



There at the beginning

Being present at AOPA's creation

BY THOMAS A. HORNE ILLUSTRATION BY JEROME LARRIGUE

THE PYLON CLUB-a flying club based at Patco Field in Norristown, Pennsylvania-was having another of its fly-outs. This one was to a private island in the Saint Lawrence River, owned by brothers Philip T. and Laurence P. Sharples, industrialists specializing in the manufacture of centrifuges. For unknown reasons, the Sharples brothers got lost en route and took a while to sort things out. By the time they neared the island it was becoming dark, so they landed at a friend's airport and spent the night. That friend was Edwin Link, the inventor of the Link trainer. Link's houseguest was Edward J. Noble, soon to become the chairman of the Civil Aeronautics Authority (CAA), the forerunner of the Federal Aviation Administration. It was autumn 1937.

By the time the Sharples brothers met Noble again, they had been busy exploring the idea of forming a pilot's association with like-minded Pylon Club members. One of them, Philadelphia lawyer Alfred L. Wolf, had written a letter to Carl Friedlander, president of the Aeronautical Corporation of America (Aeronca). Friedlander had written an article for *The American Aviation Daily* in which he argued for an association to represent the

interests of private airplane manufacturers, and Wolf agreed. "The world of the airline plane, and the world of the military plane, was a different world than the one in which Carl was making his Aeroncas," Wolf said.

There were parallels in the pilot world for example, the Private Fliers Association (PFA) and the Sportsman Pilots Association (SPA)—but Wolf felt that the SPA was just for fun, and that the PFA "wanted to be all things to all men in aviation," according to one letter. Other groups proved equally

ineffective, and made for a confusing scene that divided interests instead of uniting them. There was the American Pilots League, the Private Pilots Association, the United Pilots and Mechanics Association, and the Association for the Advancement of Aeronautics. Without a more focused, businesslike organization, Wolf and his compatriots feared that "miscellaneous aviation"—as general aviation was called then—would come out second best in political battles unless it had a better lobbying organization.

Those compatriots—all from the Philadelphia area—included Wolf, C. Townsend Ludington (owner of The Ludington Line, an air shuttle service that flew between Newark and Washington), the Sharples brothers, and John Story Smith (secretary-treasurer of the Jacobs Aircraft Engine Company).

Meanwhile, a student at the University of Pennsylvania was busy networking. Joseph B. ("Doc") Hartranft Jr. had made a name for himself at a very young age as



BEFORE WINGS became an airfield,

property included a farmhouse, built around 1776, and a large barn (above).

headquarters in May 1983 (top). The

painting on the previous page depicts AOPA's founders at Wings Field.

AOPA moved to its Frederick, Maryland,

it was a 134-acre dairy farm. The

a founder of the National Intercollegiate Flying Club (NIFC, now known as the National Intercollegiate Flying Association), and founder and president of the "Cloudcombers"—the university's flying club. Hartranft invited Wolf to speak at a NIFC convention, and Hartranft gave his own talk about the need for a national association to represent general aviation pilots.

With this in common, Wolf took the next step. He invited Hartranft to a meeting with the Philadelphia group. It was the first time the nervous, 22-yearold Hartranft met all the principals in this influential group, but the meeting aligned their convictions. However, it was another fly-out in late 1938 that brought the group encouragement to formalize their resolve.

> This time, the Sharples brothers flew Edward Noble, by now chairman of the CAA, to southern Georgia for a turkey-hunting expedition. While waiting in a blind for the turkeys to show up, Noble told the Sharpleses how the airline and military lobbyists came to the CAA with professionally executed, very convincing arguments for their positions—and usually got their way. Private pilots usually came one by one

to the CAA with their grievances, coming across as undisciplined oddballs—and, Noble said, confirming the image of private flying as a lunatic fringe. He said that without a single, coherent voice, general aviation interests would always be in jeopardy.

Wolf heard essentially the same thing in April 1939 from Edward P. Warner, a sympathetic CAA board member, who said, "Though private fliers think private flying is very important, no one else is convinced of that, and whenever anyone comes for government cooperation or assistance, they are faced with a lack of proof that there is anything beyond a luxury involved... someone must set out to prove the relationship between the type of flying we are going to represent and the national economy, the national defense, etc."

When word of Noble's and Warner's opinions reached the Philadelphia group, they decided to act. After all, here was the government, the organization that had caused general aviation all of its troubles, giving advice on how it best could be influenced.

But first there was the matter of deciding this new organization's name. Philip T. Sharples favored "Pilots, Incorporated," arguing that this conveyed a more professional approach. Laurence Sharples, Ludington, Smith, and Wolf each had their own ideas. As the meeting droned on at Philadelphia's Barclay Hotel, the clock reached 2:30 a.m., and C. Townsend Ludington had had enough. "I'm tired, and I'm going to bed," he said. "I propose we name it just what it is—the Aircraft Owners and Pilots Association."

The deal was done. On May 15, 1939, AOPA's charter was signed. The Sharples brothers, Ludington, Wolf, and Smith became the founding trustees of the infant AOPA. Ludington was elected as AOPA's first president, and Hartranft was hired as the first employee. By 1952, Hartranft was named president, and by then AOPA was the influential Washington player and voice of general aviation that its founders had hoped for. And it has continued growing in influence since then. **AOPA**

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IN 1931, two new hangar buildings were constructed near the old barn at Wings Field. They were built partially with stone, then as now a rare buiding material for aircraft storage. The barn was also converted into a hangar.





The first to

Charter members reflect on 75 years

BY MIKE COLLINS PHOTOGRAPHY BY THE AUTHOR

SEVENTY-FIVE YEARS AFTER ITS FOUNDING IN MAY 1939. a dozen charter members remain active on AOPA's membership rolls. On the occasion of the association's diamond anniversary, we talk with three of them—one helped AOPA secure its first office, in Chicago; another was nicknamed the "baby student" because he was the youngest pilot at his airport; the third used general aviation to build his business—about AOPA and their flying over the years. Longer versions of these interviews can be found on AOPA Online.

> **VIDEO EXTRA** Video interviews with three charter members.



Seeing the light

Student's idea launches pilot into lighting business

BILL BAILEY was interested in aviation from the time he was six years old. "Every night when I went to bed, I was praying to the good Lord that he would let me be a good pilot," recalls Bailey, 94, of Genesee, Michigan.

His flight instructor sold 10 hours of dual instruction in a Taylorcraft for \$50. "That was enough to solo." Bailey soloed and joined AOPA—in May 1939. "They ran an ad in the flying magazine, telling about the AOPA, and I thought that sounded good. I've been a member ever since."

Bailey wasn't particularly concerned about the buildup to what would become World War II. He bought a straight-wing Waco biplane from an airport manager who had flown the mail with Charles Lindbergh.

A barnstormer, complete with the baggy pants, checked him out. "We walk out to the plane and he says, 'It's been a while; I better take it around myself.' I don't think he'd ever been in a Waco. [Then] I take a ride around the field with him and then he crawls out and gets in the front and I get in the back. I give it the throttle and away we go. I'm not really in control of things yet, but we come around and I didn't make too bad a landing—and he's crawling out. He said, 'Oh, you can fly this thing.' I gave it the throttle and away we go—that's how I got checked out in that Waco biplane."

After Pearl Harbor, Bailey sold the Waco for \$425—the amount he had paid for it—and joined the Army. Initially classified as a mechanic, he eventually became a Curtiss P–40 pilot, assigned as a gunnery instructor. He later transitioned to the P–47, but combat ended before he could be sent overseas.

Following the war he obtained his flight instructor certificate. In January 1947, one of his students had the idea of putting a fluorescent light on a servicestation hoist, so the mechanic could do a grease job—required on cars in those days—without having to hold a flashlight in addition to the grease gun and a rag. That launched Bailey into the lighting business. "At one time we had 100 employees, and two plants, and my son is still running the business today—67 years after I started it." Bailey flew a flying club's Aztecs and Bonanzas, then bought a Bonanza of his own flying to solve many business problems and make sales calls, as well as personal trips to Florida and to several AOPA conventions, including Palm Springs, California. "I was looking for a Stearman, but I ran into this Starduster that was built for about 180 horsepower—this fellow put in a 310 [-horsepower turbocharged engine]. That was a full job to fly that thing. But that was a great, fun airplane. You could do anything—go almost straight up with it!"

He sold both airplanes in 2007. "I was 87 years old and I had some cancer operations, and so I decided it was time to hang 'em up." He had logged more than 2,000 hours—and flown even more—"over 67 years of wonderful flying. If I hadn't had physical problems, I'd probably be trying to fly yet."

66 The aviation industry has been simply great to me, and AOPA has been great also. **99**





A fortuitous youth

Serendipitous childhood fosters lifetime in aviation

CLARENCE A. "CLANCY" HESS

earned his nickname as a pilot in the Marine Corps during World War II. "I managed to leave a bomb in a Japanese ship that had a big boom [crane]. There was a popular song back in those days, *Clancy, Lower the Boom*—they saw the ship capsize and the boom went in the water, so that's been my nickname ever since."

Hess, 92, of Lockport, Illinois, grew up on a farm near Skokie, Illinois. His neighbor was Louie Meyer, the race car driver. "He bought one of the first Waco 9s. Starting in 1928, he was taking me for airplane rides with him, out of their pasture, so early on I figured out what a stick and rudder bar did in an airplane."

> When the National Air Races came to Chicago in 1930, Hess's father—a carpenter—helped build the wooden grandstands at Curtiss-Reynolds Airport, which later became Glenview Naval Air Station. The top race pilots of the day, Art Chester from Joliet, Illinois, and Johnny Livingston from Waterloo, Iowa, arrived

Aviation just permeated my thinking all the time...It's been a real interesting lifetime.??

and prepared to camp under their wings. "My dad saw heavy weather coming in and invited them to come to our house, because the house I grew up in was outfitted so people harvesting the crops could stay overnight—there was bunk space for 16 people. When they arrived, I can still remember how pleased they were."

The races lasted 10 days, and some of those pilots stayed the whole time at the Hess residence. Jimmy Doolittle and Charles Lindbergh also visited. "It's why I got so tangled up" in aviation, Hess recalled.

On Hess's tenth birthday, Livingston showed up for breakfast, then took Hess flying in his Velie Monocoupe. "He kept asking me questions or telling me stuff about what airplanes were about, and later my dad told me I interrupted him a few times because I already knew

that stuff. He put me up in the left se 'Well, you've been

me up in the left seat. He says, 'Well, you've been telling me stuff about airplanes, now show me!''' Hess taxied

around for a while, then they flew circuits for an hour and 45 minutes. "Then he got out and said, 'Go fly it, kid,' so I am as far as I can determine the first to be soloed on my tenth birthday."

Hess worked for the FBO at what is now Chicago Midway International Airport, and for lunch he often had a bowl of chili at the terminal lunch counter. One day a man sat down beside him and asked if the chili was good. "He introduced himself. He had just arrived and his name was Doc Hartranft." AOPA had been founded in Philadelphia the week before, and Hartranft had come to Chicago to find an office. Hess helped him secure one that afternoon. "I had cousins who worked in the Transportation Building. The first address for AOPA was simply Transportation Building, Chicago, Illinois."

Hess also met Arthur Collins, who started Collins Radio; Reuben Fleet, the owner of Consolidated Aircraft; Bill Lear; and others—and had more than 1,000 hours of flight time—before joining the Marines, where he served as a photographer as well as a TBF Avenger pilot. Twice he spent an entire day in the ocean, once after a midair collision and again after his engine was hit. He and a friend gained notoriety in December 1944, when they flew 700 miles to Townsville, Australia, to procure beer, rum, and cigars for the officer's club on Bougainville, in the Solomon Islands.

After World War II, Hess met the chief pilot for American Airlines at the Midway lunch counter, and went to work for the airline the following Monday. In Korea he flew the R4Q, the Marine Corps' version of the Fairchild C–119 Flying Boxcar. For the rest of his 32 years with American, he was involved in research and design, working with the Corporate Projects Group.

Hess founded Wings of Hope with four other airline pilots, initially providing a Piper Super Cub to a Catholic nun and pilot from Ireland. Wings of Hope originally operated from Lewis University Airport.

The 'baby student'

Airport's youngest pilot leverages GA's utility

Seventy-five years ago **ED ADAMS**, 92, of Winston-Salem, North Carolina, was the "baby student" of Stewart Airport in Parkersburg, West Virginia. He joined AOPA primarily to associate with other pilots.

"I've had a passion for flying ever since I was very, very young," he said. "I was 17 years old, and had just soloed. When I graduated from high school my father gave me flying lessons at the local airport. I soloed in seven days."

He garnered the moniker because he was the youngest student on the field. "The newspaper gave [me] the heading of 'baby student,'" said Adams, who still has a scrapbook filled with yellowed newspaper clippings from the local paper, which gave flight training and local aviation events considerable

coverage.

Most of his training was in Piper Cubs, then he moved on to a Waco. "The Waco F was the most fun to fly—I really enjoyed that. [Aerobatics] help improve your flying, and improve precision flying." The young aviator hoped to attend the Boeing School of Aeronautics and become an airline pilot. "The war interrupted that," said Adams, whose eyesight ultimately precluded a career as an airline—or military—pilot.

"After the war, I came back and started flying privately again. I had a Cessna 172, and then a Bonanza, and then I went to the Baron. I was in the ceramic tile business and I used the Baron to make trips all over the United States, to call on customers and so forth."

Around 1980, Adams flew from Owensboro-Daviess County (Kentucky) Airport to St. John's, Newfoundland, Canada in one day. "We had a mine located in Newfoundland, and it was quite an experience to make that trip. I remember flying across 180 miles of water to get to Newfoundland and I guess I was lonely, all by myself out there, and I called Canadian air traffic control and the first thing they said to me was, 'Are you lonely?' They said, 'We have you on radar, you're right on course, and you'll be in Newfoundland in another 20 minutes.'"

For eight years he served on the Owensboro-Daviess County Airport Board. "When I was the chairman, we found it necessary to hire legal help in Washington,

I just have a passion for flying; to me, it's relaxing, and it's satisfying. ??

and I had no knowledge of anybody in Washington. I called AOPA and they gave me names of attorneys that we should contact, and that helped us immensely." Later, he was appointed to the Kentucky Air Zoning Commission.

When Adams joined AOPA there was no *AOPA Pilot*, although there was an insert in *Popular Aviation*, which later became *Flying*. "I've always read it, and I still do today, every page of the magazine. I consider it as continuing education. And even though I'm not flying today, I still read it," he said. "There's so much to be learned."

He logged 7,000 to 8,000 hours, most of it on business and personal trips in the Barons he owned. Adams stopped flying in 1986, partially because of concerns that he might have a heart attack—although that never happened. "It took an awful lot of thought; I didn't want to do it, and I still wish I could go out and fly tomorrow." **AOPA**

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blaneblane-Crazy America

GA in pop culture through the years

BY THOMAS A. HORNE ILLUSTRATION BY JOHN UELAND

THE REALIZATION may not immediately spring to mind, but the fact is that general aviation's mass appeal has always been powerful over the past 100-plus years. After all, what was the Wright *Flyer* if not a general aviation airplane? The Wrights kicked off a groundswell of enthusiasm for aviation once word spread of their monumental achievements. That took awhile—for several reasons. First, the Wrights were secretive about their wing-warping method of lateral control, and didn't want publicity in the early years of their flying. Plus, there was a lot of skepticism. Europeans, if they believed it at all, belittled what the Wrights had accomplished.





Lindbergh had his **COMPETITORS**, but he flew into **hero status** when he made the New York-to-Paris flight on May 20 and 21, 1927.

That all changed when the Wrights demonstrated their *Flyer* in France in 1908 and 1909. Crowds and royalty alike flocked to see the airplane fly, and the Wrights even started a flying school in Pau, France. A previously unimpressed U.S. Army contracted to buy its first military airplane—the Wright Military Flyer—in 1909. And the world was about to go aviation-crazy.

In the pre-World War I years, European airshows and exhibitions garnered lots of press coverage. New designs were coming out monthly. Airshows drew thousands who gasped at the sight of a steep turn. While the Wrights began a lengthy fight to defend their patents, it was European general aviation that got the most attention.

After World War I, America took the limelight and never relinquished it. Warsurplus Curtiss JN–4 Jenny trainers could be had for \$200, and pilots lined up to buy them. Thus began the barnstorming era. All through the 1920s, pilots would drop in on towns large and small, give rides, and put on airshows. Some even put on "Air Circuses." It was the first mass, up-close introduction to aviation for the American populace. Aviation, previously the province of an in crowd of designers and the privileged, reached the middle class in a big way.

Barnstorming mirrored the freewheeling, exuberant spirit of the times. Airplanes raced each other, raced cars, flew the first wingwalkers, served as in-flight trapezes, and put on aerobatic demonstrations. But it wasn't all levity. Serious advances in airplane design were in the works. Increasingly, old wood-and-fabric biplanes were viewed as antiques as strut-braced and cantilevered monoplanes made of aluminum began to arrive on the scene. Without exaggeration, one such airplane in particular revolutionized aviation and truly signaled a new dawn in what was then identified as the Air Age.

It was the *Spirit of Saint Louis*, the year was 1927, and the pilot was Charles Lindbergh—a former barnstormer and air mail pilot. Lindbergh set out in pursuit of a \$25,000 prize offered by hotelier Raymond Orteig to the first person who could fly non-stop from New York to Paris. True, John Alcock and Arthur Brown had already flown their Vickers Vimy from Newfoundland to Ireland nonstop in 1919, but that achievement received little publicity at the time and by 1927 it had been all but forgotten.

Lindbergh had his competitors, but he flew into hero status when he made the New York-to-Paris flight on May 20 and 21, 1927. His life, and American aviation, underwent an immediate transformation. For the next 14 years, Lindbergh would be surrounded by crowds, deluged by mail, and hounded by the press. His son was kidnapped and murdered. At the same time, American civil aviation assumed big-league status. By proving that the North Atlantic could be safely crossed in a single-engine airplane, Lindbergh cleared the way for airline travel.

It was also a sort of signal for a huge number of general aviation manufacturers to set up shop. This was a time of glorious general aviation expansion and diversification, as historic brands such as Beechcraft, Bellanca, Cessna, Fairchild, Mooney, Myers, Piper, Porterfield, Stinson, Taylorcraft, Waco, and many others hit their stride—in spite of the Great Depression.

Movies began to play a part in aviation mania. Wings, a silent movie about aerial combat in World War I, came out in 1927 and won an Oscar—the last of the silent movies to win the award. This was followed by another movie—a "talkie" this time—about World War I dogfighting, *Hell's Angels*. It was a \$4 million epic that cost four pilots their lives, took three years to make, and grossed \$8 million. The producer/ director was a young oil drill-bit manufacturer and pilot named Howard Hughes.

Hughes entered aviation history in 1937 when he broke a transcontinental speed record by flying his H–1 racer from Los Angeles to Newark, New Jersey, in seven hours, 28 minutes. More noteworthy flying records, and aircraft designs, followed.

Other pilots were also busy setting records in the 1930s. In November 1930



When Apollo 11 landed the first men on the moon, the whole world tuned in to watch.

Roscoe Turner—who flew in *Hell's Angels* flew from New York to Burbank, California, in 12 hours, 30 minutes, setting a transcontinental speed record. In 1931, Bobbi Trout and Edna May Cooper broke an endurance record by flying a Curtiss Robin 122 hours and 50 minutes. Amelia Earhart was the first woman to fly solo across the Atlantic in 1932. In 1935 she flew from Honolulu to Oakland, California, making her the first to fly solo across any part of the Pacific Ocean.

It seems as though everyone was setting records or winning air races in the 1930s and the public couldn't get enough. People back then would show up in droves (there was no television) to witness any kind of aviation event. There were scads of comic books about flying—and magazines, magazines, magazines. One of them, *Popular Aviation*, had an insert titled "AOPA Pilot."

After World War II, it was generally assumed that returning military pilots, and

civilians sick of war's deprivations, would buy their own GA airplanes. This was the impetus for the Engineering and Research Corporation (Erco) to design and build its postwar Ercoupe—an endearing 75-horsepower, two-seat, stall-resistant airplane that sold for \$2,665. It was a rousing success: Erco sold 4,311 of its 1946 model 415-C. But it was a success never to be repeated.

Beechcraft's Model 35 V-tail Bonanza debuted in 1947, and in its first two years

A few showbiz and actor pilots over the years

Brian Aherne (1902-1986)—Actor, AOPA charter member

Gene Autry (1907-1998)—Musician. Flew the Hump in World War II, owned a DC-3 and Beech 18

Richard Bach (1936-)—USAF pilot, author of Jonathan Livingston Seagull

Edgar Bergen (1903-1978)-Ventriloquist

Jimmy Buffett (1946-)—Singer. Owned Stearman, Albatross, and Lake

Edgar Rice Burroughs (1875-1950)—wrote Tarzan of the Apes

Roy Clark (1933-)-Musician

Tom Cruise (1962-)-Actor. Owns P-51

Robert Cummings (1908-1990)—Actor

Cecil B. DeMille (1881-1959)—Movie director/ producer

John Denver (1943-1997)-Singer

Brian Donlevy (1901-1972)—Actor, AOPA charter member

Michael Dorn (1952-)—Actor, owned F-86 and Sabreliner

Clint Eastwood (1930-)-Actor, helicopter pilot

Harrison Ford (1942-)-Actor

Morgan Freeman (1937-)-Actor

Ernest K. Gann (1910-1991)-Author

Hoot Gibson (1892-1962)-Actor

Arthur Godfrey (1903-1983)-Radio/TV host

Paul Harvey (1918-2009)-Radio personality

Howard Hawks (1896-1977)—Movie director, World War I pilot

Skitch Henderson (1918-2005)—bandleader for *The Tonight Show*, World War II pilot

Howard Hughes (1905-1976)—Movie director/ producer, industrialist

William Hurt (1950-)-Actor. Owns Bonanza A36

Angelina Jolie (1975-)—Actress, owns Cirrus SR22 and Cessna Caravan

Danny Kaye (1913-1987)-Comedian

George Kennedy (1925-)—Actor, owned Cessna 210 and Bonanza A36

Kris Kristofferson (1936-)—Actor, singer. Helicopter pilot in U.S. Army

Paul Mantz (1903-1965)—Film director, tech advisor. Killed while filming *Flight of the Phoenix*

Ed McMahon (1923-2009)-TV announcer

Steve McQueen (1930-1980)-Actor

Wayne Newton (1942-)—Singer, helicopter pilot Chuck Norris (1940-)—Actor

Susan Oliver (1937-1990)—Actress, "green girl" in original *Star Trek*, owned Aero Commander

Lawrence Olivier (1907-1989)—Actor

Jack Palance (1919-2006)—Actor, bailed out of burning B-24

Fess Parker (1924-2010)-Actor

George Peppard (1928-1994)—Actor, owned Learjet

Sydney Pollack (1934-2008)—Movie/TV producer

Dick Powell (1904-1963)—Movie and TV actor

Tyrone Power (1914-1958)—Actor

Dennis Quaid (1954-)-Actor, Citation owner

Randy Quaid (1950-)-Actor

Christopher Reeve (1952-2004)-Actor

Cliff Robertson (1925-2011)—Actor, owned Tiger Moth and Bonanza

Gene Roddenberry (1921-1991)—Director, screenwriter, created *Star Trek.* Transport pilot in World War II

Fred Rogers (1928-2003)-Children's TV host

Roy Rogers (1911-1998)—Movie and TV actor. Owned Cessna Bobcat

Kurt Russell (1951-)-Actor

Art Scholl (1931-1985)—Tech advisor, died during filming of *Top Gun*

James Stewart (1908-1997)—Actor. World War II B-24 bomber pilot, owned Cessna 310

Patrick Swayze (1952-2009)—Actor

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Gene Autry

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Jimmy Buffett



Harrison Ford



Angelina Jolie



Ed McMahon



Fred Rogers



Jimmy Stewart

GA in the movies

It's a Mad, Mad, Mad World (1963)—A drunken pilot (Jim Backus) passes out and Buddy Hackett, a nonpilot, has to take the controls. He flies through a billboard.

Octopussy (1983)—Corkey Fornof, playing James Bond, flies a BD–5J through an open hangar.

The Great Waldo Pepper (1975)—Robert Redford as a barnstormer.

The Flight of the

Phoenix (1965)—Jimmy Stewart and Richard Attenborough crash in the desert, then attempt to rebuild the airplane and fly out:

Independence Day (1996)—Randy Quaid leaves cropdusting behind to fight invading aliens. "Hello boys...//m ba-a-ck....Payback's hell, ain't it?"

The High and the Mighty (1954)— Cockpit resource management: Copilot John Wayne



WINTERS'

slaps Capt. Robert Stack back to his senses.



The Aviator (1985)—Christopher Reeve's airmail plane goes down in the wilderness. Wolf attacks ensue.

In Like Flint (1967)—Super-spy James Coburn parachutes from a Learjet.

The Carpetbaggers (1964)—George Peppard (played by Frank Tallman) lands a biplane in the middle of a small town.

Skyward (1980)—Bette Davis successfully mentors paraplegic Suzy Gilstrap (in real life a paraplegic) as she earns her pilot certificate. Charlie Hillard does the flying on this TV movie.

of production 1,500 of these classics were built; by the end of its production run in 1982, almost 8,700 Model 35s of various designations had sold. Other classics of the 1950s included the Cessna 195 (575 sales), and the two-seat Cessna 140 (7,700 sales).

This was also the time when light twins came into their own. Cessna's 310, entered production in 1954 and was so popular that some 6,300 of them were sold by 1980. But to the public the 310 meant something beyond sales. It was the airplane featured in the television series *Sky King. Sky King* ran from 1951 to 1959 and featured Kirby Grant as an Arizona rancher/pilot (with his niece Penny and nephew Clipper) who used his 310—called the *Songbird*—to capture criminals and, well, advance the general good. To a young baby boomer the sight of a banking 310 and the opening line, "Out of the clear western sky comes—*Sky King*!" means it's time for some quality viewing on the family's black-and-white Philco. Trivia note: Sky King's first airplane was a Cessna T–50 Bobcat (a.k.a. the "Bamboo Bomber").

The Bob Cummings Show ran from 1955 to 1959 and featured Cummings, an active pilot, as a Hollywood photographer.

Cummings was reportedly taught to fly by his godfather, Orville Wright.

Thousands of kids joined the Boy Scouts of America in its 1950s heyday, and more joined the Air Explorers, a branch of the Boy Scouts that focused on aviation. Explorers wore special uniforms, could earn ratings, climb the ranks, go on field trips to airports, and even log some time in the cockpit. The Air Explorers were most active between 1954 and 1965, and participation reached its peak in 1958, with 10,968 scouts.

General aviation is defined as all flying save that done by the military and the airlines. So does that mean the United States space program is part of GA? It might as well have been, as so much public enthusiasm was directed at the Mercury, Gemini, and Apollo missions in the 1960s. It culminated in 1969, when Apollo 11 landed the first men on the moon. The whole world tuned in to watch.

Today, GA dominates a new generation of space flight. None would have thought it possible just a few years earlier, but in 2003 Burt Rutan's Scaled Composites—in a joint venture with Microsoft billionaire Paul Allen—designed, built, and flew *WhiteKnight*, a plane that carried the company's *SpaceShipOne* suborbital rocket ship and won the \$10 million Ansari X Prize by flying to an altitude of 100 kilometers (54 nm) twice in one week.

Richard Branson's Virgin Galactic orbital spacecraft project *SpaceShipTwo* fed off this success and will use Scaled Composites' new *WhiteKnightTwo* as its mothership. The idea is to offer space tourism. Flight and engine tests are now under way, and Spaceport America in New Mexico is under construction. It will serve as Virgin Galactic's base of operations. Some 640 passengers (among them Steven Hawking, Tom Hanks, and Angelina Jolie) have already signed up at \$250,000 per head, even though Virgin Galactic has yet to say when the first commercial flights will begin.

The next time someone opines that GA is on its last legs, just remember: It went from the dunes of Kill Devil Hill to the edge of space in 60 short years, and has always shown surprising innovation and mass appeal. It's not about to stop. **AOPA**

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as it ever was

Flight training through the years

BY IAN J. TWOMBLY

TODAY SOMEONE WILL walk in to a flight school and plunk down a bunch of money to fulfill a dream. They will be assigned an instructor, shown an airplane, and the lessons will start right away. If it sounds familiar, that's because it's what you did when you learned to fly, whether it was 2014 or 1939.



AOPA and flight training

AOPA has been involved in efforts to support flight training almost since its first day. In fact, one of the association's first political acts was to advocate for the Civilian Pilot Training Program, a pre-World War II pilot training initiative that greatly expanded general aviation.

What is today's Air Safety Institute launched in 1950. With a safety-oriented mission, everything it creates has flight training at its core. Today that takes the form of interactive online courses, quizzes, videos, and live seminars.

Throughout the years AOPA has taken on hundreds of policy issues related to flight training, including everything from advocating for tax advantages to squashing state regulations that would make training more burdensome.

Likely the most visible and long-lasting commitment to the flight training industry began in 1999 when AOPA purchased *Flight Training* magazine from the Specialized Publications Company. Since then the magazine's message about the fundamentals of flight has been shared with a wider audience and a group of sister efforts has formed alongside, including the *Flight School Business* newsletter, an active Facebook group, a blog, videos, and much more.

AOPA knows that the flight training industry is key to a healthy pilot population. The association recently launched a number of new initiatives to support student pilots and flight schools, coming full circle to an initial effort that propelled aviation forward at a critical time. -IJT

Flight training hasn't changed much in the past 75 years. Part of the reason is probably because neither have the laws of physics. It's also because we're still an activity that begins by learning from one person with a passion.

Ralph Butcher is a former Flight Training columnist who flew fixed- and rotary-wing aircraft in the Army, retired as a check airman from United Airlines. and ran four flight schools. In 1959, at age 19, he fixed up a car and took it to a car show-where a woman offered him \$2,500 and a lesser car in exchange. Butcher took his money and immediately went to the airport. There an old-timer said, "Give me \$700 and I'll give you a pilot's certificate." There was no syllabus, no briefings, and scant material to study. "The stack of reading material was no more than an inch thick," he says. "Everything I learned I just had to scratch and dig for in those days."

Wally Funk learned to fly during the same period but had a different experience. She soloed in 1957 at Stevens College in Columbia, Missouri, and later went to Oklahoma State. She says her instructor used a syllabus, and over the years she's been able to adapt and expand it. "We knew what we had to do from day one to the time they took their checkride," she says.

Then, as now, much of the quality of the student's experience came down to luck. Get a good instructor and you will learn the basics the right way. Get a bad one and you'll struggle the whole time.

Butcher says it wasn't until the Army that he really learned how to fly. What he learned, he adapted to his own syllabus, which he took to the various schools he managed. The first three lessons called for the instrument panel to be covered. To him, the wing is the only instrument that matters.

Funk's training had a similar emphasis on looking outside and attitude flying. She fondly remembers her best lesson from those days. She and another CFI candidate flew up a few thousand feet above the airport at night and shut off the engine. A long deadstick later, the lesson was forever cemented in her flying. "I haven't found an instructor in years who has given their student the start of a spin or a tough spiral," she says.

It would be easy to say that glass cockpits have transformed this type of training. And maybe they have. But there is enough of the old guard around to instill basic attitude flying in new students that many are still learning the right fundamentals early on. New instructor Sarah Rovner is one of them. This computer professional and part-time instructor says she loves tailwheel flying, but technology has its place. "The basic skills are important and you should build on top of those," she says. "I encourage the use of the iPad. You should start doing everything with VORs, but once you master the basics the iPad is a great situational tool."

Funk has a different view. She still teaches without electronic aids. "I tell all my students to turn off their toys and leave them in the car," she says.

For an instructor who starts students off with no instruments, Butcher is surprisingly accepting of the modern cockpit—with some caveats. "It sucks the



"I tell all my students to turn off their toys and leave them in the car."

eyeballs out of your head," he says. "Just imagine you haven't had anything to eat for 30 days and there's a stack of Big Macs on the panel." That's the trap that he says snares some pilots. His hope is that if students first learn to fly the wing, they have an easier transition to glass.

Butcher's even more accepting of simulation and computer-based training, two advances he says have significantly improved training. The school he was running in 2009 even stopped holding ground schools because of what he characterizes as excellent computer-based training software. They used the Cessna course, which is one of dozens now available to students, many of whom are learning when and where they want on mobile devices.

Of all the training evolutions, simulation probably is the biggest leap forward. The promise it holds is one of more efficiency, more students per instructor, elangeneerig mitt verset verse on binswer. Enimen toester sich bestruktundet verstering

and less expensive pilot certificates. These transformations have been painfully slow. The Link trainer was used in pilot training during World War II, and general aviation simulators have been around for 30 years. Recent increases in computing power and displays have made them increasingly realistic for a lower cost. Today a school may own a simulator, but it's likely only a small part of an official syllabus, and its use is restricted mainly to instrument training.

Rovner's experience is typical. She used a simulator in her training, and continues to do so with her students. But far from simulator-led training and an ability to take on more students, she says simulators have limitations and the amount of simulator time the FAA allows to be credited toward private and instrument certificates is appropriate. "It still has to happen in the airplane," she says. b-Instructor Wally Funk

Funk doesn't use simulation. "I'm from the old school," she says.

But to hear her describe her teaching method of repetition, proper airplane control before instrument training, and complete pre- and postflight briefings, the old school sounds an awful lot like the new school. It should then come as no surprise that she continues to solo students in fewer than 10 hours.

When Wolfgang Langewiesche's Stick and Rudder was published in 1944 it immediately became the standard text on the fundamentals of flying. It remains a best seller, and most of the respected materials produced today echo its concepts, if not the nowhomey language. The song remains the same, and so too does the way we teach it. AOPA

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What 2

A dystopian vision-general aviation without AOPA

BY THOMAS A. HORNE ILLUSTRATION BY ALEX WILLIAMSON

IN 1969. there was a humorous short cartoon—very short—titled "Bambi Meets Godzilla." In it, a tiny Bambi is mashed flat under Godzilla's huge reptilian foot. This more or less represents the essence of the relationship between general aviation and governments—as well as their regulatory bodies. Over the 75 years since AOPA's founding, its principal goal has been to prevent GA from suffering a fate analogous to Bambi's. Yes, AOPA's charter gives the association three main goals: to make flying easier, safer, and more fun. But without effective advocacy in the federal, state, local, and regulatory arenas, none of that could ever happen.



AOPA was fortunate to have been founded by a group of Philadelphia lawyers and industrialists who were as committed to flying as they were to defending GA interests. By early 1939, it was clear that airline and military aviation lobbyists were winning out over private-airplane interests. AOPA's six founders knew that general aviation needed a single, strong voice to ensure its future. Consequently, AOPA put a high priority on political work from day one. In this it was alone among other organizations purporting to represent general aviation interests.

So what would general aviation be like without AOPA's influence?

AOPA's first success came with the passage of the Civilian Pilot Training Program (CPTP)—a federal program that let thousands of new pilots earn their wings with help of a subsidy. These pilots would later serve in World War II, and continue flying—in general aviation airplanes—long after the war. AOPA secured passage of the Senate bill clinching the CPTP by the painstaking art of Congressional persuasion and consensus-building. It's work that



takes time, patience, and tactful behindthe-scenes arm-bending. And it continues to this day. Without the CPTP effort, general aviation wouldn't have registered on the federal government's radar. And a generation's worth of pilots never would have begun.

In the prewar days other initiatives broke new ground. AOPA began to **BACK IN THE LATE 1940S,** radio communications were not nearly as mandatory as they are in today's complicated airspace. When the government tried to force general aviation pilots into purchasing the heavy, tube-laden radios of the day, AOPA attempted to impart some common sense into the debate. The cartoon makes the point—although today it seems ultra-reactionary in view of more modern communications requirements.

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IN THIS 1947 cartoon that appeared in an "AOPA Pilot" insert in *Flying* magazine, AOPA is shown warning of a wave of new rules from the then-new Provisional International Civil Aviation Organization. Meanwhile, the Civil Aeronautics Authority (CAA, the FAA's forerunner) is lying down on the job, even though one of its ostensible goals is to promote aviation.

exert pressure on manufacturers and the National Advisory Council for Aeronautics (NASA's predecessor) to standardize instrument panel design, and build aircraft with safety in mind. Without this initiative, it's doubtful that stall-resistant designs like the Ercoupe would have come about.

After World War II broke out, the federal government sought to ban *all* general aviation flying, everywhere in the United States. AOPA responded by using its newly founded Air Guard units to register GA pilots and issue them identification papers. Once registered, pilots could fly everywhere but the coastal air defense areas. Thus began a tradition of AOPA cooperating with national security guidelines without sacrificing general aviation's right to fly.

After the war, an avionics revolution began with introduction of VOR and ILS navigation equipment and procedures. Without AOPA's educational mailings to members, it's doubtful that the switch to this then-radical form of navigation would have been as smooth. At the same time, AOPA argued that the old low-frequency radio range navigation stations be phased out gradually so that pilots could become more accustomed to the new VHF-based technology. The government wanted to ditch the radio ranges abruptly. Sound like today's switch from VOR/ILS navigation to a system based on GPS alone?

By the way, in 1955 the government proposed ditching VORs and ILSs in favor

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of a UHF-based system of TACANs (tactical air navigation systems) pushed by the military. If it got its way, VORs would have been decommissioned by 1965. But AOPA championed a winning alternative: collocating certain existing VORs with TACAN in a network of VORTACs.

With the debut of the Air Safety Foundation (known today as the Air Safety Institute) in 1950, training programs escalated. The "180-degree" and "360-degree" courses, designed to help noninstrumentrated pilots safely exit clouds, became popular—and saved lives. ASI continues this work today, with its many online courses and videos. The ASI also began its popular Flight Instructor Refresher Courses (FIRCs), which empowered the organization to recertify flight instructors by taking a three-day course; later, the course was shortened to two days.

In 1952, AOPA came up with the idea for a common radio frequency pilots could use to share airport and weather information. No such capability had existed, but government and industry agreed it was a good idea, so AOPA's "universal communications" frequency (quickly dubbed "unicom") came alive. Where would we be

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today if nontowered airports didn't have unicoms on which to announce our positions and intentions?

Until AOPA initiated informationsharing meetings with President John F. Kennedy's newly appointed FAA administrator, Najeeb Halaby, there was no way for pilots to appeal charges of violating the federal aviation regulations. The administrator acted as judge and jury, with no questions asked. It was AOPA, drawing on support cultivated from sympathetic senators and representatives in the late 1950s, which was instrumental in ensuring a pilot's right to question his questioners.

When Terminal Control Areas (TCAs, now known as Class B airspace) went into effect in late 1969, it was the culmination of more than 10 years of governmental efforts aimed at keeping general aviation aircraft flying under visual flight rules (VFR) away from high-density traffic. But AOPA succeeded in establishing VFR transition, climb, and descent corridors at some locations.

Confusion surrounding the nature and terminology used in an approach clearance became an issue after the 1974 crash of a TWA airliner flying into the Washington-Dulles International Airport. AOPA asked for a pilot/controller glossary so that future misunderstandings could be avoided. The request was granted.

Other initiatives were equally successful, thanks to AOPA. Fees for pilot examinations and certificates were dropped from consideration. National Ocean Survey approach chart binders were scrapped in favor of disposable, bound volumes. Flight Watch services were brought to the eastern United States. Money in the Airport and Airways Trust Fund was spent on developing America's aviation infrastructure, and not on the FAA's day-to-day expenses.

A plan to expand the number of TCAs to 65 was rejected after a midair collision between an airliner and a Cessna 172 (the airliner was at fault, and both airplanes were within a TCA) near San Diego caused near hysteria about small airplanes flying in busy airspace. The epithet "If you ride a bicycle, don't drive on the beltway" increasingly summed up public attitudes toward general aviation. A bill supported by one congressman even proposed shooting down general aviation airplanes entering the United States from the Bahamas, on the pretext that they might be importing illegal drugs. AOPA was instrumental in nixing it.

Citing high product liability insurance premiums, general aviation manufacturing took a nosedive in the 1980s. AOPA and its industry allies pushed through reforms that in 1994 set a statute of limitations on product liability lawsuits. The production lines went back into action.

The terrorist attacks of September 11, 2001, renewed AOPA's role as pilot educator. In the months after the attacks, the organization worked hard to provide accurate, timely information on temporary flight restrictions (TFRs), intercept procedures, and notams affecting national security. In many cases, the information was presented more coherently than that issued by the FAA. Today, TFR information is emailed to members in the surrounding area as they are posted.

Efforts to reverse the decline in the pilot population have been another AOPA hallmark. Numerous programs designed to boost pilot-training activity, draw younger pilots into the fold—and prevent current pilots from dropping out—have been launched. AOPA has also backed the Light Sport aircraft industry's efforts in appealing to new pilots, and retaining the existing pilot base through simpler designs. Another, recent effort is AOPA's argument to allow more pilots to use driver's licenses in place of medical certificates, in essence self-certifying themselves in much the same way that glider and balloon pilots always have.

AOPA also has been successful in repeatedly blunting the federal government's ongoing initiatives to impose user fees. Preserving the existing funding mechanism—aviation fuel taxes—is the most efficient and fairest way to move forward.

All of the above are just a few of the ways that AOPA has made a difference over the years. So where would we be if AOPA hadn't emerged on the scene in 1939?

There would be fewer pilots than there already are; restricted—or no—access to Class B airspace; more Class B airspace; no unified, powerful influence in Congress or before the FAA, various levels of government, and other regulatory bodies; no unicoms; no ASI educational programs and courses; no ability to appeal FAA enforcement actions; no legal plans tailored for pilots; no medical staff providing expert advice to pilots; an already-diminished general aviation industry diminished even further by lawsuits; no unified international representation; fees for airman certificates and medical exams; and user fees for filing flight plans, using navaids, landings, and who knows what else. Oh, and for that matter, no AOPA Pilot, ePilot, or AOPA Live This Week.

Over the years there have been those inclined to disparage AOPA, for whatever reason. But critics should bear in mind that when it comes to advocacy for general aviation pilots and their interests, AOPA is, bar none, the most effective force. Who else has a full-time staff of 200? Who else has the membership numbers and lobbying savvy to effect change in our favor? Where else can you go for expert advice, just by picking up the phone or emailing? It takes more than a website or raw opinion to get things done in the venues that matter. AOPA knew this from day one, and we've all benefitted-even those who aren't members. AOPA

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How, flyin

What will the next 75 years bring?

BY ALTON K. MARSH ILLUSTRATION BY TOM WHALEN

GENERAL AVIATION'S FUTURE depends on dealing with higher costs and on making do with less, says industry analyst Richard Aboulafia. Either the industry sinks under the weight of current issues—including rising fuel prices, user fees, or more expensive airplanes—or technology comes to the rescue. Let's root for technological optimists.



"For general aviation in 2089 you'd have to be a technological optimist-you just have to-because of all of these pressures," he said. "That means advanced propulsion is going to allow us to make do with less; greater autonomy is going to allow us to do more with less; greater materials choices in the fabrication of airframes is going to allow us to make do with less; more efficient air traffic management and airport procedures are going to allow us to do more with less room; more efficient flying procedures are going to allow us to make do with less. It's all about making do with less. So much of that comes down to technology."

You hopefully end up with a future that is "good enough," but perhaps not one featured in "The Jetsons" cartoons of the 1960s and 1980s. "Technological futurism that borders on utopia almost never works out," Aboulafia said. "Usually we find a way to make do, muddle through, and live in a pretty good world. On the other hand, the whole Amazon octocopter thing [a proposal to deliver packages by drone]—you can go too far with the optimism," he said.

John Hansman, a professor of aeronautics and astronautics at MIT, estimates the Amazon shipping cost by drone to be \$100 to \$200. The FAA currently estimates that as many as 7,500 small commercial drones may be in use by 2018, assuming the necessary regulations are in place. The number may be updated when the agency publishes the proposed rule on small unmanned aircraft systems later this year.

66 The future of aviation, literally carrying people about—whether flying themselves or somebody flying them—is safe, secure, and growing. 99

–Joe Hepburn, senior vice president Customer Support, Cessna Aircraft

Pursuing the \$10,000 hamburger Humorous looks ahead

AOPA members were asked in the "I Was Wondering" forum on AOPA.org for predictions on general aviation in 2089. Here's a sampling.

• "GA pilots will be pursuing their \$10,000 hamburger at a space station orbiting Earth, eating it at a café with antique memorabilia consistent with 2050 architecture and decorations, arguing about how great America was back in the 2000s."

"A Google Skyhawk will be priced at \$4.5 million (fully equipped)."
"I predict the weak satellite signals/solar flares/whiz kids jamming problems will have made GPS so unreliable as to be next to useless, and the FAA having decommissioned all the NDBs, VORs and ILSs [navigation systems]—we'll be back to navigating by tuning the ADF [automatic direction finder] to commercial AM broadcast stations. The AOPA Forum will be full of discussions about navigating via 'rock' versus 'country."

• "General aviation will still exist but it will be called 'The People's Aviation.' We will all be speaking Chinese. And Bitcoins [a payment network for people-to-people transactions] will be the monetary exchange. But don't include me in the 'we' since I will be taken to Sirius B [brightest star in the night sky] and I'll be 147 years old and still winning racquetball games (Sirius B folks are a lot slower)."

 "Millions of Americans will download designs for roadable aircraft and print them at their local fab [fabrication] labs from spider silk and glue. They will take off and land on designated lanes of public roads and commute to work and recreational destinations. They will be battery powered, charged with electricity from small thorium reactors. Internet-connected avionics will provide automated trafficavoidance guidance with 100-meter separation minimums for personal aircraft." -AKM

66 Really getting way out there, automation may be the **ultimate** revolution for small aircraft. Systems will become robust enough over the next **75 years** that you will not need to be a pilot to fly; i.e., the plane will truly fly itself from takeoff to landing. This will remove a barrier for all that have the money. **99**

> -Rhett Ross, president of Continental Motors

Under the "good enough" view, newly built airplanes look much the same as in 2014. "The airplanes from a configuration standpoint will be not as different as you might expect," said Hansman. "It will be standard to have airplanes built out of composites. The planforms will be things that would be recognizable today. They won't be that radically different. The cockpit and avionics are where they will be much more radically different."

AVIONICS

A majority of those interviewed agree that avionics will provide the greatest advances. Aviation analyst Brian Foley describes the cockpit of the future this way: "The flight plan will be shared directly between the airplane and air traffic control in real time. Guidance for startup, taxi, and takeoff will initiate from this information. A master air traffic computer will communicate with each aircraft to optimize flights and provide separation and weather avoidance. Synthetic vision will advance to allow the pilot to look out the window and see outside as if it were a clear day, even at night or in weather-analogous to the projected window views in today's simulators. These advances will improve safety and allow an increase in total movements through precise timing of takeoffs and landings and reduction in separation minimums."

"There's going to be a very, very brilliant co-pilot with access to all kinds of information," said aviation futurist and AOPA "Opinion Leader" blogger John Petersen. "Even aircraft skin will have processors sensing temperatures, wing loading, whatever, and feeding it to the pilot."

Tyson Weihs, CEO and cofounder of ForeFlight, agrees. "Computers get more powerful, go into more places, and get smaller and lighter. That means that computing power is distributed throughout the aircraft. Everything gets smarter. The amount of computing horsepower you can put into materials gets to be interesting. The material actually comes alive.

"If past trends [are an indicator], communication gets faster and faster and applications tend to consume it all. That means aircraft in the future will be really chatty. What you may see is much less pilot-to-national-airspace communication. The aircraft becomes aware and the

66 I will give you one prediction that you can count on. You will see a little floatplane that is not compromised as a floatplane but has the range and speed of a landplane and can operate off heavier seas. It can take off on water, land on snow or grass, and go back to water with no modifications. It will happen reasonably soon, even though you can prove it's impossible by looking at every light seaplane. 99

-Burt Rutan, founder of Scaled Composites, speaking about his new project SkiGull

Helping modernize the fleet AOPA has upgraded 16 giveaway airplanes

AOPA sweepstakes projects have contributed 18 airplanes to the GA fleet since 1993, when the Good as New Cessna 172 was brought back to life. Most were upgrades to tired birds, but a few were new. We're very proud of Good as New, since it has taught thousands to fly at Dean International on the Kendall-Tamiami Executive Airport in south Miami.

Those refurbished ended up safer, more useful—and, in many cases, faster—than their original selves. They were improved to present-day standards, which for the past six years has meant glass cockpits. Good as New still has analog instruments that were the best of the day in 1993. One, a pristine Waco biplane that was our Centennial of Flight contribution, became a work of art at Rare Aircraft with modern avionics for safety.

In a moment of brilliance, Air Mod of Batavia, Ohio-which has done many of our sweeps airplanes' interiors, including today's "The Debonair Sweepstakes"added a bed to the interior of a Cessna 206 (the Aero SUV Sweepstakes in 1999) that later went to famous actor Edward Norton. It had what we called "the very latest in avionics," which turned out to be a Garmin GNS 430 nav/ com. We said it earned "oohs and ahhs," and we called our installation "extravagant" because it had two 430s

New airplanes also have been awarded, like the Aviat Husky that was factory new when a tornado flipped it during a Sun 'n Fun show in Lakeland, Florida. It was restored to its factory-new condition. A Remos light sport aircraft also was factory new. Overall, the case could be made that general aviation is stronger in many ways thanks to past and present Sweepstakes programs. —AKM 66 It's a pretty dismal state right now for general aviation. Fuel used to be two bucks a gallon or less and now it's six or more. It's not a good scene. 99

> –Lance Neibauer, designer of the Lancair line of aircraft

aircraft and system sort of operate in a unified manner. There's no more tuning of radios. There's no more programming of clearances into an avionics system. All of that is preformulated and updated as you fly. That doesn't mean humans are out of the loop. There will be much less human in the loop." Pilots will do little but monitor the airplane's decisions.

"I think there will be a whole segment of aviation that is done by autonomous airplanes," said Joe Hepburn, senior vice president for customer support at Cessna Aircraft. "There is a huge use for autonomous products that serve a specific niche function, whether you want to talk about border patrol, real estate, or communications."

John Uczekaj, Aspen Avionics president and CEO, has introduced a product called Connected Panel, linking a pilot's smart devices with the avionics panel to enter and synchronize flight plans. "One day a guy flying a 172 will have interconnectivity similar to the iPhone. In an airplane environment that's a major step," he said. A well connected airplane can learn where the bad weather is and divert by itself, or discover delays at the airport ahead and fit the aircraft into the flow that air traffic control needs. He predicted that the projection of synthetic vision on the windscreen, mentioned above by Foley, is "right around the corner."

PROPULSION AND FUEL

MIT's Hansman was asked to describe what he might see during a visit to the local

6 Personal-use two-place aircraft will look more like the JetSONS and less like Lindbergh with vertical takeoff electric aircraft powered by tiny antimatter drives, landing right at home. I personally would want a solar-powered carbon nanotube structured bird suit for soaring and augmented exercise.

> —Tom Peghiny, Flight Design USA

airport in 2089. "There are some things you are not seeing," he said. "You are not seeing leaded fuel. That's long gone.

"We have the leaded fuel challenge that as far as I know there is no easy way around. The issues are real. There is no alternative to these high-compression engines. Once we pull the trigger to the next generation of airplanes, you can go to diesel. We definitely will see diesels in the future."

Agreeing with that is Rhett Ross of Chinese-owned Continental Motors, a company that is counting heavily on the diesel-engine market in the future. "The international small aircraft market is going to go through a renaissance as places like Africa, China, South America, Pacific Rim, and eventually, India embrace the benefits of small aircraft," Ross said. "This will be facilitated by adoption of a common fuel [Jet-A/diesel] with large aircraft. The primary reason for a single fuel is logistics and economics more than anything else. I believe that this market will rival the North American and European markets in their heyday. They may not get us back to 10,000 units plus in small aircraft production, but they will certainly drive us north of 5,000 per annum."

He is not as optimistic about hybrid electric aircraft. "Hybrid will occur in aircraft," Ross aid. "It will not really become truly viable as a passenger-carrying, longhaul option until the ultracapacitor or similar higher-power-density device can be mated with a fuel-based engine. The laws of physics still apply. Batteries will not be light enough or stable enough, based on my understanding of this industry, to meet the weight restrictions of aircraft."

Analyst Foley offers this view of future propulsion: "New piston aircraft will have moved towards purpose-designed aerodiesel engines which are more efficient, don't need leaded gasoline, and have a friendlier carbon footprint. By the time 75 years roll around, advances in technology could make diesel-electric or hydrogen hybrid engines a reality."

"While in the United States 100 low lead is still widely available and has a terrific distribution chain, the rest of the world is taking us to a place where Jet-A is the preferred answer," said Cessna's Hepburn. He's not expecting electric airplanes to be developed by 2089. "Electrical propulsion is always interesting to talk about, but as we all know, battery management for all the little devices we carry becomes kind of onerous—and it's really tough to stop and plug in."

66 China, India, Korea, Brazil, Africa...all the things you see in terms of degradation of aviation in the United States are actually primed for growth in other countries, partly because they don't have it. That is where the biggest change is going to be. **99**

> –John Hansman, MIT professor of aeronautics and astronautics

66 Flying will still be fun, still a **unique** way to look at the world. **99**

–Tyson Weihs, CEO and cofounder, ForeFlight

None of the above sounds good for the future of all-electric aircraft, but futurist Petersen strongly believes a company called Volta Volaré has the greatest chance for success. "By the end of this next year you'll have a four-place electric airplane that has 1,000-mile range and flies at 170 knots and will recharge in 15 minutes. Charging stations will be added to FBOs," Petersen said.

Paul Peterson (similar last name but a different spelling) of Volta Volaré confirmed the information and said the company—which specializes in battery and energy management technology, and just happens to have an aircraft factory—is test flying such an aircraft.

Futurist Petersen didn't stop there, having once worked with a company developing levitation using gyroscopes (the attempt, ultimately, didn't fly). "There are at least four companies working on levitation and antigravity. It's inevitable that it's going to happen. Airplanes won't even look like airplanes anymore," he said.

Tom Peghiny, a founder of the Light Sport aircraft (LSA) industry and a dealer for its top-selling model, Flight Design, predicts that two-seat Light Sport aircraft—already known for technological innovation—may one day use electric propulsion. "The current LSA fleet might exist in a similar fashion to how we have Pietenpol Aircampers [designed in 1932] and OX-5-powered biplanes [1917], either converted over to electric powerplants or special-use waivers running on biofuel with double carbon credits."

FLYING CARS

For years flying cars have captured the imagination of the press and the public. By

2089 they could be common, right? There's a bit of disagreement on that.

A Boeing official said he can't imagine there will not be flying cars by 2089, and in a lot less time than 75 years. Flying cars will be available as a niche market for the general public, the way \$70,000 Tesla electric cars are available today, in 20 to 25 years, said 25-year Boeing technical analyst Jake Schultz. All the current efforts to get a flying car to market, even unsuccessful ones, are steps along the way, he added. For those with long commutes and the financial means, a flying car will expand life choices, he said. Schultz personally has a 34-mile commute to Boeing.

Terrafugia CEO Carl Dietrich in Woburn, Massachusetts, trained by MIT's Hansman, says it will take only two to five years before he can deliver a flying car to a customer who is either a pilot or is willing to complete pilot training—as opposed to the nonpilot general public. The company has demonstrated its Transition model in flight, but proposes a TF-X hybrid-electric flying car with intelligent systems for the future.

Disagreeing with the concept of flying cars is Continental's Ross, "I do not think that the current flying car concept makes any sense," he said. "However, I do believe that modern robotics [as seen in drones] and computing technology will result in self-driving cars. Eventually, as a better energy source is seen, I see that [form of] transportation may take to the air, but not in the way we think of it today."

Cessna's Hepburn had a similar view. "I don't believe that the convergence of winged automotive transportation and winged airplane transportation necessarily fit efficiently together in a design," he said.

There is even greater disagreement about flying cars that land vertically at your home, to the horror of your local homeowners association. "Money will still trump technology every time," said Aboulafia. "There's an awful lot that we would like as technology fans that just doesn't work out economically. Vertical takeoff and landing has been a prime example of that. It's really expensive. Going faster than 150 knots with a rotorcraft is still extremely expensive after 50 years of trying. I would bet that cost premium isn't going away. There are not going to be Jetsons flooding the highways in the sky."

CHINA

Is China going to buy America's aviation industry? It appeared so by 2014 with the purchase of Continental Motors, Cirrus, Sherpa, and Mooney. Ed Smith of the General Aviation Manufacturers Association says that isn't the case.

"I wouldn't venture a guess on what China is going to own," he said. "I know they have a very strong interest in developing an indigenous GA manufacturing industry in China. Let the market and the community develop from the ground up [in China], and that will foster its own indigenous innovation and industry. It's always difficult to transplant industries from one country to another, one culture to another." To do that, they need to buy technology from the United States.

"It's a growing market right now. Any market that's growing at double digits looks extremely attractive. You've got to remember it is growing at double digits from an extremely low base. Even the absolute numbers of planes imported are not that huge." He noted the country is rapidly building airports. As airspace restrictions drop, Chinese people may want to fly for recreation, and that will foster a general aviation industry, he said. Natural disasters have shown Chinese officials the need for helicopters.

China is seen in the future as more of a technology customer than an innovator. "We're in a race to advance technology before our problems catch up with us. They're in a race to get rich before they get old. That's a big challenge," said Aboulafia.

Obviously no one can know what breakthroughs lie ahead, only that they are rapidly accelerating. It's like asking Abraham Lincoln for a 75-year forecast that included cars, radio, television, and jet airplanes let alone biplanes—by 1940. Technology advanced more slowly then.