TWIN COMANCHE

RUN FAST RUN LEAN

Ahead of its time in many ways, this controversial airplane has features that make it very competitive in today's used twin market.

BY THOMAS A. HORNE

Engineering and design objectives make light airplanes a blend of tradeoffs. If you want a greater payload, then speed is sacrificed. If speed is an objective, then engine displacement increases and fuel consumption surely must rise. And, of course, the airplane's handling and maintainability must receive equal consideration. Maximizing an airplane's ability to carry a respectable load at high cruise speeds with conservative fuel burns is a delicate balancing act that general aviation manufacturers must perform every year. Among the competitors, only a few distinguished airplanes over the years have come out head and shoulders above the rest.

Among the light twins, Piper's Twin

PHOTOGRAPHY BY ART DAVIS

Comanche certainly must represent one of the most efficient design compromises ever achieved. Briefly stated, the remarkable feature of the Twin Comanche is its ability to cruise at speeds of 170 knots (that is 196 mph) using two relatively small, 160-hp engines that, at 75 percent power, burn a total of only 17 gph. That's right, 17 gph for both engines.

With the standard 90-gallon tanks full, the basic PA-30 Twin Comanche has a useful load of 853 pounds, making it an honest four-place plus 100 pounds of baggage airplane with an endurance of just over five hours and a range of 870 nm. Turbocharged versions, when operated at 20,000 feet, can cruise more than 1,400 nm at economy cruise settings since they come standard equipped with tip tanks (30 more gallons) and an oxygen system.

But these are the practical aspects of the machine. The real essence of the Twin Comanche is its style, its quirky behavior and its subliminal appeal. The performance and economy features assume the status of nice-to-have secondary items when you consider this airplane's image as a pilot's airplane. When you show up in a Twin Comanche, all eyes are upon you. The airplane radiates an air of distinction that allows it to take its place among other twins costing tens of thousands more.

Piper began development of the Twin Comanche in early 1960, when the single-engine Comanches were at the crest of a four-year surge in sales (see May *Pilot*, The Comanche Singles, p. 83). The goal was to produce a twin-engine airplane with single-engine operating costs, high cruise speeds and a competitive price. Sales targets were flight schools and pilots of single-engine airplanes who wanted the safety and redundancy of a twin, but until then could not afford to make the switch. Based on flying the Twin Comanche 500 hours per year, Piper reasoned back then that operating costs would be around $16.78 per hour, a feature they felt sure would bring them business from fixed-base operations.

With a base price of $33,900, the first of the Twin Comanches was the lowest-priced light twin of its time; a new

Beech Travel Air went for $49,500 in 1963, a Cessna 310 sold for $59,900 and the soon-to-be-extinct Apache H cost $37,990. And all of these other airplanes burn from one to five more gallons per hour to obtain cruise speeds at 75 percent power very close to the PA-30's optimum cruise true airspeed of 168 knots. The Travel Air burns 21.3 gph to get 173-knot cruise speeds, for example; the Apache H, using the same basic engine as the Twin Comanche, consumes 19 gph to obtain cruise speeds of only 148 knots.

Apparently, 1960 was a very busy year at Lock Haven because Piper's own engineering department was too preoccupied to undertake design work on the Twin Comanche prototype. Howard Piper, chief of Engineering, however, was so convinced of the project's eventual success that he contracted Edward Swearingen of Swearingen Aviation Corporation in San Antonio, Texas, (manufacturers of the Merlin and Metro turboprops) to begin work right away. Piper sent Swearingen a single-engine Comanche and told him to design the most efficient low-powered twin-engine installation that he could, based on the wing and fuselage of the Comanche single.

Swearingen took two 160-hp Lycoming O-320 engines (the same ones Piper used in the Tri-Pacer, Super Cub and Apache and that Cessna used in the 172) and converted them to fuel injection, thus making the already compact engines even "flatter" and making possible the Twin Comanche's distinctively trim nacelles. This was the so-called tiger shark cowling, which easily is recognized by the elongated propeller spinners. Actually, this was a result of using six-inch propeller shaft extensions, a device Swearingen used to make a needed forward weight shift. This configuration also helped reduce noise and vibration. The shark look, standard on all Twin Comanches, was incorporated into the 260-C model Comanche singles in 1968, five years later.

The basic airframe is identical to that of the Comanche singles, and the cabin dimensions are virtually the same. The Twin Comanche's wing is also identical to that of the Comanche singles, with the same wing area, planform and airfoil designation—the slippery, laminar flow NACA 64^2A215. The stabilator and landing gear are also the same.

The pointy, bullet-shaped nose, Piper said, was inspired by the then-current Century series of fighters used by the armed forces. The vertical stabilizer and rudder were made larger and stronger to deal with the twin's higher speeds and the need to counteract asymmetric thrust. Other significant structural differences are the heavier wing spars and the nose-gear support tubing.

This configuration—essentially a Comanche 180 airframe with two wing-mounted engines—presents a very low drag profile for the amount of speed and power developed.

But this aerodynamic combination of single and twin is at the root of what came to be called the Twin Comanche's "landing problem." Legend has it that no one can land a Twin Comanche the same way twice. There is something about its behavior in the flare that makes it difficult to land well. That is, gently, mains first. The airplane has a tendency to drop in—kerthump!—on all three wheels, as though it has let go of its lift suddenly, prematurely and without warning. Even if you do manage to get the mains to touch down first, the nosewheel will follow a microsecond later.

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The PA-30 is remarkable: 170-knot cruise speeds while burning only 17 gph.

But remember that you are flying with the wings of a single and the weight of a light twin. The laminar-flow Comanche wing, designed for speed, not slow flight, can release all its lift suddenly when near the stall. It is a wing that does not stall as progressively as fatter, more docile ones do. That is to say, the outboard sections can stall at the same time the inboard ones do. And with a wing-mounted engine, the lift-producing area of the wing is reduced. In short, you have more weight for a lesser amount of lift.

Of course, there also is its nose-high deck angle. Designed to give the propellers adequate ground clearance, what this attitude really means is that unless you raise the nose to what might seem an unusually high angle in the moments before touchdown, you will land with all three wheels striking the runway at once. Or maybe even nosewheel-first, if it is one of your first few times out.

Another part of the problem might be the way the nacelles blanket the rearward airflow. By the time the relative wind strikes the stabilator, this theory goes, its force has been decreased. The stabilator can lose lift or even stall as you attempt a flare. This is aggravated when you select full flaps and have a forward center of gravity (CG). All twins, you may hasten to say, have nacelles that could create the same behavior. Or landing any airplane with full flaps and a forward CG makes it difficult to achieve a proper landing attitude.

But the Twin Comanche is not just any airplane, and therein lies its ultimate appeal. Unlike most airplanes around these days, the Twin Comanche takes some skill, hard practice and finesse to land properly. If you are the kind of pilot who wants a forgiving airplane, then this is not the one for you. You have to love it and deal with it to earn your place as a bona fide, competent Twin Comanche pilot.

On the subject of landings, it seems that every Twin Comanche pilot has a method of his own; but certain common elements emerge when you inventory all of them. First of all, a further aft CG helps. (One owner puts 100 pounds of ballast in the aft baggage compartment when he flies alone or with just one other person in the copilot position.) The airspeed should be kept constant on final, pegged at blueline (Vyse, 91 knots). Use half, not full, flaps. On short final, with the field made, power should be reduced gradually to 13 or so inches of manifold pressure (mp), and over the threshold the airspeed should be bled off to about 70 knots. Now keep some power in as you raise the nose to an attitude that is higher than you ordinarily might be comfortable with in a light twin. Above all, keep the control column back and hold it there through the touchdown, which should come mains-first at a speed just above stall. But then again, it may not. There are good days and bad days.

The stories go on and on. But the point is, landing a Twin Comanche is never a dull experience. If you own one, you, too, will be entitled to your own personal theory of how to land it.

Other endearing quirks that Twin Comanche pilots take pride in coping with are a shudder that passes through the airplane when cruising at 2,100 or


N12RN

2,200 rpm, and pitch oscillations, usually discovered while trimming for cruise flight. The stabilator is very effective at high airspeeds, and this makes the airplane very sensitive in the pitch axis. The technique to use here, experts say, is to trim, then wait, then trim some more. It takes time for this airplane to settle down at cruise.

It is anybody's guess as to what causes the shudder. The propeller shaft extensions? The engine mounts? No one seems to know, or care; but it is there, all right. While cruising you notice that from time to time vibrations pass through the control column or that the instrument panel shakes slightly. Oh, well, it is just another Twin Comanche idiosyncrasy. You can try to eliminate it by changing the rpm, but this probably will not do any good. Most choose to ignore it and fly on.

However irritating these traits may be, they are of relatively minor consequence, causing little more than embarrassment or hurt pride in the case of the landing behavior or annoyance in the case of the pitch oscillations. There are other traits of the Twin Comanche that pass beyond the bounds of quaint eccentricity and bring into question what may be this airplane's darker side. While the Twin Comanche was a brilliant composite in terms of performance and economy, it may be that if anything was sacrificed in the bargain it was safety.

No discussion of the Twin Comanche would be complete without addressing the subject of this airplane's alleged killer Vmc stall characteristics. We have seen how the Twin Comanche was the least expensive of all the light twins of its day. This, and its low fuel consumption and overhead (the engines are very durable and uncomplaining) made Twin Comanches very popular with flight schools as multi-engine trainers. The Federal Aviation Administration before the late 1960s was not as clear in its guidelines for stall training as it is today. A multi-engine student in those days could expect to practice his Vmc demonstrations within 500 feet of the ground. There, in the denser layers of the atmosphere, asymmetric power is maximized. While this provides a convincing presentation of the control problems a pilot can expect to encounter in the takeoff configuration with an inoperative, windmilling engine and an airspeed close to the single-engine minimum control airspeed, some of

A PLOT EXPOSED

BY GUERNSEY LE PELLEY

At long last I have decided to sit down and write the truth about Twin Comanches. This either will make me a hero or brand me as a traitor by the Secret Order of Twin Comanche Owners. But somebody has to sacrifice himself for the betterment of mankind, if not simply for truth in advertising.

For more than a decade, buyers have been sneaking into dark alleys and knocking at an unlabeled door (two long, one short) to get the awful word-of-mouth low-down on this airplane's characteristics. A pair of cracked, swollen lips appear as the peephole in the portal opens. Then they whisper, "Hey, man, the Comanche brand is hard to land."

By peeling another sawbuck off your roll of bills you can hear more. The lips say, "Hey, Jake, the engines shake." If you come up with enough bread you can get some further hair-raising facts: "It won't stay level, Neville" or "It won't fly even, Stephen."

What no one knows, and what I am herewith exposing for the first time, is that Twin Comanche owners have been spreading all this propaganda themselves to keep undesirables out of the neighborhood. Some Twin Comanche owners will not even paint their airplanes, just to perpetuate the impression they are so dangerous to fly no owner wants to put too much money into one.

Naturally, being a Twin Comanche owner myself, I knew what was going on. It is only now, after years of anguish, that my conscience has caught up with me. It is not easy being a snitch. But I have decided. I'm going to sing. Just call me the Comanche Canary.

For instance, did you know that many test flights of Twin Comanches are made by writer/pilots who previously had never flown one? Comanche owners lie in wait for these innocent test pilots just to be able to misinform them.

An innocent test pilot is easy to spot. Usually he frequents well equipped airports only on rainy afternoons. He appears with styled hair, oversize, gold-rimmed sunglasses, a briefcase made of real leather and a sharp sport jacket. The jacket he removes and folds neatly on a back seat, revealing a casual powder-blue shirt with a large, loosely knotted, but very sincere, tie.

Mostly he is a capable pilot, but gullible. Carefully planted suggestions by nefarious Comanche people make him

PLOT EXPOSED continued

This was all that was found after the smoke cleared in Guernsey Le Pelley's office, believed to have been bombed by the Comanche Nostra. Le Pelley, AOPA 165412, an editorial cartoonist and a commercial pilot with multi-engine and instrument ratings, is believed to be living under an assumed name in upper Saskatchewan.

these demonstrations in Twin Comanches ended in fatal stall/spin accidents. Crash investigations suggested that the airplane easily entered a flat spin.

By 1967, 30 persons had died in 13 training accidents involving Twin Comanches, and the debate had begun. A large part of the problem, of course, was that the Vmc maneuvers were performed so close to the ground, making a recovery from the stall nearly impossible. Then it was learned that some of the accidents involved passengers in the rear seats, which would move the CG aft and enhance the probability of a flat spin or, at least, make stall recovery much more doubtful. In some accidents low-time instructors may have failed to recognize a stall in time to effect a recovery, or, if a stall/spin had been entered, failed to stop the condition in time to prevent impact. More puzzling was the involvement of many experienced instructors in these accidents, pilots who should have been able to recognize and control an airplane's adverse behavior.

The National Transportation Safety Board and the FAA became very interested in the Twin Comanche's spin characteristics, and a chain of events began that ultimately led to changes in the airplane's airfoil and powerplant designs and its operating limitations. Other changes affected recommendations on the performance of stalls and single-engine training maneuvers that are still in effect today.

First came a July 27, 1967, letter from the NTSB to the FAA describing the pattern of accidents and noting a coincidence of impacts in a flat attitude. While the report noted that spin tests had been conducted during flight tests in 1964 and that no flat-spin characteristics were detected, it also was mentioned that there were no deliberate attempts to induce a flat spin. Therefore, there was no factual evidence concerning the Twin Comanche's control characteristics while actually in a flat spin. What really concerned the NTSB was that there was no assurance that normal spin recovery techniques would bring a Twin Comanche out of a fully developed flat spin.

The NTSB's recommendations were to find out what configuration and pilot input it would take to precipitate a flat spin, if there was adequate control available to check an inadvertent entry or if a special procedure was necessary to effect a recovery.

In September 1967 wind tunnel and

1966 Piper Twin Comanche B (PA-30B) Basic price new $35,990 Current market value $34,000		**1972 Piper Turbo Twin Comanche C/R (PA-39)** Basic price new $57,490 Current market value $56,000
	Specifications	
2 Lycoming IO-320B, 160 hp @ 2,700 rpm	Engines	2 Lycoming IO-320-C1A, 160 hp @ 2,700 rpm
2,000 hr	Recommended TBO	1,200 hr
2 Hartzell HC-E2YL-2, 72 in	Propellers	2 Hartzell HC-E2YL-2, 72 in
35 ft 11.7 in	Wingspan	——
36 ft 9.5 in	with tip tanks	36 ft 9.5 in
25 ft 2 in	Length	25 ft 2 in
8 ft 3 in	Height	8 ft 3 in
178 sq ft	Wing area	178 sq ft
20.22 lb/sq ft	Wing loading	20.9 lb/sq ft
11.25 lb/hp	Power loading	11.64 lb/hp
4/6	Passengers and crew	6
2,207 lb	Empty weight	2,416 lb
1,393 lb	Useful load (basic aircraft)	1,309 lb
853 lb	Payload with full fuel (basic aircraft)	——
798 lb	with tip tanks	589
3,600 lb	Gross weight	——
3,725 lb	with tip tanks	3,725 lb
90/84 gal	Fuel capacity, standard/usable	——
120/114 gal	with tip tanks	120/114 gal
8 qt	Oil capacity each engine	8 qt
250 lb (20 cu ft)	Baggage capacity	250 lb (20 cu ft)
	Performance	
950 ft	Takeoff distance (ground roll)	990 ft
1,750 ft	Accelerate/stop distance	2,560 ft
1,530 ft	Takeoff over 50 ft	1,590 ft
1,460 fpm	Rate of climb (gross weight)	1,290 fpm
260 fpm	Single-engine rate of climb (gross weight)	225 fpm
178 kt	Maximum level speed, sea level	——
——	12,000 ft	198 kt
——	24,000 ft	214 kt
168 kt/17.2 gph	Cruise speed, 75% power, 8,000 ft	——
161 kt/15.2 gph	Cruise speed, 65% power, 12,000 ft	——
144 kt/13.4 gph	Cruise speed, 55% power, 10,000 ft	——
	Turbo Cruise	
——	12,000 ft	192 kt/22.6 gph
——	24,000 ft	208 kt/22.6 gph
	Intermediate Cruise	
——	12,000 ft	181 kt/17.2 gph
——	24,000 ft	198 kt/17.2 gph
	Economy Cruise	
——	12,000 ft	168 kt/14.4 gph
——	24,000 ft	180 kt/14.4 gph
	Range, 75% cruise (45-min reserve)	
695 nm	8,000 ft	——
986 nm	with tip tanks	——
	Range, 65% cruise (45-min reserve)	
768 nm	12,000 ft	——
1,087 nm	with tip tanks	——
	Range @ Turbo Cruise (no reserve)	
——	12,000 ft	946 nm
——	24,000 ft	1,102 nm
	Range @ Economy cruise (no reserve)	
——	12,000 ft	1,290 nm
——	24,000 ft	1,450 nm
18,600 ft	Service ceiling	25,000 ft
5,800 ft	Single-engine service ceiling	12,600 ft
1,215 ft	Landing distance—ground roll	725 ft
1,875 ft	Landing over 50 ft	1,900 ft
66 kt	Vsi (Stall speed clean)	66 kt
60 kt	Vso (Stall speed with gear and flaps down)	61 kt
78 kt	Vmc (Minimum control speed with critical engine inoperative)	78 kt
78 kt	Vx (Best angle-of-climb speed)	78 kt
97 kt	Vy (Best rate-of-climb speed)	97 kt
91 kt	Vyse (Best single-engine rate-of-climb speed)	91 kt
130 kt	Vle (Maximum landing-gear-extended speed)	130 kt
108 kt	Vfe (Maximum flap-extended speed)	108 kt
141 kt	Va (Design maneuvering speed)	141 kt

Based on manufacturer's figures; fuel flow data for both engines; all V-speeds indicated airspeed.

smile and nod knowingly. He flies with crisp precision, with computer in lap and notebook in shirt pocket. A pencil is held delicately between the teeth.

After a test flight he steps out, calm, unflustered, slips into his tailored jacket, puts the notebook, computer and pencil back into the real leather briefcase, shakes hands all around and then speeds off, smoothly, in his secondhand BMW.

The words this test pilot writes soon become gospel, appearing as they do in widely read magazines. A sentence may go like this: "One of the first things I noticed about the Twin Comanche, flying solid instruments between Gumburg and Smeltville, is that the engines shake." What you do not read is that there was a Twin Comanche guy sitting right beside him who *told* him that the engines shake.

I had a passenger with me recently on the over-water leg of V139 east of New York. He kept looking nervously outside at the engines. "When are they going to shake?" he asked. (It is quiet enough in a T.C. so that you can talk to people.)

"Shake?" I asked. "Yeah. I read in a magazine that they shake." I put my ear against the cabin frame. "Maybe they're shaking now," I said. "We're moving close to 200 mph. What do you think?"

He put his head against the panel, rolling his eyes thoughtfully. "Could be. I feel a vibration. Maybe it comes from the propeller going around and all that."

Another time I had a schoolteacher with me. He said, "I wanted to buy a Twin Comanche, but someone told me they were underpowered and they could be overloaded easily."

Underpowered? Overloaded? Ah, some sly Twin Comanche owner did his work well. As yet I have not strapped any excess baggage out on the wings; but the airplane performs with beautiful normality with anything you can stuff inside it. You have to be able to shut the doors, of course.

Then there was the day I had a friend with me on a rainy, instrument flight from Jacksonville, Florida, to Norfolk, Virginia. We were level at 7,000 feet, and an Aztec was being handled above us at 9,000. Center talked with us alternately as we went along. After half an hour my friend, a heavy twin man, said, "Don't you have itsy-bitsy 160-hp engines on this box kite?"

"Affirmative," I said. "Well, when is the Aztec going to pass us?" he asked. "Oh, maybe around Kinston someplace. North Carolina," I replied. "Not until Kinston?" He looked incredulous. "Maybe Kinston."

But alas, the Aztec never passed and was in the landing vectors with us at Norfolk. My friend, not quite believing it was the same airplane above us all the way, went out to watch while they took on fuel. He joined me at the counter in the flight office, looking worried.

"You know, that really is the same airplane. They filed on to Boston with the same ETA as we have."

"Shhhh," I whispered, pulling him into a corner. "Sometimes a Twin Comanche goes right along with bigger twins. Please keep quiet."

"We took on only half as much fuel—" I held up a warning hand so he lowered his voice. "We took on only *half as much fuel!*"

"Okay, okay," I said, looking around to see if anyone was listening. The urge to come clean overpowered me. I blurted it out: "We're burning 14 gallons an hour."

He had read that the engines shake. I put my ear to the cabin frame. "Maybe they're shaking now. . .we're going almost 200 mph."

"Jeeze, that's not bad, each engine."

"No—total." I began to sweat. I felt purged. No more lying. Well, maybe just a small lie, because I was new at this. We were actually burning a total of 13.7, and I let him think it was 14.5. The way the Twin Comanche sips gas can be embarrassing. To keep from being too self-conscious, some guilty Twin Comanche owners say 16. Some even say 17. The die-hard owners won't answer.

Almost every Twin Comanche owner knows what makes a test pilot say the twin will not fly level. It is mostly the fault of those "itsy-bitsy" little Lycoming 160s, which not only run on forever, but even pulled back, deliver very exotic speeds. Twin Comanche owners remain mum about this. They do not mention that it is no sweat to climb out at more than 1,400 fpm. There is silence about the fact that they really dig in after you level off and that the gradually increasing speed is sneaky and almost imperceptible. The airplane becomes gleeful, feeling the speed, and wants to climb. The uninitiated test pilot thinks he is trimmed out and shoves the nose down. This only encourages those itsy-bitsy 160s further when they find the going so easy, so they start to climb again.

The secret, of course, is that one of the things you do with a leveling-off Twin Comanche is concentrate on trimming gently-gently by hand. Close the cowl flaps, then trim a little more. Lean the mixture, trim a little, check a little, then trim a little more. "Think of it as kissing the hand of a beautiful woman," as one Comanche Cowboy commented.

Once an exposé like this gets started, there seems to be no end to the perfidy. When an earnest young man, weaned on Cessna Skyhawks, came to me with trembling questions, my betrayal was complete. What about stalls? Uncontrollable spins? Single-engine terror? There was a time when I would have rubbed my hands in villainous glee at the chance to scare the hell out of a novice.

I was within earshot of other Comanche owners when I said, "Don't make me laugh, I have a cracked lip!" I could see them exchanging glances, but I went on to explain that anyone flying a Twin Comanche according to the standard twin-engine rules would reveal this airplane as an everloving pussycat. There were even some weirdos, I told him, who took off on one engine when they were sure no "outsiders" were watching. I knew then I was a marked man.

Now comes the diabolical part of this Comanche-owner subversion. One of the confidential whisperings heard back of the fence is that Twin Comanches are hard to land. Ah, what satanic cunning. This bit of propaganda was included with all the other gibberish because it is the only thing that is true. Well, almost true. Maybe true on Mondays, Wednesdays and Fridays. It evolves from the fact that you have to *fly* a Twin Comanche. The minute you let it run around loose, the airplane reminds you with its frisky freedom. It is what makes the love affair so real and rewarding.

Since my hair is down (what there is of it) I am not going to suggest the fun-loving T.C. is *easy* to land. It is always an interesting challenge. As when walking a slack wire over the Grand Canyon, you have to pay attention.

For instance, you cannot land this airplane if you are distracted by anything, such as chewing a stick of gum. Or breathing. Or the tower saying, "Cleared to land." Or if the windshield gets too close to your eyeballs. Each time, you have to take the trouble to sweet-talk this flying wonder off its wings and onto its wheels.

All this romancing is because the Twin Comanche is built exactly as an airplane should be. As long as it has flying speed, it flies. When it does not have flying speed, it quits. The solution is quite simple. You arrange for the flying speed to end about 12 inches off the ground and at the same time lift the nose a lot higher than you think it should be. Then, honest to goodness, you get nothing but kiss-kiss landings. Kiss-kiss landings. Kiss-kiss landings. . . . □

flight tests were begun under National Aeronautics and Space Administration auspices at the Langley Research Center in Hampton, Virginia. That same month Piper began printing spin recovery procedures in Twin Comanche flight manuals, noting that intentional spins were prohibited.

On September 14, the FAA issued Advisory Circular 61-40, which carried recommendations on the performance of stalls. No longer, it declared, would single-engine stalls be demonstrated on multi-engine flight tests. Though they never were required in the past, this entry is significant because it clarified an FAA position that was ambiguous until the Twin Comanche issue arose. "Single-engine stalls should not be practiced in high performance airplanes by other than qualified engineering test pilots," the phrasing went.

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For the money, you'd have a hard time finding a better light twin.

The bulletin also brought up engine-out minimum control speed demonstrations, stressing that Vmc demonstrations should not be attempted when it is known that the density altitude is such that Vmc is close to the stalling speed. "Loss of directional or lateral control just as a stall occurs is hazardous," the AC read, ". . . but such loss of control when the airspeed is five knots or more above stalling, however, need not be serious."

Stall demonstrations, the AC continued, were from then on to be performed at a high enough altitude to permit recovery from an inadvertent spin, in no case below 1,500 feet above ground level.

Delays occurred on the wind tunnel testing program, but by mid-1969 NASA's Bureau of Aviation Safety had assembled the data. The final report would not be delivered until July, 1971. In the meantime, the number of Twin Comanche stall/spin accidents climbed to 40, with 73 persons losing their lives.

The bureau eventually reached three conclusions:

- At the stall, large rolling and yawing moments occur as a result of asymmetric wing stall; i.e., a large part of the left wing outboard of the nacelle stalls at an angle of attack about two degrees lower than the right wing.

- The rolling and yawing moments generated by the asymmetric wing stall are larger than the corrective moments produced by aileron and rudder controls, respectively.
- The airplane exhibits a flat spin under certain conditions involving the use of asymmetric power.

Piper had been kept advised of the progress on the aerodynamic tests and moved on its own initiative to develop a modification kit for all Twin Comanches and Turbo Twin Comanches. The first kit was described in Service Letter 552, dated May 1, 1970. This entailed the installation of a new right engine with a counterclockwise-rotating (viewed from the cabin) propeller, an aileron/rudder interconnect system and wing leading-edge stall strips.

In this configuration the left propeller rotates to the right and the right propeller rotates to the left. This eliminates the so-called critical engine, the one that most adversely would affect the performance or handling qualities of an aircraft if it failed. In conventional American airplanes with clockwise-rotating propellers, the critical engine is the left engine because of the different thrust vector dynamics exhibited by the left and right engines.

This modification could run anywhere from $1,900 for a normally aspirated Twin Comanche to $2,600 for a Rajay turbocharged model. In spite of the advantages of a balanced airflow, more docile stall characteristics and the absence of a critical engine, the high cost must have discouraged owners. Only 60 of these modifications were performed.

Another kit that Piper offered beginning in July 1970, was made available to Twin Comanche owners free of charge. Described in Service Letter 558, this "airflow kit" included the installation of wing leading-edge stall strips, a rudder seal strip and the aileron/rudder inter-connect system and a rerigging of the rudder and the stabilator. Piper distributors received 1,303 of these kits by May 1971, but only 843 Twin Comanches actually were outfitted with this kit. NASA's final report recommended that FAA issue an airworthiness directive requiring all Twin Comanches to have the installation made. The recommendation never reached AD status, however, and the installation of these kits remains completely voluntary.

The only airworthiness directive to come out of the great Twin Comanche Flat-Spin Controversy was AD 69-24-4, which required a change in the Vmc from 69 knots (80 mph) to 78 knots (90 mph).

Perhaps it is a credit to the airplane that so few of the modifications were made. Pilots by and large saw no reason to change an airplane that already handled so well. The only constructive emphasis to be derived from all this concentration of anxiety about the Twin Comanche's stall/spin tendencies is to fly the airplane precisely and never at airspeeds slower than Vmc-plus-five knots, unless you are in the

FEATURES AND MILESTONES

Presenting the all-new Piper Twin Comanche! Well, it was new when this photo was taken in 1964. Note the Palm Beach paint scheme and the landing lights near the wingtips.

The original PA-30s came in several different variations. The Standard was just that. Bare-bones day VFR with only one generator and one vacuum pump. The Custom was a lot better: dual generators and vacuum pumps, an automatic direction finder, a Narco Mark 12 nav/com with an instrument landing system indicator and a two-axis autopilot. If you wanted dual VORs, the ILS, marker beacons and an ADF, then it was the Executive. Next came the Sportsman, which had as its big feature the all-new Palm Beach interiors and exteriors, designed especially for the Twin Comanche. The top of the line was the Professional, with all the above plus DME and a transponder. You can tell the Palm Beach paint jobs by the solid-colored fuselages and nacelles and the triangular trim. You rarely see a Twin Comanche nowadays with an original paint job.

Palm Beach interiors meant leather seats. The rear seats were bench-style, and curtains were on the side windows.

The PA-30B, the first model change for the Twin Comanche, came out beginning in 1965. The B had a wider range of options, including fifth and sixth seats and extra side windows. Tip tanks could be ordered, as well as an oxygen system, heated windshield and wing deicing and propeller anti-icing equipment.

The first Turbo Twin Comanche Bs also came out with the 1965 model year. The tip tanks and a six-outlet, 67-cubic-foot oxygen bottle came with all turbocharged Twin Comanches. Turbocharging is accomplished by using a Rayjay manually operated wastegate unit. To control the wastegates you use two push/pull controls located under the power quadrant. Using a vernier adjuster, screw the wastegate controls in to close the wastegate and redirect air from the turbocharger into the engine's intake manifold. Slowly, please, or you will overboost the engines. A glance at the manifold pressure (mp) gauges will tell you how much power you are developing as you continue to advance the turbo controls. Turbocharging permits you to develop more manifold pressure at altitude, in effect "fooling" the engine into thinking it is operating at a lower altitude. It also comes in handy for take-offs where density altitude is a factor.

Both the PA-30 and the PA-30B have instrument panels that leave something to be desired. Flight instruments are not in the standard T configuration. A drum-type directional gyro is directly above the control column and to its right is an old-fashioned black-background attitude gyro. The altimeter is on the left, below the airspeed indicator. Electrical switches are lined up together, all of them, and each toggle switch is identical to the other. This makes it easy to turn on the right boost pump instead of the landing flare. This is an airplane that will not tolerate sloppy flying and is not forgiving once it has entered a stall with asymmetric power.

While it is useful to know that the Twin Comanche has certain bad tendencies, it is not altogether fair to blame an airplane for accidents that were caused by questionable pilot technique or training practices. It should be remembered that flying any twin near Vmc with asymmetric power is courting disaster and that any airplane spun with an aft-located CG will exhibit flat-spin characteristics of one intensity or another.

At any rate, all this bad publicity drove down sales of the Twin Comanche. In the used airplane market, they began to sell for $15,000 or less. Piper

rotating beacon or shut off the left generator instead of the pitot heat, especially at night when the cabin is dark and illumination of this area is inadequate. It is also necessary to cock your head over to read the labels. Circuit breakers can be found under a trap door on the floor beneath the power quadrant.

Aft of the circuit breaker compartment is the manual gear-extension system. To extend the gear, you put the handle (stowed separately in the compartment) alternately into each of the two sockets, pushing forward until you get a green (all gear down) light.

Fuel can be drawn from either tank to either engine using the floor-mounted fuel selectors between the front seats. If the left engine is inoperative and you want to use fuel from the left wing's tanks to power the right engine, put the left fuel selector to either the Main or the Auxiliary (level flight only) position, depending on which tank you want to use, and the right fuel selector to Crossfeed. To move the selector into the Crossfeed position, you will have to push a spring-loaded guarding mechanism out of the way of the selector's travel.

The panel was redesigned in 1968 when the PA-30C and Turbo Cs came out. Flight instruments went to the T, the magneto and starter switches went to a side panel of their own, the circuit breakers went to the lower right and toggle switches were replaced by integrally lighted rocker switches.

The IO-320 was beefed up for the C models. Heavy duty Inconel alloy valves are used, and the valve guides are strengthened. Cylinder heads are heavier; longer-reach, cooler-running spark plugs are used; and the crankshaft and camshaft are also sturdier and better lubricated. Time between overhaul for the normally aspirated Twin Comanche is 2,000 hours, for the turbocharged models, 1,200 hours.

Another big operational improvement was the introduction of simplified power settings. Only four cruise settings were recommended for each Twin Comanche model. In the C, they were Normal (26 inches/2,400 rpm), Intermediate (24 inches/2,400 rpm), Economy (24 inches/2,200 rpm) and Long Range (20 inches/2,200 rpm). The Turbo C had Turbo Cruise (28 inches/2,400 rpm), Intermediate (26 inches/2,400 rpm), Economy (24 inches/2,200 rpm) and Long Range (22 inches/2,200 rpm). No longer was it necessary to refer to a power chart to determine settings as altitude varied.

Cruise speeds went from 168 knots up to 172 knots for the normally aspirated C and from 193 knots to 208 knots for the turbos, as a result of the improved engines and the new crusie settings.

In February 1970 the PA-39 C/Rs were announced. (From this model on, all Piper light twins would have counter-rotating propellers.) Except for the counterclockwise rotation of the right engine, some C/R decals on the nacelles and a new paint job (bold vertical stripes on the tail section) there was no difference between the appearance of a PA-39 and earlier Twin Comanches. Service ceiling for the -39, though, went up to 20,000 feet, and single-engine service ceiling rose to 7,100 feet. In the C they stood at 18,600 and 5,800 feet, respectively. Takeoff distance over 50 foot obstacles went down, and so did the landing run for the PA-39 and the -39 Turbo.

When the end came for the Twin Comanche, Piper had been doing prototype work on an airplane they called the PA-40 Arapaho. Intended as a replacement for the Twin Comanche, the Arapaho had dropped leading edges, longer landing gear, flaperons and other hi-lift and safety features seen in the Robertson conversions. But because it was too work intensive and expensive to manufacture, the Arapaho never made it, the Twin Comanche slid into the past, and we got the Seneca instead. —*TAH*

Twin Comanche Sales Deliveries

	1963	64	65	66	67	68	69	70	71	72	73	74	
PA-30	234	438	259	437	259	124	230	15	2	—	—	—	1,998
PA-39	—	—	—	—	—	—	—	80	43	21	0	1	145
Total													2,143

responded by coming out with a new, improved Twin Comanche, the PA-39. These models came with counter-rotating propellers and all the airflow modifications described above as standard equipment. But it was too late. The Twin Comanche's negative image had dealt the airplane irreparable harm. In 1970 only 15 PA-30s were delivered; then their production was discontinued. That same year, the first for the PA-39 (Piper called them PA-39 C/Rs—for counter-rotating—in its sales literature), only 80 of the new Twin Comanches were sold. In 1971 the situation worsened: only 43 sales. By this time, work had begun on the Seneca series of light twins. With counter-rotating props and a large cargo-carrying capability, Piper saw the Seneca as a more utilitarian replacement for the Twin Comanche and drew attention to the safety features drawn from the Twin Comanche experience.

The *coup de grâce* came with Hurricane Agnes in June 1972. Both the twin- and single-engine Comanche production lines were flooded when the Susquehanna River rose, destroying the jigs and tooling used to construct the Comanches. By the fall of 1972, rumors began to spread that Piper wanted to end production of all Comanches, and by early 1973 the final decision was made. While the Piper management no doubt felt that it was taking the right action at the time, it is interesting that Piper tantalized the flying public for a while by holding out the prospect that the company would, maybe, resume production of the entire Comanche line. But this was not to be.

Though Twin Comanche owners are inclined to hold on to their airplanes, you still can find many on the market today. Depending on the model in which you are interested, you can expect to pay anywhere from $21,000 for an early PA-30 with no tip tanks, turbocharging or counter-rotating conversion, to $55,000 for a 1972 PA-39 Turbo C/R. It all depends on the options. The counter-rotating conversion will add $1,500 to the airplane's average retail price; propeller de-icing, $500; and turbocharging, tip tanks and oxygen, another $700. Distance measuring equipment and area navigation are worth another $500 each.

Recurrent airworthiness directives for the Twin Comanche center on the landing gear, aileron spars and stabilator attach bolts. The landing gear AD (77-13-21) requires a complete inspection every 1,000 hours time in service and replacement of the bungee cords every 500 hours or three years, whichever comes first. Unless a modification has been made to the aileron spars at the outboard hinge brackets, AD 77-8-1, calling for an inspection of this area every 100 hours, must be complied with. The stabilator attach bolts, by order of AD 74-13-3, must be inspected for corrosion every 500 hours or three years, unless corrosion-resistant AN bolts have been installed. Another aileron AD, 79-20-10, requires a 100-hour inspection of the aileron spar doublers, unless Piper modification kit #763893 has been installed.

TWIN COMANCHE

Flown properly, it is no more dangerous than any other airplane.

One AD concerns the propeller shafts and power-on stalls. AD 65-3-3 requires that the airplane be placarded not to exceed 2,100 rpm when practicing power-on stalls and to have the engine inspected following any aerobatic maneuvers (including spins). Apparently, the gyroscopic stability of the propeller disc in high rpm ranges can cause stress on the propeller shafts when the airplane goes through sudden G-loadings or abrupt maneuvers.

For a complete listing of all ADs applying to the Twin Comanche, write Aero-Tech Publications, P.O. Box 528, Old Bridge, New Jersey 08857 and buy a copy of their "adList."

Maintenance on Twin Comanches is best left to shops who specialize in them. Two that do are Hill Aviation in Lancaster, Pennsylvania, and Midwest Piper in Wichita. If you really are interested in buying a Twin Comanche, contact the International Comanche Society (4140 Manson Avenue, S.E., Smyrna, Georgia 30080), which can provide you with more names of maintenance facilities in your area. The society's monthly magazine, the *Comanche Flyer*, contains maintenance tips and personal experiences from its many members.

If safety considerations are preventing you from buying a Twin Comanche and you have the money ($7,600), you can always have a Robertson conversion made.

By redesigning the leading edge, installing a larger dorsal fin, stall fences and ailerons that droop when the flaps are extended, you can enjoy several advantages. The gross weight goes up by 200 pounds to 3,800 pounds (this is one of the few Robertson conversions that result in a higher gross weight); Vmc goes back down to 69 knots; the single-engine climb rate rises from 260 fpm to 305; and takeoff, landing and accelerate/stop distances are reduced significantly. To date, 110 Twin Comanches have had this modification made.

Want more power? Go to J.W. Miller Aviation in Marble Falls, Texas, and have the Miller Twin Comanche 200 conversion. For $56,500 you will get two 200-hp Lycoming engines, an extended nose with 130-pound capacity baggage compartment, 38-gallon auxiliary tanks, a Vmc-lowering dorsal fin, dual brake system, 3,780-pound gross weight and a one-piece windshield. Whew! This modification boosts cruise speeds by a claimed 13 percent, and the twin-engine rate of climb goes up from 1,450 fpm to 1,900 fpm. Single-engine rate of climb jumps by almost 100 percent, from 260 to 500 fpm.

Not enough? Try on the Miller Turbo Twin Comanche 200. $73,335 gets you a near-structural-limits cruise machine with airspeeds of 225 knots.

Did I hear you say you wanted the ultimate Twin Comanche rocket sled, with JATO (jet assisted takeoff)? Then it would have to be the Miller Turbo 200 with a Robertson STOL (short takeoff and landing) conversion. Think of it! Near-vertical climbs out of small grass strips to level off in a 225-knot cruise. And this is not just fantasy. The Miller and Robertson conversions complement each other well, though a confirmed sighting would have to be a rare event indeed.

But the Twin Comanche really does not need all this adornment to achieve above-average performance. For the money, it is the best buy in light twins today. Flown properly and with respect, it is no more dangerous than any other airplane.

But let's face it. The hint of danger surrounding the Twin Comanche is a big part of its snob appeal, and it is probably the only airplane that can boost your macho image at the same time that you save on both gas and maintenance. □