vmc demonstrations can be performed without the wild excursions possible in some aircraft.

Our evaluation aircraft was loaded with options, including turbosupercharged engines. The trade between payload and range takes careful calculation before the tanks are filled to stay within gross weight.

Another calculation is that which weighs cruise speed with fuel burn and mixture setting with fuel burn. The difference between best power mixture and best economy mixture at the four recommended settings averages five gallons per hour.

The difference between the Turbo Cruise setting (roughly 80% power) and Intermediate Cruise (about 75%) is 10 knots at 10,000 feet with best economy mixture. The difference in fuel burn is 3.3 gallons per hour. The differences between Intermediate and Economy (about 65%) cruise settings at the same altitude are 11 knots and 3.6 gph. Factored over a few hundred flight hours per year, the potential fuel savings loom larger than speed.

The turbo version is happiest at altitudes above 8,000

feet where the advantage of the blowers begins to show.

Approach and pattern work was improved with the introduction of the F model. The flaps and pitch trim were interconnected to improve the already-mentioned forces and attitude changes. At the same time flap extension speed was reduced and provision was made for extension of quarter flaps at 141 KIAS and half at 123. This helps the management of the airplane when speeds have to be maintained close in to the airport. The basic good manners of the airplane have been further improved.

Docility and maneuverability are relative, or course, depending upon the type of aircraft flown and the overall experience of a pilot. For some stepping up from a light single, the Aztec will seem imposing, heavy and lumbering at first. Also, there is a great deal more to tend to.

But pilots of average skill will be able to transition into the Aztec easily, and qualified pilots of average proficiency should be able to operate the airplane with less concern than some other, competitive, aircraft. It is both a good commercial twin and a manageable one for the owner-pilot.

Our evaluation aircraft has been outfitted in what can be described as super deluxe. Most of its cost is in systems and the panel. At nearly a quarter of a million dollars, N6843A costs nearly two-thirds more than a bare, standard airplane. The turbosupercharging option, which includes all available de-icing equipment, adds nearly $34,000 to the base price.

Of the total additional weight—274 pounds—of options, 42.7 is anti-ice equipment, 27.9 is the Bendix RDR 150 color radar, the 115-cu. ft. oxygen system (which provides more than five hours supply for six, including two crew) weighs 48 pounds and the heavy duty battery adds an additional 16 pounds. All are desirable options for a full-capability aircraft.

With respect to full capability, there is an interesting limitation on the known-icing certification of aircraft fitted with approved equipment. The manual states that the approved equipment is not sufficient for flight in ". . . heavy or very prolonged moderate icing conditions." (We thought the limitation might be the result of the external electric windshield deice panel, but a factory representative has told us that it is because pneumatic boots are not fitted to the inboard wing leading edges.)

Icing encounters which produce an accumulation beyond a manageable trace have always been a very strong clue to us that it's time to take action, but we have never been aware that icing certification for some aircraft were so limited. It pays to read the operating manual carefully. We have talked to some pilots who think their aircraft are certificated for known icing because they have boots. Often they are not.

The avionics package in 6843A is about as complete as can be, primarily King (including a KNS-80 RNAV system), with an EdoAire Mitchell Altimatic IIIC autopilot, the already-mentioned Bendix color radar, and includes slaved gyro's, remote magnetic indicator, radar altimeter and a telephone. There is a full set of copilot's instruments with a separate pitot-static system and electric gyro's.

One interesting feature is a ground clearance switch, which permits running the radio's without starting engines or turning on the aircraft master switch. This is useful for getting clearances, ATIS information or departure delay

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information before starting engines. The function is automatically turned-off when the master switch is turned on.

The panel arrangement is good, even with all the equipment loaded into 6843A, and this is one way in which Piper has done good work in keeping the Aztec up with the times. Once checked-out in the airplane, there is no tendency to hunt for gauges, switches, levers or knobs because of their logical arrangement and grouping. Despite this, pilots of early model Aztecs will find little to mystify them because basic controls and subsystems, such as fuel controls, haven't changed.

More than 4,600 Aztecs have been built in its nearly 20-year run, and a lot of them have been bought by repeat customers. Not the fastest and to most observers not the prettiest of the light twins, the Aztec has kept pace with the times and the market.—EGT

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Piper PA-23T-250 Aztec F
Basic Aircraft $143,300
Plus Turbo Group $35,905
Basic Price $179,205
Price as tested $247,988

Specifications

Engines	2-Lycoming TIO-540-CIA 250 hp @ 2,575 rpm, 39.5 in mp, recommended TBO 1,800 hr.
Propellers	2-Hartzell, two-bladed, hydraulically actuated, constant-speed, full-feathering, 77 in. dia.
Wing span	37.3 ft
Length	31.2 ft
Height	10.1 ft
Wing area	207 sq ft
Wing loading	25.1 lb/sq ft
Power loading	10.4 lb/hp
Passengers and crew	6
Cabin length	8.5 ft
Cabin width	45 in
Cabin Height	50.5 in
Empty weight	3,322 lb
Equipped empty weight as tested (including unusable fuel)	3,637 lb
Useful load (basic aircraft)	1,878 lb
Useful load (as tested)	1,563 lb
Payload with full fuel (basic aircraft)	816 lb
Payload with full fuel (as tested—long range tanks)	501 lb
Gross weight	5,200 lb.
Maximum landing weight	4,940 lb
Zero fuel weight	4,500 lb
Fuel capacity (standard)	144 gal (137 usable)
Fuel capacity (with optional tanks)	184 gal (177 usable)
Oil capacity	12 qt
Baggage capacity	forward 150 lb (17.4 cu ft) aft 150 lb (23 cu ft)

Performance

Takeoff distance (ground roll)	990 ft
Takeoff over 50 ft	1,980 ft
Rate of climb (gross weight)	1,470 fpm
Single-engine rate of climb (gross weight)	225 fpm
Speed @ turbo cruise (2,400 rpm, 34 in) best economy mixture	
22,00 ft	206 kt
10,000 ft	189 kt
Speed @ intermediate cruise (2,400 rpm, 30 in) best economy mixture	
24,000 ft	198 kt
10,000 ft	179 kt
Speed @ economy cruise (2,400 rpm, 26 in) best economy mixture	
24,000 ft	181 kt
10,000 ft	168 kt
Speed @ long range cruise (2,200 rpm, 24 in) best economy mixture	
24,000 ft	148 kt
10,000 ft	151 kt
Range @ turbo cruise best economy mixture	
22,000 ft	947 nm (775 best power)
10,000 ft	895 nm
Intermediate—best economy	
24,000 ft	1,020 nm
10,000 ft	945 nm
Economy—best economy	
24,000 ft	1,075 nm
10,000 ft	1,010 nm
Long range—best economy	
24,000 ft	1,145 nm
10,000 ft	1,115 nm
Critical altitude	18,500 ft
Service ceiling	24,000 ft
Single-engine service ceiling	13,300 ft
Stall speed (clean)	61 kt
Stall speed (gear and flaps down)	54.5 kt
Landing distance (ground roll)	760 ft
Landing over 50-ft.	1,585 ft