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AVWEB INSIDER

I Flew The Cornfield Bomber
(</blogs/insider/I-Flew-the-Cornfield-Bomber-231566-1.html>) »

By James Van Laak | September 23, 2018

Following up our video on this storied F-106, it turns out that even after its cornfield slide, the airplane was a joy to fly. As the author says, it became somewhat of a celebrity and remains so yet today. [More](/blogs/insider/I-Flew-the-Cornfield-Bomber-231566-1.html)

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Do You Really Want a Twin?

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AVweb editor Mike Busch takes a long hard look at the truth about moving up from a high-performance single to a twin-engine aircraft. A brutally frank discussion of the minuses as well as the plusses of twin ownership, based on Mike's own nine-year experience owning and caring for his 1979 Cessna T310R.

By Mike Busch (/db/fdc_collector?client_id=avweb&form_id=maileditform&link_id=109), This article first appeared in CESSNA PILOTS ASSOCIATION magazine and is reprinted here by permission. | December 1, 1997



It's only human nature. There you are, looking through the Bonanza or Cessna 210 or Mooney ads in *Trade-A-Plane* to check out how much your retractable single has appreciated -or maybe to find out what it would cost to trade up from your fixed-gear bird. Suddenly, without warning, your eyes are drawn down the page by a mysterious force field and are captured by the Aerostar or Baron or Cessna 310 section.

You scan through some of the twin ads and it suddenly dawns on you: hey, these twins are selling for a lot less than I would have guessed. In fact, for the price of a clean early-80s-vintage A36 or 210, you can buy a nice mid-time late-70s Cessna 310 or even an early-70s pressurized cabin-class Cessna 340. And you get to thinking "Gee, I could be flying a twin!"



That's exactly what happened to me in 1987. I was in the

market to buy a nice late-model T210 and looking through *T-A-P* when my eyes strayed south. Before I returned to

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ABOUT THE AUTHOR ...



Mike Busch is editor-in-chief of AVweb, a member of the technical staff at Cessna Pilots Association, and in a prior lifetime was a contributing editor for *The Aviation*

my senses, I found myself the owner of a 1979 Cessna T310R. And I've spent the last nine years learning about the pros and cons of twin ownership.

These days, I find myself talking to lots of pilots asking for advice about buying their first twin Cessna. And I counsel most of them to think very carefully before taking the leap into twin ownership.

Don't get me wrong. My T310R has been a wonderful aircraft. It has been very reliable, a great traveling machine, and has treated me very well indeed. It also has appreciated nicely since I bought it. But I've learned a lot about twin ownership since then, and it hasn't all turned out exactly as I anticipated. Frankly, if I were shopping for an aircraft today, I'm not sure it would be a twin.

Consumer and IFR Magazine. A 6,000-hour commercial pilot and CFI with airplane, instrument and multiengine ratings, Mike has been flying for 36 years and an aircraft owner for 33. For the past 14 of those years, he's owned and flown a Cessna T310R turbocharged twin, which he maintains himself. In his never-ending quest to become a true renaissance man of aviation, Mike's on the verge of earning his A&P mechanic certificate. Mike and his wife Jan reside on the central coast of California in a semi-rural area where he can't get DSL or cable TV.

Bigger and Faster?

One thing I learned pretty quickly is that if you want to go fast, adding a second engine is not a good way to do it.

My friend John Frank is executive director of the Cessna Pilots Association. John and I travel together quite often to teach seminars in various parts of the U.S. Sometimes we take John's T210 and sometimes we take my T310R. There's no appreciable difference in travel time.

According to book figures, my twin is about 10 knots faster than John's single. But I recall the time a few years ago that John and I flew both of our airplanes from Cincinnati to Wichita, a trip of about 650 NM and 3.5 hours. John took off from Cinti just a couple of minutes before me, but I didn't catch him until we were about 10 minutes from touchdown at Wichita.

The big difference revealed itself when we both refueled at Wichita. John's fuel tab was about \$120; mine was over \$200.

The 310 looks like a much bigger aircraft than the 210. Max gross is about 2,000 pounds more: 5,500 versus 3,500 pounds. But this can be deceiving. Useful load is only 400 lbs. more-1,600 versus 1,200 pounds-and on long legs that difference is fully consumed by the additional fuel the twin needs to carry.

The 310's cabin is considerably more spacious than the 210's, about 8 inches wider, and offers capacious space for baggage in its wing lockers and its huge 21 cubic foot nose baggage compartment. But on long trips (the kind I fly a lot) there's hardly any practical difference in load carrying ability or speed.

The same holds true for most light twins: Aero Commanders, Aerostars, Aztecs, Barons, and Cessna 320s, 340s, and 414s. If you want to haul appreciably more load than a Cessna 210 can carry for any significant distance, you'd need to look at a big heavy twin like the Cessna 402 or 421 or Piper Navajo.

It is not far from the truth to say that the principal role of a light twin's second engine is to overcome its own drag and to carry its own weight and the weight of the additional fuel it requires!

Are Twins Safer?

The question of whether twins are really any safer than singles is guaranteed to trigger a vigorous debate in any group of pilots. I recently finished editing a Cessna 310 safety review for the AOPA Air Safety Foundation. In the course of this project, I took an in-depth look at the safety record of the Cessna 310 and a group of comparable aircraft (Aerostar, Aztec, Baron, Commander, Crusader) during the eleven year period from 1982 through 1992. Some interesting statistics emerged from this study.

The overall accident rates of high-performance singles (like Bonanzas or 210s or Mooneys) and light twins (like Aerostars or Barons or Commanders or Cessna 310s) are astonishingly close. Twins have a slightly higher accident rate per 100 aircraft and a slightly lower accident rate per 100,000 hours, but for all practical purposes the accident rates are the same. The same is true if you consider only "serious" accidents that involve death, serious injury, or substantial damage. For both high-performance singles and light twins, approximately one-third of all accidents are classified as serious.

For both singles and twins, roughly three-quarters of all accidents are classified as "pilot caused". While weather-related accidents dwarf all other pilot causes in the single-engine accident data, the pattern for twins seems to be significantly different. Weather is still the leading cause of pilot-caused twin accidents, but a variety of other non-weather-related causes are quite significant: botched takeoffs and landings, controlled flight into terrain, improper IFR procedures, fuel exhaustion, and gear-up landings, just to name a few.

About one-fourth of all accidents are classified as "machine caused" for both singles and twins. Only a small fraction of those are engine-failure accidents. But it's interesting to look at the impact of that second engine on engine-failure accident statistics.

For the group of light twins we looked at, mechanical failures of the engine or propeller were responsible for One about 3% of all accidents. Breaking that down, 15.3% of all accidents were due to mechanical failures, and 20.8% of those involved the engine or propeller.

In contrast, roughly 8% of all accidents in high-performance singles were attributed to engine or propeller failure: 17% of accidents were mechanicals, but nearly 50% of those involved the engine or prop.

The statistics showed that a light twin is about equally likely to have a mechanical-caused accident as a high-performance single. But the twin's mechanical problem is most likely to be gear-related while the single's is most likely to be engine/prop-related. A single is about two-and-a-half times more likely to have an accident due to engine/prop failure than a twin (8% versus 3%). And if we assume that a twin is twice as likely to have an engine/prop failure (since it has twice as many to fail), then we can conclude that an engine/prop failure in a single is five times more likely to result in an accident than an engine/prop failure in a twin.

So are you any safer flying a light twin than a high-performance single? In terms of the overall and serious accident rates, the answer seems clearly to be no. But your risk profile changes somewhat: in the twin, you're less likely to be hurt by an engine failure, and more likely to be victimized by something else.

Operating Costs

If you have to ask, don't even consider buying a twin.

Seriously, an in-depth analysis of operating costs is beyond the scope of this article. But we can take a quick look at this distasteful subject.

There's an old rule-of-thumb that says you can get a rough approximation of the hourly operating cost of flying an airplane 200 hours a year by taking the hourly cost of fuel and multiplying by four. Using this rule and assuming that avgas costs \$2.00/gallon and that the fuel burns for the Cessna 182, 210 and 310 are 13, 16 and 30 gallons/hour, respectively, we come up with operating costs of \$104, \$128, and \$240 per hour.

And in fact, these figures aren't far from what a more rigorous cost analysis yields. Note, however, that operating cost calculations have a lot of variables, and your costs may differ substantially from the figures shown here. For example, our figures ignore depreciation (or appreciation) and opportunity cost of funds.

Maintenance

I give mixed reviews to maintenance on the twin Cessnas.

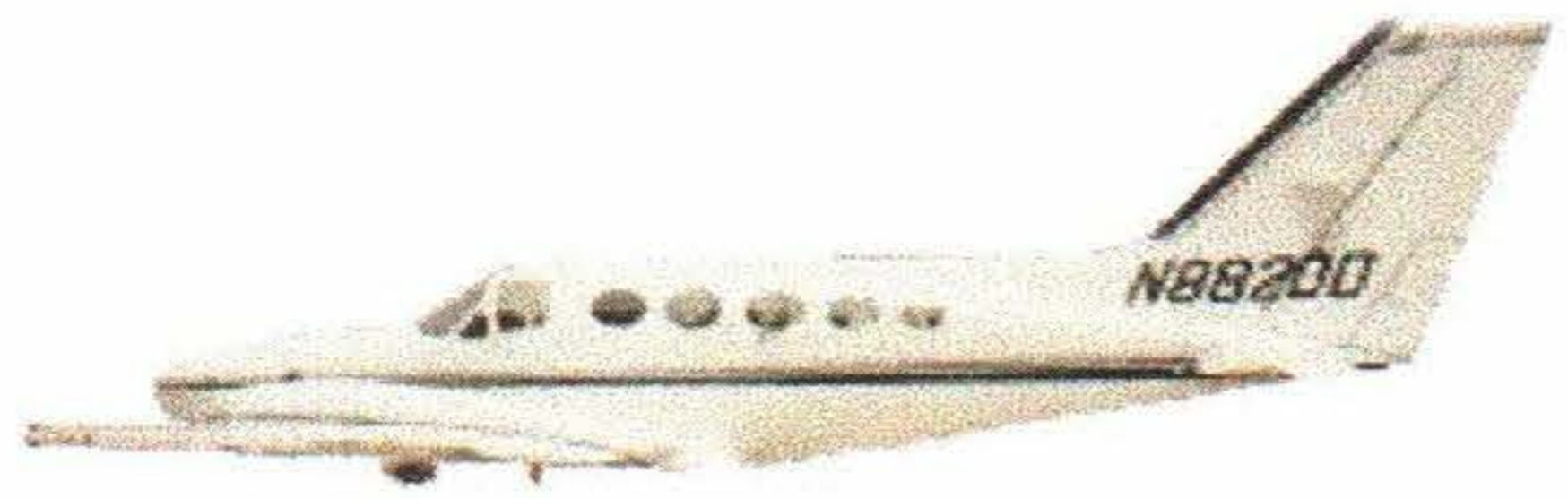
My personal experience with my 1979 Cessna T310R has been exemplary. After the first two "catch-up" annuals (which cost about \$7000 each), I've found maintenance on my airplane to be surprisingly economical. But mine is probably an unusual case: I was lucky enough to buy an extraordinarily clean and well-maintained 310, and I've done nearly all the maintenance work on it myself.

When I started swinging wrenches on my 310, I found (to my surprise and delight) that the most twins are very easy to work on-often a good deal easier than high-performance singles. The twins are big, roomy airplanes and maintenance access is generally outstanding. This is particularly true of the engine compartments, which are incredibly spacious compared to, say, a M252 or T210 or B36TC.

On the other side of the coin, I've seen many cases (including some good friends) of folks who moved up from a high-performance single to a light twin and were inundated with ruinously expensive maintenance problems which, in several cases, finally forced them to sell the aircraft.

The best defense against costly maintenance surprises is meticulous attention to preventive maintenance. This is true of any aircraft, but especially so of twins where the surprises can be very expensive indeed. Frequent cleaning of the exhaust trails and flap wells can forestall wing spar corrosion. Careful inspection of exhaust components at every oil change can prevent severe heat damage to the engine mount keels. Performing a full landing gear rigging without fail at every annual is the best defense against landing gear collapse and cracking of the wing attach structure. Neglect any of these preventive steps and sooner or later you're likely to be in for a nasty shock.

Some of twin parts are hideously expensive. I had to replace my windshield hot-plate some years ago and was floored to discover that a replacement cost \$5,000. Last time I looked, the price was up to \$8,000. But that's nothing



compared to a heated glass half-windshield for the Cessna 414 or 421, which cost \$25,000 last time I looked!

And it's not just windshields that are pricey. Replacement landing gear parts like torque tubes, pushrods and uplock hooks also cost ten times what you'd expect.

In general, parts prices are most reasonable for parts that turn over quickly, and unreasonable for parts that don't move. (That's opposite of the way my professor taught me that supply and demand is supposed to work, but then he wasn't involved in aviation.) These pricey parts are the ones that don't require replacement very often-but when they do, kiss your checkbook goodbye!

The thing to remember is this: although you may have purchased your "pre-owned" twin for \$100,000 or \$200,000 (or perhaps a good deal less if it was an older model), that airplane would sell for \$1 million or more if Cessna or Piper or Aero Commander were building it today. And as far as the cost of parts and maintenance is concerned, you own a million-dollar airplane. When a manufacturer sets its parts prices, you can be sure it doesn't pay any attention to what the airplanes are going for in Trade-A-Plane.

Reliability

In theory, a complex machine like my known-ice-equipped, turbocharged, twin-engine T310R should have a lot more problems than a simpler aircraft like a Cessna 182 (my first airplane). The twin has so many complex systems...so many more things to go wrong. When I open up my aircraft at the annual and look at it with all its guts exposed, I'm sometimes amazed that so complex a machine works at all.

In practice, my experience has been the opposite. My 310 has proven itself to be the most reliable airplane I've ever owned. Everything works almost all the time, and unscheduled maintenance has been almost nil. But many twin owners don't share my good fortune, and some of the twins are real hangar queens.

The secret to reliability is uncompromising attention to preventive maintenance. Be on a constant lookout for the first signs of corrosion, chafing, leakage of fuel, oil or exhaust, changes in engine instrument readings, or anything that looks, feels, or sounds unusual. If you find a small leak or chafing problem at an oil change, fix it now-don't put it off until the next annual.

If you need a reliable aircraft but aren't prepared to become compulsive about preventive maintenance, you'd be a lot better off owning a simpler airplane.

Weather Flying

Flying in rotten weather is the time I'm most happy to be a twin owner. That extra ton of gross weight and "big airplane feel" inspires a lot of confidence when flying in turbulence. The boots, hot props, and other known-ice gear helps me keep my cool when dealing with icing conditions. And having two engines is reassuring when flying over water or inhospitable terrain, particularly at night or in IMC.

Although the second engine doesn't do much for speed, it definitely offers a big boost in the climb department. In cruise, the power from the spare engine is largely consumed in overcoming the twin's extra drag. But parasite drag varies with the square of airspeed, so at slower airspeeds (takeoff and

climb) a twin has a big advantage in terms of excess power available. This means that a twin often has the climb capability to escape a downdraft or get above an icing layer when a single might not manage very well.

When I first bought my T310R, I was really excited about having all that deicing equipment. But after flying it in all sorts of weather for nearly a decade, I've found that the utility of the deicing gear is greatly overrated. It isn't that the boots and hot props don't work-they do-but that they are so seldom needed when flying a turbocharged aircraft. Turbocharging gives you such a wide choice of altitudes between the MEA and the service ceiling that there's almost always an ice-free altitude to be found. I'd guess I've actually accumulated enough ice to use the boots perhaps a half-dozen times since I bought the aircraft-and in none of those cases did I consider having the boots to be a decisive advantage (in most cases I was descending through an icing layer into warmer air that would have melted the ice off anyway).

If you fly a lot of thunderstorms, weather radar is nice-and twins provide the radome area and panel space for a first-class radar installation. You can put radar in a single, too, but the small pod-mounted antenna reduces its range and resolution sharply. My 310 has no radar, only a Stormscope, but so far it has done a great job of keeping me out of trouble.

Runway Requirements

One of the downsides of flying a conventional twin (other than cost) is poor short- and soft-field performance. My 310 is heavy (5500 pounds), lands fast (92 knots over-the-fence), and has barely-adequate brake capacity.

For the first several years after I bought the 310, I avoided any airport with less than 4,000 feet of hard-surfaced runway, and I'd advise other new twin pilots to do the same. The problem isn't landing-it's takeoff. On takeoff, 4,000 feet is barely long enough to allow a 310 to accelerate to minimum safe single-engine speed, lose an engine, and panic-stop without running off the end of the runway. With any less runway, losing an engine near rotation speed leaves you with no good options: not enough speed to fly on one engine, and not enough runway to stop.

Even now that I've been flying the 310 for almost ten years, I'm extremely reluctant to use an airport shorter than 3,000 feet. Once in awhile, I'll operate out of an airport as short as 2,500 feet, but only at extremely light weight (one person, minimum fuel). Even then, I am acutely aware that I'm taking a calculated risk-betting my life that an engine won't fail during the takeoff roll-and I don't like that feeling one bit.

When flying singles, I always felt comfortable landing at dirt strips and even on dirt roads, particularly in Mexico. In the 310, I feel pretty much limited to tarmac. The airplane is too heavy and the landing gear too fragile for me to operate comfortably on an unpaved runway. Even parking on the grass (as at Oshkosh) makes me worry about sinking in and getting stuck.

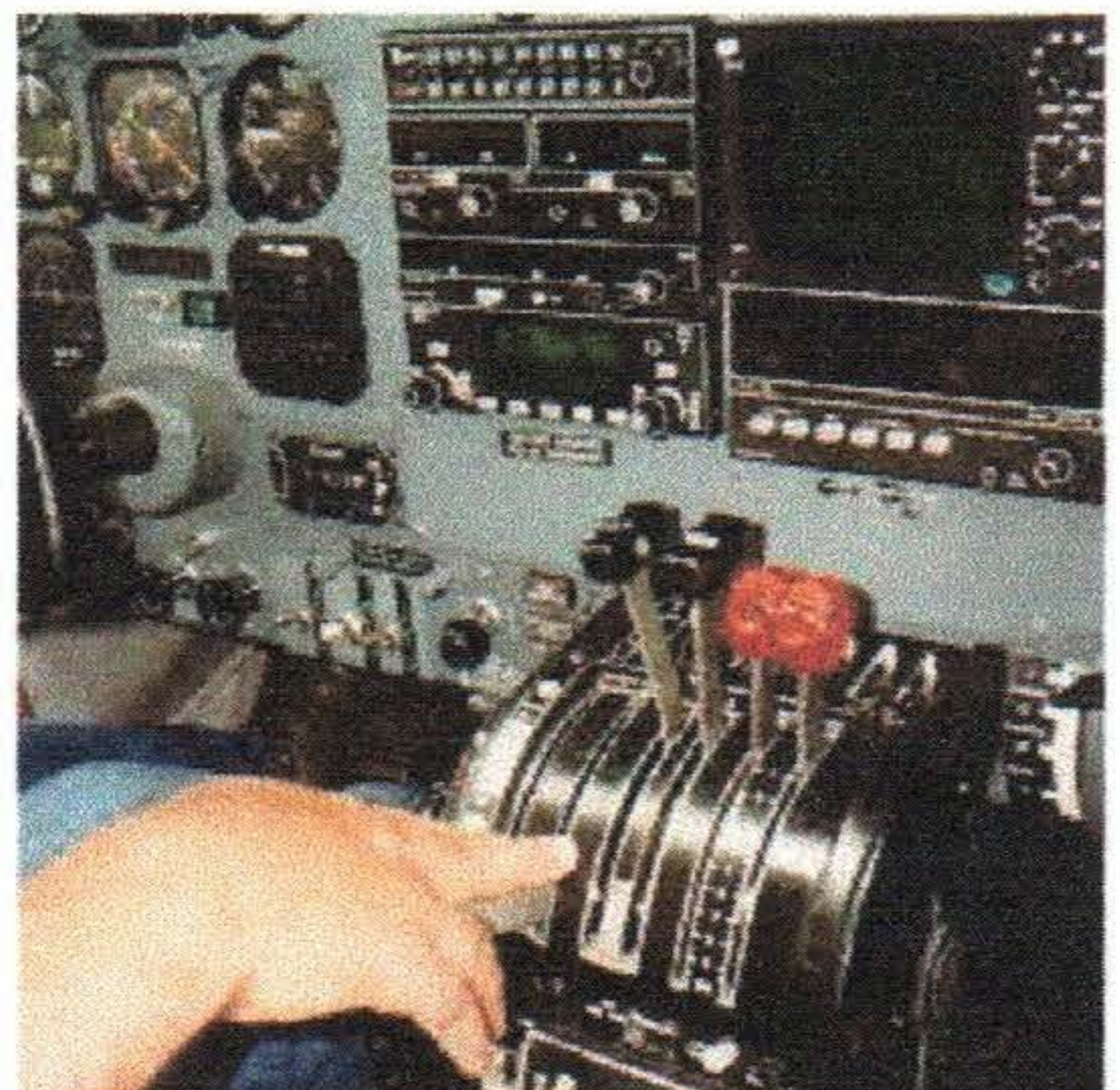
Recurrent Training

It's not easy to achieve and maintain proficiency in a piston twin. Engine-out emergencies are difficult to practice realistically in the airplane without jeopardizing safety, and engine cuts can be very tough on the engines, particularly in turbocharged models.

For this reason, I strongly recommend simulator-based initial and recurrent training for twin Cessna pilots. Excellent piston twin simulators are available at FlightSafety International Simcom.

But this sort of training doesn't come cheap. My annual training contract at FlightSafety costs \$4,200 a year (and goes up every year or two). Simcom is a little less expensive, but still quite steep.

I'm convinced that frequent simulator training is an essential prerequisite to operate a twin safely. If you have trouble justifying the expense, you'd probably be better off not flying a conventional twin.



Insurance

When you first move up to a twin, you'll probably find it difficult to get insurance. No matter how many ratings or accident-free hours you have, underwriters are reluctant to insure you in a twin until you have at least 500 hours total time and 50 hours in type, and tend to charge painfully stiff premiums until you have a few hundred hours in type.

The accident statistics explain why. Pilots with less than 1,000 hours total flight time or 100 hours in type are far more likely to have a serious accident than pilots with more experience.

So in addition to budgeting extra cash for an expensive catch-up annual during your first year of twin ownership, plan on setting aside extra money for extra steep first-year insurance premiums.

A recurrent training contract with FlightSafety or Simcom is usually very helpful in securing a lower insurance premium. Underwriters love pilots who undergo regular simulator training. Some even require such training before they'll insure you.

If You Decide To Take The Plunge

Despite the fact that a light twin is expensive to operate and maintain, difficult to insure, not particularly fast or particularly good at hauling big loads, and not demonstrably safer than a high-performance single, you might turn out to be one of those stubborn folks who decide to purchase one anyway. If you do, be very careful about which airplane you buy. If you wind up with a lemon, it's likely to be one of the most painful mistakes in your aviation career.

Do yourself a favor by looking at lots of airplanes before you decide to buy one. Try not to be influenced by cosmetics like paint and interior—it's what's under the floorboards and inside the nacelles that really matters.

Buy the cleanest, latest-model airplane you can possibly afford. Early 310s and Aztecs and Travel Airs can be purchased for a song, but may easily turn out to be a disastrous money pit.

Don't hesitate to buy a twin with high-time engines, assuming the price is right. If you buy a runout airplane and overhaul the engines yourself (or replace them with factory remans), you'll know exactly what you've got. Beware of buying a twin with low-time engines unless they are factory remans or were overhauled by a top-notch shop like Mattituck or RAM. If the seller overhauled the engines with the intention of selling the airplane, the overhaul might well be questionable.

Before you plunk your money down to buy a twin, talk to your insurance agent and make sure you can get it insured. Find a good A&P/IA with lots of experience on your particular model and have him go over the airplane with a fine-tooth comb. Plan on spending \$1,000 or so on the pre-purchase—it'll pay for itself many times over. And despite that thorough pre-purchase inspection, be prepared to spend a bundle—\$10,000 or so—on the first couple of annual inspections to get the airplane totally up to snuff.

Do all that and you can expect years of rewarding twin ownership, with a minimum of unpleasant surprises.

The Skymaster: A Different Twin

A discussion of twin ownership wouldn't be complete without mentioning Cessna's unconventional twin, the Model 337 Skymaster. Much of what we've said about the wing-mounted twins applies to the Skymaster, too. It's not particularly fast or roomy, can't carry a great deal of payload, and is costly to operate and maintain.

In fact, the Skymaster is one of the most maintenance-intensive airplanes that Cessna built. It combines one of Continental's most problem-prone engines (the IO-360), a complex landing gear system (from the early 210), a poorly-designed electrical system, and some oddball systems like motorized cowl flaps. Unlike most wing-mounted twins, the Skymaster is not easy to work on, and its engine compartments are particularly tightly packed.



But the Skymaster is an absolute delight to fly, and does things that no other twin can do. It's a superb short- and rough-field airplane. It has no Vmc problems, and so is ideal for pilots who don't fly a lot and can't justify the costly recurrent training demanded by a conventional twin. And it has the best engine-out performance of any piston-powered light twin.

If you're looking for twin-engine redundancy but put off by some of the disadvantages of conventional twins, the Skymaster is definitely worthy of consideration.

Operating Cost Comparison

Direct Hourly Costs	<u>C182</u>	<u>C210</u>	<u>C310</u>
Fuel @ \$2.00/gal	\$26	\$32	\$60
Oil @ \$4.00/qt	1	1	2
Scheduled 50-hour maintenance	4	6	10
Unscheduled maintenance	4	6	10
 Amortized Hourly Costs	 <u>C182</u>	 <u>C210</u>	 <u>C310</u>
Engine overhaul	\$10	\$14	\$28
Miscellaneous engine maintenance	3	4	7
Vacuum pumps	1	1	3
 Total Hourly Costs	 \$49	 \$64	 \$120
 Annual Fixed Costs	 <u>C182</u>	 <u>C210</u>	 <u>C310</u>
Annual inspection	\$2,000	\$3,000	\$6,000
Insurance	1,500	2,000	3,000
Propeller overhaul @ 5 years	300	500	1,600
Paint and interior @ 5 years	1,600	2,000	2,400
Avionics maintenance, gyro OH	800	1,000	1,200
Hangar	1,800	1,800	3,000
Recurrent training	1,000	2,000	5,000
 Total Annual Fixed Costs	 \$9,000	 \$12,300	 \$22,200
 Total Cost/Hr @ 100 hours/year	 <u>C182</u>	 <u>C210</u>	 <u>C310</u>
	\$139	\$187	\$342
Total Cost/Hr @ 200 hours/year	94	126	231
Total Cost/Hr @ 300 hours/year	79	105	194