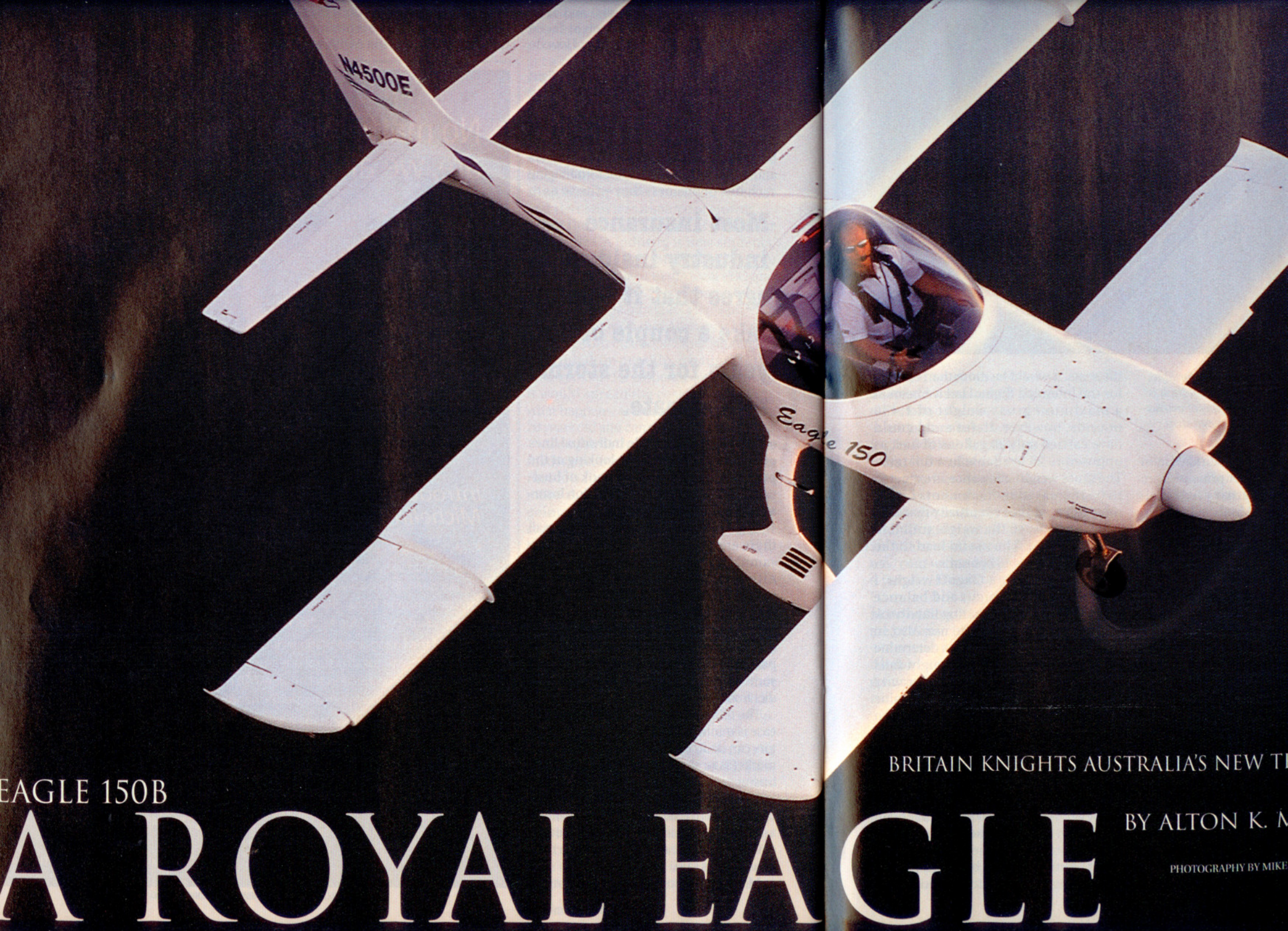

EAGLE 150B

A ROYAL EAGLE

BRITAIN KNIGHTS AUSTRALIA'S NEW TI

BY ALTON K. M

PHOTOGRAPHY BY MIKE

BRITAIN KNIGHTS AUSTRALIA'S NEW TRAINER

AGLE

BY ALTON K. MARSH

PHOTOGRAPHY BY MIKE FIZER

Australia's entry into the two-place trainer market is truly an international effort. The type certificate for the composite Eagle 150B aircraft, now manufactured near Perth and using an American engine and avionics, has been purchased by the Malaysian government and will be manufactured in that country sometime in the future. At the moment, however, Eagle Aircraft is too busy filling orders to move the factory. The airplane is fully certified in Australia, the United States, and several other countries under JAR/VLA regulations—joint rules for very light aircraft that have been adopted by several countries. ■ However, the chances are that you have not yet seen an Eagle 150B unless you have attended a major airshow or live in Wichita; fewer than a dozen currently fly in the United States. Think of it as a Cessna 152 with four wings that cruises at a true airspeed of 120 knots. ■ From its appearance, the aircraft looks like a canard design, but technically it has a forward wing. It is made of carbon fiber composite material; Kevlar reinforces the cockpit. Nomex honeycomb is used for some of the structural parts. ■ To be technically correct, it is a three-wing design. The "main" wing at the center of the aircraft supplies about half the lift. The forward wing supplies most of the remaining half, while the horizontal stabilizer—actually a lifting surface—supplies the final 10 percent of the needed lift. ■ Little known in the United States, the aircraft is gaining recognition

The cockpit offers a neat and comfortable design that is flight-instructor friendly. It is comfortable enough for a long day of instruction and simplified to aid the student.

from other countries. In late October, England's Prince Phillip awarded a medal for the aircraft's design to Eagle codevelopers John Roncz of the United States and Graham Swannell of Australia. The award is sponsored by The Guild of Air Pilots and Air Navigators in London, and is called the Grand Master's Australian Medal—the grand master being Prince Phillip. The two men were nominated two years ago, but had to wait until extensive research assured that the award was going to a worthy effort.

Roncz is an aerodynamicist, while Swannell designed the Eagle's structure. Together, the two made a maximum effort to make the Eagle's handling qualities perfect. If the award from Prince Phillip could be linked to one achievement in the development of the Eagle, it would be the handling qualities.

"It handles just like an F–16," said Mike Hahn, a co-owner of HGL Aero in Augusta, Kansas, 12 miles east of Wichita. While admittedly biased, he should know. He flies for Southwest Airlines and is an instructor in military jets in the Air Force Reserve. HGL has committed to purchase 50 Eagles for resale in the United States, and is the only dealer, although there is an Eagle Aircraft North America office in Orlando, Florida. Hahn is the H in HGL. The other principles are John Guernsey of Guernsey Aviation, located at the Augusta Municipal Airport, and Justin Ladner, the HGL president. The dealership is housed in the facilities of Guernsey Aviation, an airframe-rebuilding and aircraft maintenance company that also assembles Eagles after they are shipped from Australia.

AOPA Pilot got to test the aircraft's handling qualities during a flight at Augusta Municipal Airport. It was obvious from activities at HGL that there is widespread interest in the Eagle 150B. Hours prior to the test flight the aircraft had returned from Colorado Springs, Colorado, where it was demonstrated to the U.S. Air Force Academy. Another demonstrator was in Michigan.

The weight and balance numbers indicated that the airplane could not legally fly with Hahn, myself, and full fuel aboard. Luckily, there were only about 10 gallons of fuel in the tank, which is located in the fuselage aft of the seats. It would be more than enough for the intended flight. Had we been at a maximum gross weight of 1,430 pounds, however, Hahn and I could have carried only 20 gallons of fuel, as opposed to 26 available in a full tank. The gross weight allowance is expected to be increased in increments by the time you read this, eventually reaching 1,500 pounds, so the weight problem may be solved. The useful load in the aircraft I flew was 464 pounds.

While computing takeoff weight, I noticed that the weight and balance chart in the pilot's operating handbook is unnecessarily difficult to use. Also, in addition to using the chart to determine that the aircraft's overall weight falls within the aircraft's center of gravity envelope, the pilot must also determine that the weight without fuel is within the envelope.

It was past 6 p.m. when the flight was ready for takeoff, and darkness was only two hours away. The Eagles currently flying are not equipped for night flight. However, night approval has just been granted in Australia and was said to be nearly complete in the United States. Night lighting kits will be developed for retrofitting to older aircraft and will be

Flight instructor Jaden Stapleton finds the Eagle an ideal training airplane. He appreciates the excellent visibility from the cockpit and the gentle handling qualities.

installed on production-line aircraft. There are also plans for limited IFR certification so that the aircraft can be used as an instrument trainer. Even then, the Eagles will lack lightning protection.

Entry into the roomy, 46-inch-wide cockpit offered no problems. I took a minute to look around the modern panel. The instruments are all electric, including the gyros. The panel comes standard with a Bendix/King KX 125 nav/com with a digital VOR display and a Bendix/King KT 76A transponder. A Garmin GNS 430 GPS can be installed as an option. The engine instruments are by Vision Microsystems.

Are you a tall pilot? A short one? It doesn't matter. The rudder pedals adjust away from and toward you with an electric switch.

On the center console near the control stick "tree" (so called because it has two branches, one for the student and one for the instructor) is a spring-loaded roll trim selector to be used when, say, a light pilot is flying with a heavy passenger. Otherwise, the airplane would tend to roll toward the heavy passenger.

Right away, you start to notice clever engineering secrets. No cowl flap is needed. Low pressure is generated at the back of the cowling to suck hot air from the engine. As the angle of attack increases, the suction increases, improving cooling. The landing gear is one continuous piece of fiberglass: During certification, a drop test from eight feet resulted in no damage to the gear, company officials said.

There is no nosewheel steering. Taxiing with differential braking took some getting used to. My first maneuver was a 180-degree turn to get away from the Mooney that Hahn was going to fly to Texas later that evening. A series of starts and stops, accompanied by pumping of the unfamiliar left brake, was required to negotiate the turn. The rudder pedals must be depressed a few inches before braking action begins: There are no toe brakes. Brakes have been built in to the function of the rudder pedals. Once out on the taxiway, however, I had no trouble holding the centerline. By the time I got to the runway, I had mastered the unusual braking system.

Supporting Hahn's impression that the Eagle is like a military jet is the design of the throttle; it is military style and is located on the left side of the cockpit. The control stick has a push-to-talk switch, coolie-hat trim switch, and a frequency-select button, while the instructor's branch of the stick has a push-to-talk switch. Flaps were lowered electrically to takeoff position by bringing them down to a visual identification marking on the forward wing, but there is also an indicator in the cockpit. There are four flaps in all, two on the forward wing and two on the main wing. Only the main wing has ailerons.

Once in the air, the visibility through the canopy was dramatic, an unobstructed view of 180 degrees side to side, 90 degrees from straight ahead to looking straight up. If you fly because of the view, this is your airplane.

It was a 90-degree Fahrenheit evening, but the 125-horsepower Continental IO-240 pulled us upward at better than 1,000 fpm at about 80 kt. Leveling at 3,500 feet, an average groundspeed (minus wind effects) of more than 120 kt was measured via GPS at a cruise setting of 2,600 rpm.

Control responses were instanta-

The forward wing is not a canard. In addition, the tail acts as a lifting surface. The aircraft, therefore, has three lifting surfaces. It behaves much like a spirited Cessna 152.

neous, thanks to push tubes linking the stick to the control surfaces; move the stick a quarter of an inch, and the airplane is banking. The handling qualities felt more like some of the aerobatic aircraft I have flown than a trainer. You want to turn? Just think about it, and the aircraft seems magically to begin a turn in that direction. A quarter-inch of control movement means a lot in the Eagle.

Stalls were uneventful and occurred at less than 45 kt. The aircraft simply drops its nose and begins flying again, without much effort from the pilot. During a power-on stall, and holding the aircraft in the stall without recovering, I did manage to get the Eagle to drop first one wing, then the other. Most aircraft must be handled gently at minimum controllable airspeed, but this aircraft can be rocked rapidly side to side without stalling.

Landing speeds are low—61 kt on short final, slowing to 55 in the flare. Although there was a crosswind, the aircraft was easily controlled to land near the centerline in a smooth touchdown.

Following the flight, Roncz provided the history of the aircraft's development.

Originally, a private company in Australia approached Roncz in the 1980s and asked for his help in designing an ultralight. The original design was to use an engine then built by England's Norton motorcycle company.

The Norton engine, normally very reliable and holder of a land speed record, didn't work well with the aircraft design. Then a Volkswagen engine was tried but performed poorly, failing on the first flight. So a Continental O-200 engine was used. Now, the developers were using a heavier engine than planned, but it worked well and gave the promised performance. But when it was time for the aircraft to enter production, Continental no longer offered the O-200, and instead was selling the still-heavier O-240.

"To make a long story short, the gross weight of the aircraft went up 40 percent [including extra fuel that the manufacturer wanted to offer], yet the size of the airfoil went up zero percent," Roncz said. The airframe could handle the weight. In fact, while it is certified to normal standards of 3.8 Gs, it can actually handle 13. But under JAR/VLA rules, the manufacturer was stuck with a requirement that the stall speed be 45 kt or less. The heavier Eagle now had a stall speed of 47 kt. Rules are rules, especially when they are government rules, so the size of the airfoil now had to be increased to lower the stall speed. That was accomplished by increasing the chord of the flaps, Roncz said.

With that problem solved, Roncz and Swannell went to work on handling qualities, because they believed that alone would sell an aircraft. "The plane worked fine, but we were trying to get the exact forces that we wanted. One fallout of that is that the aircraft [now] has a servo tab on the rudder. Almost any airplane that you fly has very weak rudder centering. That is, you kick 5 degrees of rudder, and the aircraft pretty much stays with 5 degrees of rudder. To fix that, we put a servo tab on it. That shows how fanatically devoted we were to handling qualities. And you noticed there is no friction in the controls? We were maniacs on handling qualities," Roncz recalled.

The outer main wings have vortex generators and an aerodynamic fence to maintain aileron effectiveness at low airspeeds, such as flight at the edge of a stall. They were added, Roncz said, partly to appease the Australian equivalent of the FAA.

"They misinterpreted the regulations," Roncz said. "The regulations clearly state that you shall initiate a stall at 1 kt per second. Then it says a wing shall not drop 20 degrees after the pilot has made the correction—which is pushing the stick forward in this case.

Eagle 150B

Base price: $121,000

(A recent sale with GPS and leather seat options cost $135,000)

Price as tested: $121,000

Specifications

Powerplant	Continental IO-240-B7B, 125 hp
Recommended TBO	2,000 hr
Propeller	McCauley, fixed-pitch, 70-in dia
Length	21 ft 2 in
Height	7 ft 7 in
Wingspan (max)	23 ft 6 in
Main wing area	56 sq ft
Forward wing area	39 sq ft
Wing loading	14.74 lb/sq ft
Seats	2
Empty weight	946 lb
Empty weight, as tested	965.6 lb
Maximum gross weight	1,430 lb
Useful load	484 lb
Useful load, as tested	464.4 lb
Payload w/full fuel	331 lb
Payload w/full fuel, as tested	310.8 lb
Fuel capacity, std	26.9 gal (25.6 gal usable)
	161 lb (153.6 lb usable)

Performance

Takeoff distance over 50-ft obstacle	1,143 ft
Landing distance over 50-ft obstacle	1,198 ft
Max demonstrated crosswind component	15 kt
Rate of climb, sea level	1,055 fpm
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	
@ 75% power, best economy	125 kt/4.2 hr
2,000 ft	(36 pph/6 gph)

Limiting and Recommended Airspeeds

V_X (best angle of climb)	74 KIAS
V_Y (best rate of climb)	77 KIAS
V_{S1} (stall, clean)	52 KIAS
V_{SO} (stall, in landing configuration)	43 KIAS

For more information, contact HGL Aero, 10504 Southwest Indianola Road, Augusta Airport, Augusta, Kansas 67010; telephone 316/733-6015; fax 316/733-6250; or visit the Web site (www.hglaero.com).

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

Well, the Australians said you have to hold the stick full aft." So the result is an airplane with better low-speed handling qualities than the regulations require. (In a separate interview, an HGL official said the vortex generators also help direct airflow that is disrupted by the forward wing at high angles of attack.)

Roncz is quite happy with the results. "It is actually a nice cross-country machine. Mine does 126 to 128 kt between 6,000 and 8,000 feet. It burns exactly six gallons an hour. That is faster than a 172, and people use those for cross-country [flights]," he said.

Roncz asked me if I stalled it in a 60-degree bank. I had to admit that my bank angle during stall practice was much more anemic than that. "It rolls out on its own. That's the magic! It rolls itself level. You can't get the stall-spin scenario. I set it up with the proper physics to do that, because in Australia they use it for herding sheep. And these guys get really close to the ground and pull a lot of Gs," Roncz said.

The ultimate secret of the Eagle is that it is based on an outstanding aerobatic performer that had to be tamed to keep the average pilot, especially the Australian sheep herder, out of trouble. Roncz said that part of the Eagle is based on an airplane that Swannell had built for himself called the Maverick. It also used the Continental O-200 engine, the one that the Eagle designers went to after trying the Norton and Volkswagen engines. The result is an airplane that is more capable than it lets on, one worthy of a prince, if not a king. □

Links to additional information about the Eagle 150 may be found on AOPA Online (www.aopa.org/pilot/links.shtml). E-mail the author at alton.marsh@aopa.org