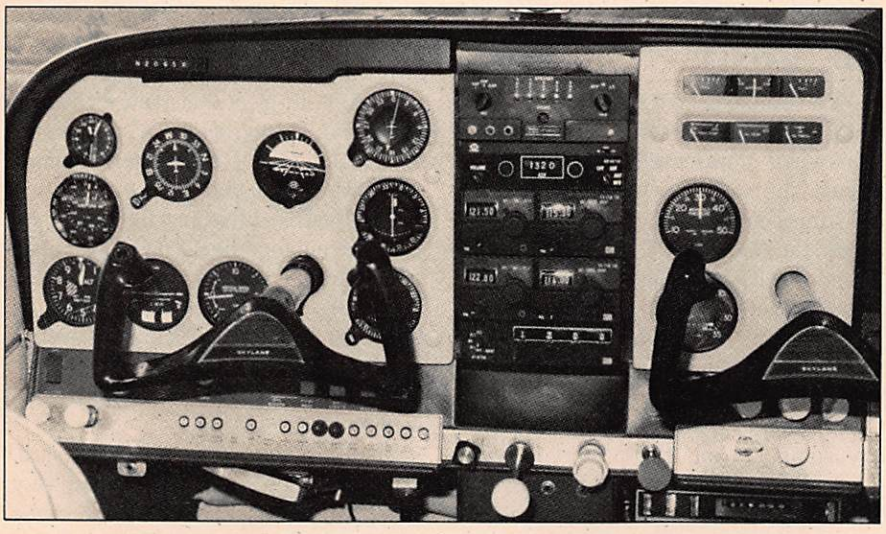


In the used market, the panel is a big variable. The latest in avionics updates can drive an airplane out of your price range. Updating yourself might be more economical.

with these. One with brand C, K or N avionics is worth a considerable premium.)

The 210 does have some advantages, the ones that all Cessnas have always had. It has good (almost STOL) short-field performance, is roomier inside and can carry a lot more weight than the competition. At almost $20,000 less than the equivalent Beech product, the airplane represents a good value in direct costs, which, in addition to its capabilities, make it popular with commercial operators.

In its heyday, the airplane never conveyed the glamour or prestige or had the desirability that the Beechcraft did, and now that it's an orphan and Cessna parts are beginning to get difficult, it isn't going to get any better. If the performance of the airplane while it is sitting on the ramp is important to you, there are better buys. I wouldn't invest in one on the hope that Cessna will return to this market, unless you are the sort that bets on drawing to inside straights.

The Bellanca Viking has little to recommend it from an investment point of view. Exposed to the weather, the wood wings rot if not properly maintained and cared for (which includes hangaring and removal of covering for inspection), and its performance is just not up there with the competition. If this isn't enough, it shares the light-case Continental problems with Beech and Cessna, too. To round out the story, the small numbers of these airplanes that were made (and survive in good condition) make marketing one a sometime proposition. The airplane has a lot of charm—a lot about it to like, but it will cost you money to indulge your taste.

In an investment analysis, the Piper Comanche comes out as the star performer of the group—not only has it outperformed the market in the past, which indicates little downside risk for its future performance, it has considerable speculative potential for the future. The Beech is the sound and solid investment in the group, with no real downside risk, and good upside potential. The Cessna is a poor investment compared to the other two, but it probably has a higher utility value, while the Bellanca has only its charm to recommend it to a potential buyer.

A word to the wise. The relative investment potential of the various manufacturers' products differs markedly in different performance categories. Compare Cessna 172s with Beech Musketeers, for instance. If you are interested in a 200-hp retractable, go through the same procedure in that category, and so on.

If I'd written this article before we bought our Debonair, we might be driving a Comanche, but even the best airplane investment isn't much from an investment point of view—you could do a lot better at your local bank. Investment potential is only one factor in the equation; we buy airplanes for other reasons, many of which don't make much sense. The editor of this magazine wanted a Debonair, so that's what we have. If you really want a 210, or even a Bellanca—go ahead. □

My Favorite Airplane

An Owner's Look at the Grumman American Tiger

By Keith Connes

Aviation writers are lucky folks. In the course of doing pilot reports, year in and year out, we get to fly all manner of aircraft, from Champs to Citations. And the price is right. But despite the unending opportunities to fly other people's airplanes for free, some of us are also full dues-paying members of the society of aircraft owners.

Sure, it's fun to borrow somebody's pride and joy and play with it for awhile, but darn, you always have to give it back.

Over the course of the 33 years that I've been flying, I have taken title to five airplanes. I received my primary training (I almost said "learned to fly," but you never stop learning) in a taildragger, and my first three planes were a Cessna 140, a 170 and a 180. Then I went retractable and low wing with a Mooney Super 21.

After a hiatus of some years, I acquired my present airplane, a 1976 Grumman American Tiger, and I like it best of all.

The Tiger's forbears (if I may mix animals) can be traced to the creativity of Jim Bede, a designer/entrepreneur who has almost produced a goodly number of interesting planes.

Although best known as a designer of homebuilts, Bede initially burst upon the aviation scene with a prototype (he's great at prototypes) of a production model originally known as the BD-1. This was a two-place airplane that was put together mostly by bonding instead of rivets. But one aspect of the project was quite riveting: The airplane was supposed to sell for $2500. This was cheap even in the 1960s. In fact, it was not only cheap, it was totally unrealistic.

No doubt about it, Jim had a promising future. He was always promising something in the future. After awhile, his disgruntled stockholders ejected Jim, and the name of the company, located in Cleveland, was changed from Bede Aviation to American Aviation, and the company's lawyer, Russell Meyer, was selected to run it. In 1969, the AA1 Yankee made its debut. Some of Bede's concepts were abandoned—including foldable wings—and the price tag of $9740 acknowledged the realities of production, distribution and marketing.

The Yankee had some basic design characteristics that were to be retained in future models. The metal-to-metal bonding concept was retained, but the methodology was different. Bede had intended to use a cold-bonding process that would have made kitbuilt versions possible, but the new management opted for pressurized jigs and autoclaves. Much of the fuselage was honeycombed for strength. The tubular main spar was used to hold the fuel, 12 gallons per side. (The later four-place models were given conventional wing tanks.)

Among the unique features were a sliding canopy and free-castoring nosewheel. I'll discuss their advantages and drawbacks in a bit.

HOT TRAINER

The Yankee had a full laminar flow wing, which caused some control problems when it was used as an *ab initio* trainer. The two-placer was modified several times and called, variously in its career, the AA1A and B Trainer and TR-2, and AA1C Lynx and T-Cat. Horsepower ranged from 108 to 115.

American Aviation experimented with a four-place model called the Patriot, which was built with a side door and a 180-hp engine. The project was eventually scrapped and the prototype was donated to a school for A&P mechanics. Then in 1972, another four-seater, called the AA5 Traveler, went into production. It was basically a stretched version of the two-place models and was powered by a 150-hp Lycoming O-320-E2G.

The following year, Grumman Corp. acquired American Aviation, which became Grumman American. The new owner brought in as chief engineer a man who had worked for Grumman Aerospace on the lunar module project at Cape Kennedy, but whose chief interest was in small planes.

His name was LeRoy LoPresti, and he was put to work on a project with the unpromising name of Fat Albert. This was a Traveler that had been mated with a 235-hp engine and cobbled up to make room for an eventual installation of retractable gear. LoPresti was unimpressed with Fat Albert's appearance and performance, and he decided to start afresh with a cleanup of the Traveler.

Here, in Roy LoPresti's own words, is what he did:

"The fellow who ran the shop for me, Dick Jarvis, was a race car fan, and I used to drive and design race cars, so we hit it off real well. Dick and I really put most of the new Tiger together ourselves. We spent one evening with a pair of tinsnips and we cut the turtledeck bigger for larger windows in the back. We decided that the horizontal tail on the Traveler, which was made up of a bunch of scabbed-on pieces from the Trainer tail, just didn't look right. It worked fine, but it looked funny. So we built a brand-new, high-aspect-ratio horizontal tail.

"We also changed the dorsal fin," LoPresti continued. "We went from a sheet-metal wraparound piece to a formed plastic piece that made for a much better line. The top of the dorsal is parallel to a water line. Later, when I joined Mooney, we changed the dorsal fin that was on the Executive, just like the Tiger.

"We put together a cowling that had some internal ramps that let the air out a little more smoothly. We put fairings on the landing gear legs. All of these things made a difference, and the result was a 175-mph airplane in its experimental version.

"It is a very nice, straightforward, simply structured airplane that flies very efficiently," he concluded. "And that's what good airplanes are all about."

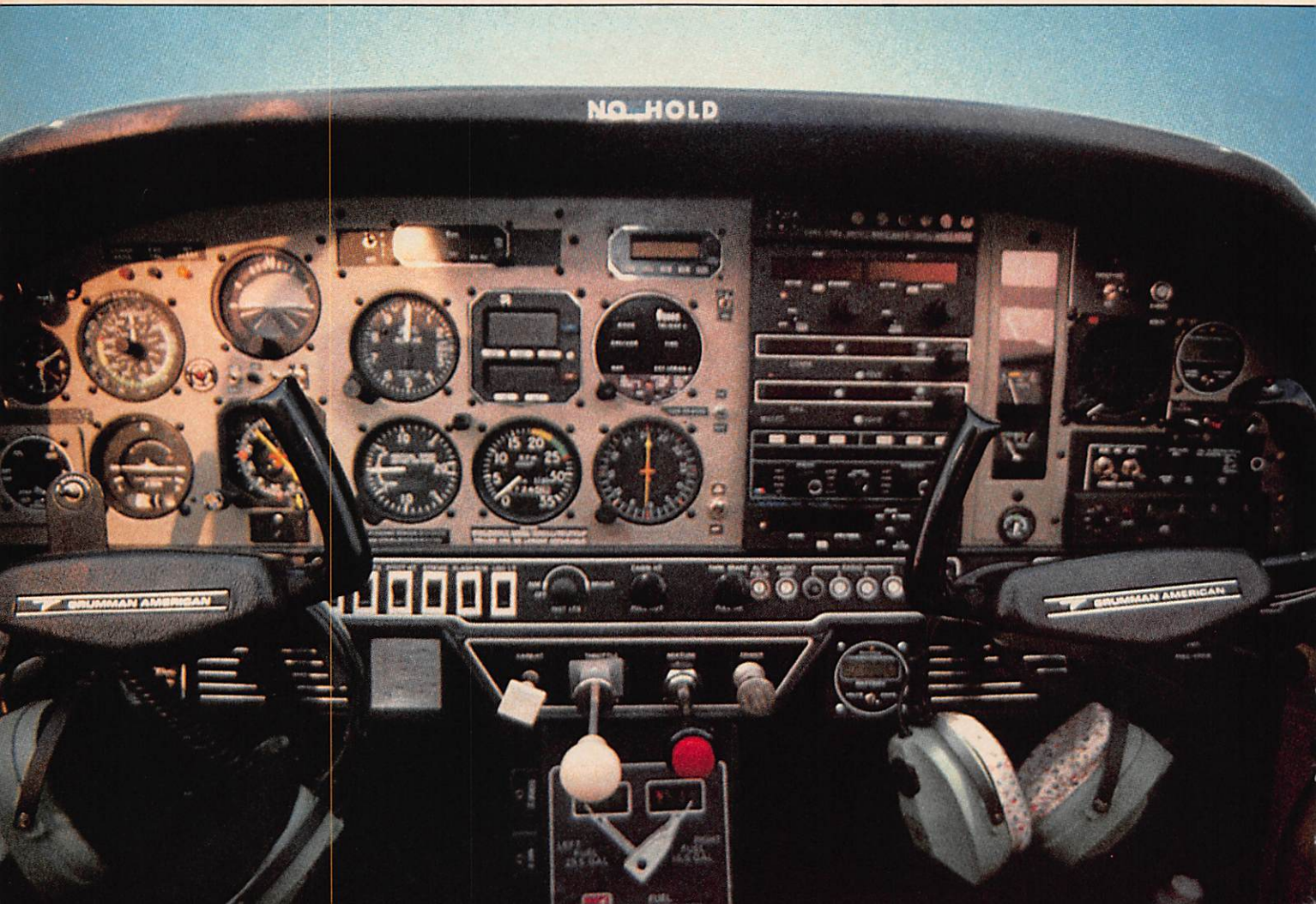
MORE LOPRESTI CLEANUPS

In addition to the changes LoPresti mentioned, the Tiger was given a 180-hp Lycoming O-360-A4K engine. A beefier belly permitted a 200-pound increase in gross weight, of which 157 pounds translated into useful load. The Tiger cruises 17 knots faster than most versions of the Traveler—139 versus 122.

LoPresti did not remain at Grumman American to see the Tiger into production. He left to become chief engineer at Mooney Aircraft Corporation, which had

The Tiger, one of the more popular orphans around, evolved from Jim Bede's BD-1 design. It's the end of the line—unless recent attempts to acquire the production rights from Gulfstream Aerospace are successful.

Photos: Keith Connes


NO HOLD
GRUMMAN AMERICAN
GRUMMAN AMERICAN

been purchased by Republic Steel. He later moved from Mooney to Beech Aircraft Corporation, and has most recently cut a deal with Piper Aircraft Corporation to set up an advanced engineering design group called LoPresti Piper Aircraft Engineering Company at Vero Beach. Roy plans to revive and clean up the single-engine Comanche Turbo 260C and the Swift.

Actually, most of the LoPresti cleanups were also applied to the Traveler in 1975, the year the new Tiger came out. The following year saw the introduction of the Traveler's successor, the Cheetah, which was given the Tiger tail. The significant differences between the Cheetah and the Tiger are 2200-pound versus 2400-pound gross (the Tiger has a stronger center spar) and 150 versus 180 hp. The Cheetah has a book cruise of 127 knots—12 knots slower than that of the Tiger.

In 1977, the Tiger was built with thicker plexiglass and additional soundproofing. The tubular nosegear strut was redesigned to accommodate a shock absorber, and corrosion proofing became standard. Improvements for the '78 model included more comfortable seating, a separate hydraulic parking brake system and a more reliable overvoltage protection circuit. In 1979, the twist-type fuel caps were replaced by flip-tops, which are said to be less rainproof.

By that time, the production line had been moved to Grumman's corporate aircraft production facilities in Savannah, which caused a certain amount of havoc, but the worst was yet to come. Grumman sold those facilities to Allen Paulson's entity, now called Gulfstream Aerospace. Paulson was very interested in Gulfstreams and not at all interested in small piston-powered aircraft. The last of the Grumman Americans—which then included the twin-engine Cougar—were produced in 1979.

Efforts were made to sell the Grumman American line and there were nibbles but no solid takers. However, there has been continued interest even now, during this time of depressed general aviation production. At this writing, a number of domestic and foreign groups are negotiating to buy the line from Gulfstream Aerospace, which is now owned by Chrysler.

With a 180-hp Lycoming O-360-A4K engine, the Tiger zips along at 135 knots, burning less than 10 gph. It's 17 knots faster than the Traveler. There's room on the panel for almost anything you can cram in.

The prospective purchaser of any out-of-production airplane needs to address the issue of parts availability. Parts for the Tiger (and the other Grumman Americans) are available from various suppliers at prices that, with some horrific exceptions, are reasonable. The largest nonfactory supplier of new and used parts is Fletcher Aviation, 7786 Braniff St., Houston, TX 77061; telephone 713/641-2023. Dave Fletcher is also a good source of maintenance tips on these aircraft.

THE AD QUESTION

Another item of interest is airworthiness directives, especially those of the recurrent persuasion. The Tiger has two recurrent ADs, one of which can be sidestepped. The McCauley propeller must be removed and inspected for cracks every 200 hours. What's more, harmonics from this prop have resulted in a yellow arc on the tach cautioning against prolonged operation between 1850 and 2200 rpm. The solution to this annoyance comes in the form of an STC for a Sensenich prop, installation of which eliminates both the inspection AD and the yellow arc.

There is no getting around the other AD, which involves removal and inspection of the ailerons every 100 hours for bearing wear. It's a fairly simple operation.

Let's get back to the more positive aspects. Tiger owners can rightfully expect their airplanes to outpace all other comparable fixed-gear, four-place, 180-hp production aircraft. According to book figures, at 75% power, the Tiger cruises 10 knots faster than the Piper Archer, 12 knots faster than the Aerospatiale Tobago, 15 knots faster than the Cessna Cutlass, 16 knots faster than the Beech Sundowner and 9 to 16 knots faster than the Cessna Cardinal. Although no match for most retractables, the Tiger will keep

Tiger Mods

Aero Mods has one-time STCs to install a Lycoming IO-360 200-hp engine with constant-speed propeller in the Tiger, and to install the Lycoming IO-540 engine, 235 to 260 hp. (At presstime, the multiple STC was expected in May.) According to company president Maynard Crosby, the 200-hp installation will cruise at 144 knots. Cost of the conversion is in the $16,000 range.

The Sabre Tooth Tiger, as he calls his 260-hp version, is said to cruise at 156 knots. I flew it briefly and saw 150 knots at 7000 feet, along with very impressive climb performance. Cost is in the $20,000 range.

The larger engine conversions carry a weight penalty.

The company also offers the Sensenich prop STC (at presstime, the price was $1885, not installed, but an increase was expected) as well as oil-cooler and air-induction modifications for the Tiger. It also does engine conversions on the two-place Grummans.

Air Mods NW has the Sensenich prop STC available for $1940 (shipping and installation are not included in the price).

Ken Blackman, a co-owner of the company, says that Air Mods has done a one-time STC for the Cheetah for a constant-speed Lycoming O-360-F1A6 engine, and plans to eventually STC the Tiger (he stresses it's not available now). Because of the cowling configuration of the Tiger/Cheetah airframe, a horizontal carburetor is required, and the O-360-F1A6, he says, is the only off-the-shelf engine that has it. (It's used on the Cessna Cutlass RG.)

Blackman is working on approvals for more Tiger mods: a split nosebowl and lower cowling for easier maintenance (at present, to get at the alternator, you have to remove the prop!); wingtip landing lights to complement the existing nosebowl light; a larger oil cooler mounted on the firewall; Piper reclining seats as front-seat replacements.

Ken Blackman found my Tiger for me and is a good source of information. He says that it's pretty hard to improve the Tiger; Roy LoPresti did his homework well. *—Keith Connes*

FOR MORE INFORMATION, *contact: Maynard Crosby, Aero Mods, P.O. Box 2361, Everett, WA 98203, telephone 206/353-3559; Ken Blackman, Air Mods NW, P.O. Box 8, Snohomish, WA 98290; telephone 206/691-7634.*

Tigers, Yankees, Travelers, Trainers—even Cougars—abound at annual meetings of the American Yankee Association.

The Yankee Group

If you're interested in buying any of the Grumman Americans, or have just bought one, you should join the American Yankee Association. The club has more than 1500 members who own all Grumman American makes and models. Secretary-Treasurer Stewart Wilson said that, since there are more four-place models around, naturally, the association has more owners of AA5s than of the two-place AA1s. There were 113 twin-engine Cougars built, and owners are welcome; 11 currently belong.

The AYA puts out a very informative bimonthly newsletter, which generally runs between 16 and 24 pages (no advertising is included). Some of the members—particularly those who are commercially involved in maintenance and mods—know all there is to know about these airplanes. Stew Wilson bought a 1975 Tiger when it was new and has flown it for 2200 hours. President Bill Marvel owns a 1976 Tiger and the two have just bought an AA1.

The club conducts regional fly-ins in all parts of the country, runs special tours for members only and has an annual national convention. The convention traditionally has been held near Oshkosh, Wisconsin, but since the membership is growing steadily, the decision was made to hold it in different parts of the country to give more

Bright colors and open-cockpit canopies gave the early Yankees from American Aviation a sporty feeling. They were light on the controls and easy to fly, but they were hotter than the usual primary trainer. This AA1A was produced in 1971.

members a chance to attend.

This year, Northampton, Massachusetts, on the Connecticut River, will be the site, August 2-4. Wilson describes Northampton as a quaint New England town, with an old-fashioned hotel that will serve as lodging for the group. Several hundred airplanes of Yankee extraction are expected to gather at the airport. Roy LoPresti and Jim Bede are two of the important figures in the airplane's history who have spoken at previous conventions.

The association is not merely a vehicle for type camaraderie; when Bill Marvel became president last year, he wanted the association to take a direct, active role in improving the safety record, in increasing parts availability and in trying to get the line into production again. Concerned about the aircraft's poor safety reputation, the group has instituted a volunteer pilot familiarization program to help new owners transition into the type. The aircraft are less forgiving of careless flying than other makes, but the association is doing a first-rate job of educating new and prospective owners. "We are not trying to check people out, or approve them," said Marvel, "but familiarize them with the aircraft's unique characteristics."

"It's not like flying a Cessna 150," Wilson said. "Pilots in the association have an excellent safety record, and we are trying to tie our familiarization program into our insurance program." Hull and liability insurance are available on a group basis through an AYA associate, but the coverage is not ideal for everybody. (I buy mine elsewhere.)

Marvel contacted Gulfstream to let the company know of the group's interest in the reintroduction or the sale of the line. Gulfstream is not interested in resuming production but did confirm that there are two potential purchasers. Marvel has met with the U. S. group, but said that he cannot divulge its identity.

Membership dues are $20 a year, plus a one-time initiation fee of $5. There is a discount for multiple-year memberships. —*Keith Connes*

FOR MORE INFORMATION, *contact: Stewart Wilson, The American Yankee Association, P.O. Box 11757, Fresno, CA 93774; telephone 209/435-3277.*

TIGER/continued

pace with the 180-hp Piper Comanche and will overtake the 180-hp Piper Arrow and the 200-hp Beech Sierra. (For a comparison of other performance areas, see the accompanying sidebar.)

My Tiger trues out at an average of 135 knots, cruising at approximately 70% power and burning about 9.5 gph block-to-block. My performance is helped on the one hand by the fact that I usually fly several hundred pounds below gross, but conversely, it is hindered because my well-equipped plane bristles with an inordinate number of antennas.

With a capacity for 51 gallons of usable fuel, the Tiger has adequate range. I like to land with an hour's worth of fuel in the bank, so I'll average about 550 n.m. between pit stops.

One of the ways the Tiger achieves its performance is by showing a relatively narrow frontal profile, and this means the cabin is going to be on the snug side. Its width, in the passenger compartment, is 40 inches. Interestingly, the Archer looks a lot heftier, but its cabin is not much wider, at 41.2 inches. The Tobago, with the most comfortable cabin in its class, boasts a width of 50 inches; its performance is abetted by a controllable-pitch propeller, versus the fixed-pitch props of the competition.

My companion Anne and I are medium-size people (5 feet 5 inches and 5 feet 7 inches, respectively) and we find the cabin environment quite comfortable. It is helped by a rather short instrument panel and lots of plexiglass, which keeps the cabin from becoming claustrophobic and, even more important, provides superb visibility. Tallish folks have occupied the back seats and I haven't heard any complaints from aft, but then, that's one reason why I wear a headset.

A large cargo area can be created by removing the rear-seat back cushions and folding the rest of the seat assembly down to form a flat floor. The entire operation takes maybe two minutes. However, the trapezoidal baggage door is somewhat skimpy: 24 inches wide, 14 inches high at the forward end and 12 inches high at the aft end. Bulky baggage must be loaded from within, over the seat backs.

IT'S A BREEZE

I like the sliding canopy. It allows easy entry and egress from both sides of the airplane and lots of ventilation when taxiing on a hot day. Besides, it's fun. The Tiger can be flown with the canopy partway open, at speeds of up to 113 knots. The major downside of a canopy is that in the rain you get a lot wetter climbing in and out of an open-roof plane. Also, the rails need regular cleaning and lubrication.

The nosewheel castors freely, 90° left and right. This makes for considerable agility when maneuvering in and out of tight parking spaces. The airplane will want to weathercock when taxiing in a crosswind—just like a taildragger—so opposite brake must be judiciously applied on occasion. That's not nearly as tricky as backing the aircraft into a parking slot without a towbar.

The Tiger is a delight to fly. Control forces are pleasantly light and the air-

GRUMMAN AMERICAN AA5B TIGER

Price

Average used	$25,000-$30,000

Specifications

Wingspan	31.5 ft.
Wing area	140 sq. ft.
Length	22 ft.
Height	8 ft.
Cabin length	85 in.
Cabin width	40 in.
Cabin height	45 in.
Landing gear	tricycle, fixed
Tire size, mains	6.00 x 6
Tire size, nose	5.00 x 5
Seats	4
Fuel capacity	52.6 gals.
Oil capacity	8 qts.

Engine

Lycoming O-360-A4K, four-cylinder, normally aspirated, rated at 180 hp at 2700 rpm at sea level. Recommended TBO 2000 hours.

Propeller

McCauley two-blade, fixed pitch.

Weights and Loadings

Gross weight	2400 lb.
Empty weight, standard	1294 lb.
Empty weight, as flown	1467.48 lb.
Useful load, standard	1106 lb.
Useful load, as flown	432.52 lb.
Wing loading	17.1 lb./sq. ft.
Power loading	13.3 lb./sq. ft.
Baggage capacity	120 lb.

Performance

Maximum cruise speed	147 kt.
Maneuvering speed	113 kt.
Cruise speed, 75% at 8000 ft.	139 kt.
Maximum range, with reserve 75% at 8000 ft.	552 n.m.
Fuel consumption, 75%	10.8 gph
Service ceiling	13,800 ft.
Stall speed, clean	56 kt.
Stall speed, flaps	53 kt.
Best rate of climb	850 fpm
Takeoff ground roll	865 ft.
Takeoff over 50-ft. obstacle	1550 ft.
Landing ground roll	410 ft.
Landing over 50-ft. obstacle	1120 ft.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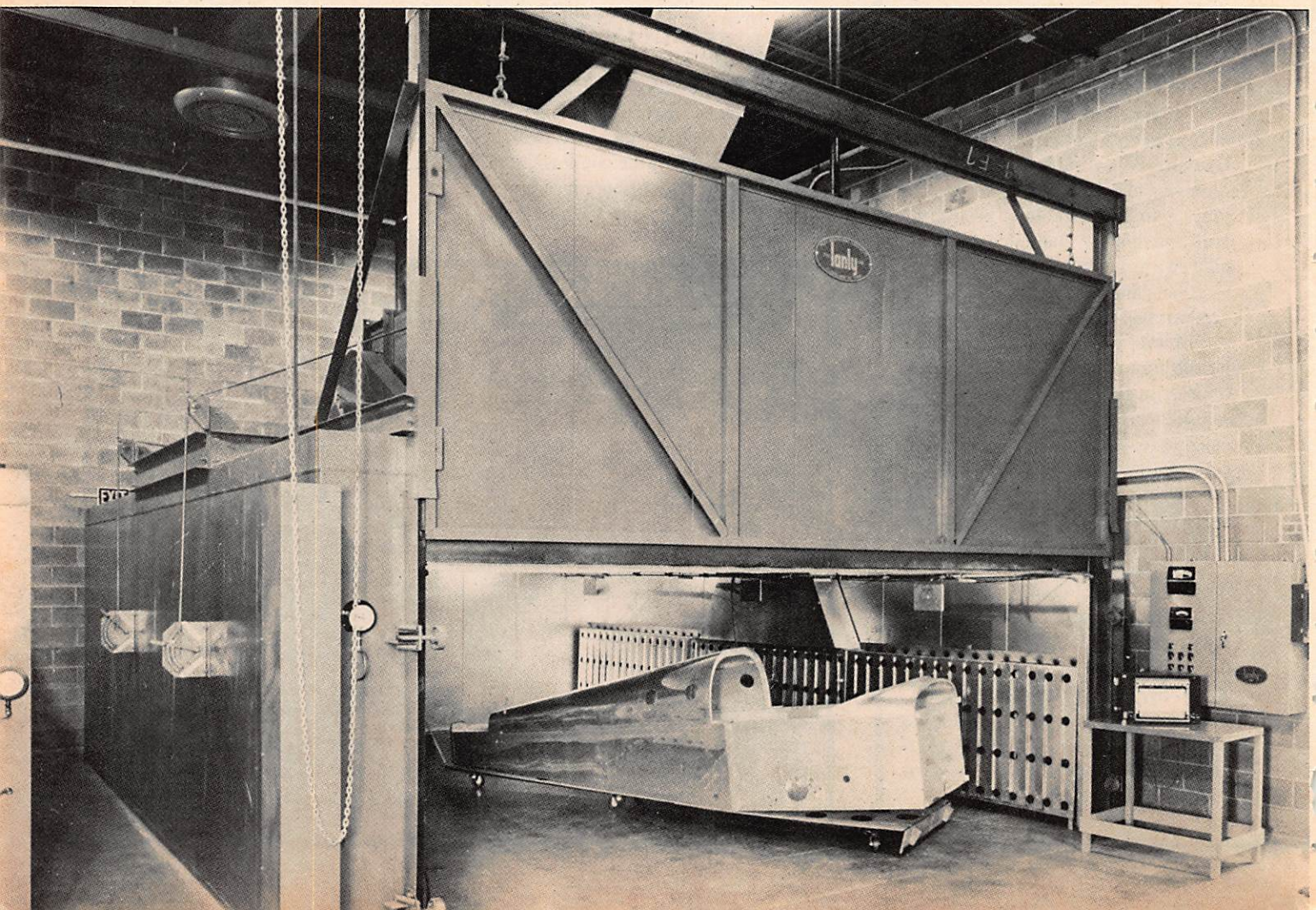

TIGER/continued

plane is very responsive in the pitch and roll axes. The control surfaces are moved by a combination of torque tubes and cables. The electrically operated flaps are a bit undersized and not as effective as those in many other aircraft. An approach to landing must be made with conscientious attention to detail. Come in over the fence a mite too hot, and you'll float like a bar of Ivory soap.

I've heard some people complain that the Tiger is not as stable as some aircraft and must be "flown all the time." That is probably somewhat true of any airplane with responsive handling characteristics. I think that most pilots who like hands-on flying will enjoy commanding the Tiger. Those who prefer to be flown by their airplane will find other models more suitable.

To sum up my personal feelings about the Tiger—and it pretty much echoes those of other owners I've talked to—the airplane neatly combines superior performance in its class with sporty handling characteristics and very good visibility. The plane's carbureted Lycoming O-360 engine is among the more reliable powerplants, and the fixed-pitch prop (especially the Sensenich) and down-and-welded gear should keep maintenance costs within reason. Actual ownership costs depend, as always, on the treatment the plane has had in the past, the treatment you give it from now on, and the smiles or sneers of Lady Luck. My annuals, for example, have been running about $1200 a year. (As a side note, my Tiger won the Fixed Gear Production Category trophy in last year's CAFE 400 fuel efficiency race, thanks to a combination of the plane's inherent efficiency and pilot Rich Powell's skills.)

Bonding was an unusual term in general aviation when the Yankee was designed. Bede planned on cold bonding, but production turned on the heat: American Aviation's ovens bonded fuselages, stabilizers, wings and almost all structural joints of the aircraft, at 275°F. Above: an early AA1.

The four-place Traveler expanded the line in 1972, a stretched version of the two-seater, with 150 hp. It grew into a faster version, the Tiger, after the company was acquired by Grumman Corp.

The market for used Tigers seems to be pretty strong. When I was shopping for mine four years ago, asking prices were in the $20,000 to $25,000 range. A recent listing of aircraft for sale showed 12 Tigers, with most advertised prices in the $25,000 to $30,000 range.

If you're shopping, try a Tiger. □

AIRCRAFT COMPARISON CHART

	Grumman Tiger	Piper Archer II	Aerospatiale Tobago	Cessna Cutlass	Beech Sundowner
Cruise 75% (knots)	139	129	127	124	123
Stall (knots)	53	49	52	48	51
Max range 75% (n.m.)	552	600	653	620*	533
Best climb rate (fpm)	850	735	790	680	792
Service ceiling (ft.)	13,800	13,650	13,000	17,000	12,600
Takeoff over 50-ft. (ft.)	1550	1625	1657	1690	1955
Landing over 50-ft. (ft.)	1120	1390	1394	1335	1484
Gross weight (lb.)	2400	2550	2535	2550	2450
Useful load (lb.)	1106	1145	1073	1072	950
Power loading (lb./hp)	13.3	14.2	14.1	14.2	13.6
Wing loading (lb./sq. ft.)	17.1	15.0	19.8	14.7	16.8
Engine hp	180	180	180	180	180
Propeller type	fixed	fixed	constant speed	fixed	fixed
Landing gear type	fixed	fixed	fixed	fixed	fixed
Usable fuel (gal)	51	48	54	50/62	57.2
Seating capacity	4	4	4-5	4	4

*With optional fuel tanks

Autogas Now

After a Decade, Autogas Is Still a Burning Question

By Bill Welch

Back in 1976, the general aviation community was in turmoil. Supplies of 80-octane avgas were drying up, while operators were steadily encountering more problems with the new 100-octane "low lead" fuel (100LL). Overhaul shops were complaining about increased warranty service, owners were jarred by frequent cylinder replacements and operational difficulties such as plug fouling. When our supplier finally dropped 80 octane and we loaded our first tank of 100LL, we couldn't keep the plugs firing long enough to run the engine up. After scrounging 80 octane wherever we could find it for several years, we finally settled on the 100LL—with TCP (a lead scavenger) added to every tankful.

Petroleum industry sources and engine manufacturers generally claimed that the 80-octane low-compression engines would run okay on the new grade. They recommended some adjustments of operating procedures, and some valve design changes were made, but overall, the official position is that 100LL is okay. The oil companies were—quite reasonably—anxious to reduce the number of different aviation fuels distributed in such a small market, but there was growing proof that the new fuel wasn't adequately tested before it was standardized.

The Federal Aviation Administration stoutly maintained there was no safety problem, but as its own technical reports showed, there was definitely an increase in the probability of inflight engine failures. Some unscheduled landings were definitely attributed to the new fuel, but luckily, no one was killed. Maintenance people were finding substantially increased lead fouling. National Transportation Safety Board accident reports clearly showed an alarming increase in valve failures, and a test program at Embry-Riddle Aeronautical University demonstrated a major increase in maintenance requirements for aircraft using the new 100LL.

EAA TESTS AUTOGAS

In the context of this worsening situation, the Experimental Aircraft Association (EAA) first took the proverbial bull by the horns. After some earlier experiments, a formal test program on automotive gasoline for 80-octane aircraft engines was started in 1979. By mid-1982, the EAA had its first supplemental type certificate (STC) from the FAA for the use of automobile fuel in a Cessna 150, and other STCs followed for other models.

Now, about 200 STCs and 35,000 individual approvals later, how does the use of autogas look? EAA holds more than 100 of those STCs covering unleaded fuels and has licensed more than 17,000 aircraft owners to use them. Other STCs including both leaded and unleaded fuels are held by Petersen Aviation, of Minden, Nebraska. As this is written, according to president Todd Petersen, the company has 21 engine models and 71 airframes approved and has licensed 17,546 owners to use its STCs. (Lists of approved aircraft and engines are available from the respective organizations; EAA STCs run less than $30, and Petersen's cost 50 cents a horsepower.)

With something more than 10% of the general aviation fleet authorized to use automobile fuel, it's time for an overall look at this grass-roots response to aviation fuel supply problems.

The total picture is a hazy one. Some owners are pleased with the results, and report trouble-free operation using the ordinary automotive fuels. Others have run into a variety of problems, some of which have more to do with greed, apathy or bad judgment than with the technical properties of the fuel. In some cases, autogas seems to have taken a bad rap for problems actually caused by other factors. In still other cases, there have been legitimate complaints associated with autogas.

The STCs, which apply only to Part 91 and Part 141 (school) operations, require fuel complying with American Society for Testing Materials (ASTM) Specification D-439. Although that document does not refer to alcohol, EAA explicitly cautions against using fuel containing 1% or more of alcohol, on the premise that alcohol attacks some of the materials in fuel systems. Petersen discourages using alcohol, but does add that if it's accidentally loaded once and burned out promptly, it probably won't cause a problem. An FAA powerplant engineer expressed the reservation that alcohol might cause the fuel to fail some of the tests in Specification D-439, even though it is not prohibited by that specification. That seems unlikely if the fuel is manufactured to meet the specification in the first place.

A number of states require automotive fuels sold within their boundaries to meet Specification D-439, but some don't. While the oil companies and their distributors are generally careful about meeting specifications, the user should obtain assurance from the supplier where it is not required by the state.

Because many of the unleaded automotive fuels now contain some alcohol, this point can be a major concern for anyone using autogas in an aircraft. Three different alcohols are in common use—methanol (wood alcohol), ethanol (grain alcohol) and isopropyl alcohol. Methanol does attack some of the fuel system parts and is corrosive. Some automobile manufacturers caution against using fuel containing methanol, but ethanol is widely believed to be acceptable in small concentrations. Isopropyl alcohol is less used, especially in fuels, and there is little information available on its compatibility with fuel system materials. One complication is the fact that automotive fuels, particularly in some parts of the country, do contain methanol, while ethanol is used in other areas. This gasohol distribution results partly from the Environmental Protection Agency (EPA) requirement to reduce lead content in automotive fuels. Octane rating is restored to the unleaded fuels by using more of the aromatics (the lighter fractions of petroleum) and in some by the addition of alcohol. Tetraethyl lead additive and alcohol used together in an optimum ratio produce a higher octane rating than either alone. Some states do not require disclosure to the consumer that a gasoline contains alcohol.

In Colorado, the use of gasohol, fuel containing at least 10% alcohol, is man-

The Experimental Aircraft Association stepped in to test the use of autogas when supplies of 80-octane avgas dried up, and EAA and Petersen Aviation now have some 200 STCs for the use of autogas.