

For some, happiness is a homebuilt. But you need plenty of time, tenacity, and the hobbyist's temperament. Good homebuilts, say the 'pros,' cost as much as a 'storebuilt'

# The HOMEBUILDERS

by DON DOWNIE/AOPA 188441



The No. 1 Thorp T-18, built and flown by Bill Warwick, Torrance, Calif. "It sure flies nice, but it's a little like having a tiger by the tail," Warwick reportedly said after his first flight in this plane over nine years ago. The comment is credited with nicknaming the plane the T-18 "Tiger." All photos by the author, except as noted

If you're a would-be homebuilder, looking for the cheapest way to fly, get the parts from a wreck or an older, run-out airframe and rebuild it. You'll spend fewer dollars, because most parts are readily available, and you'll still receive a good education in aircraft construction. Above all, you'll get into the air a great deal sooner than you will by starting from scratch with your own homebuilt." The preceding comment, al-

most word for word, is from several of the nation's leading do-it-yourself designers.

Starting with a set of plans and constructing your very own homebuilt is fun. It's educational. But it can also be frustrating and, for many, costly. There's usually a great feeling of personal accomplishment in building your own aircraft; however, it's not going to save you any great amount of money, if

any at all, and you'll invest a great deal of time.

Building your own airplane is a complex, long-range project. If it's a family affair, the builder needs a sympathetic and understanding wife (or husband) who has long since decided to join 'em, not fight 'em. The family garage may never see an automobile again. The living room or kitchen table may be where detailed parts are planned and fabricated.

"If I were to design a plane that looked like a Cessna 150 or a Piper Cherokee, nobody would buy the plans," said veteran Lou Stolp (AOPA 11902) of Redland, Calif., who designed the "Starduster" and the "Starlet." "The man who orders a set of plans for an open-cockpit, wood, steel-tube and fabric airplane is sort of an adventurer. He probably rides a motorcycle, drives a sports car, and is a scuba diver."

"It's going to take a dedicated homebuilder at least a year to make one of my VW-powered, single-seat PL-4As," said Ladislao Pazmany, of San Diego. "If he's really dedicated, works three hours every night and all day on weekends, he may be in the air in a year. And that PL-4A is one of the simplest designs available." (FAA estimates it takes the average part-time builder about 3,000 hours, or as much as four to five years, before he gets FAA approval to fly his homebuilt.)

"Once he gets his feet wet, homebuilding can become an obsession," explained John Thorp (AOPA 22461), who has been designing homebuilts almost all

EDITOR'S NOTE: FAA recently reported that FAA-certificated homebuilts in the United States now number about 3,600 aircraft, or approximately 2½% of general aviation's total fleet of around 140,000 aircraft. The agency also estimated there are approximately 10,000 pilots—a little more than 1% of the total pilot population of about 800,000—who are now working on homebuilts. The figures indicate, FAA said, that many more homebuilt projects are started than are ever completed. While PILOT Western Editor Don Downie has never built his own airplane (except for a hang glider during high school), he has worked closely with many of the veteran builders and homebuilt designers on the West Coast. His accompanying report is, he says, "one reporter's opinion of the homebuilders today." Because of space limitations, only a very few of the many homebuilt designs are mentioned in the report. On the com-

parative safety of homebuilts certificated by FAA, agency officials reported that National Transportation Safety Board statistics on amateur-built aircraft for 1970 show 13 pilot fatalities in a total of 85 accidents in homebuilt planes. "This is equivalent to one pilot fatality for every 270 aircraft," FAA said, "which is comparable to the figures for all general aviation (about one pilot fatality for each 230 aircraft)." In referring to the comparative safety between homebuilts and "storebuilts," FAA points out: "There are some differences in the handling of amateur-built planes . . . They are generally small planes, the wing loading is high, and thus they do not have the stability of larger planes. Getting used to an inherently unstable aircraft takes practice." Summarizing its appraisal, FAA said, "All in all, the homebuilt aircraft seems to be just about as safe an airplane as its builder is a patient craftsman and careful pilot."

his life. "It's a creation where the builder is completely involved, and the whole operation has great therapeutic value."

Homebuilts come in all shapes and sizes, various complexities, and unique construction techniques. Volmer Jensen, Burbank, Calif., built his two-place "Sportsman" amphibian in 1957. Since then he has sold more than 700 sets of plans (\$125 per set) and reports that more than 70 units are flying. [See Jan. 1963 *PILOT* cover.] Jensen has cut builder time and cost by designing his amphibian to use a standard Aeronca Champion or Aeronca Chief wing. When he built his prototype, he was able to buy a set of used wings for \$300, but this supply has just about vanished. Wings can be purchased new from the Bellanca Aircraft Corporation's Champion factory.

Jensen has more than 1,500 hours on his own "Sportsman" (five times around the world) with nothing more than routine maintenance and two engine changes. Purchasers of his plans (250 square feet of blueprints and 80 photographs) are required to sign an agreement (not always followed) that \$125 for the plans is "for the right to manufacture one and only one amphibian airplane."

Like almost all other designers, Jensen has a single plea. "Please follow the plans!" he says almost automatically as he picks up the phone. "I get phone calls from all over the world asking about changes in construction. I tell everyone who calls that if he changes anything in the basic design, he may as well scrap the project and design a whole new machine on his own."

Jensen built his first hang glider in 1925 and added one new glider each year for nine successive years. Last year he built a 100-pound, 32-foot-span, two-control hang glider with engineering help from Irv Culver (AOPA 117226). Plans are also available for this relatively simple machine, which Jensen recommends as a good "starter kit" for the newcomer to the homebuilders' ranks. Jensen recently remained aloft for 42 minutes, in a 17-mph wind, on

a ridge that was just two feet higher than the span of the glider. (I've flown it to perhaps 15 feet. It's fun!)

John Thorp, among other projects, designed the "Little Dipper" for Lockheed. That plane almost became "everyman's infantry airplane" during World War II.

Thorp's FAA-licensed "Sky Scooter" hit the market just as surplus World War II military aircraft flooded the market at giveaway prices. During the Korean War, he developed a single-seat, armed lightplane, the FD-25, for Fletcher Aviation Corporation. [The author was test and demonstration pilot for this Army ground-support fighter for nearly two years.—Ed.] Thorp was also preliminary engineer for the original Piper Cherokee, which still bears more than a passing resemblance to the "Sky Scooter."

But Thorp's most popular design is his T-18 "Tiger" (the "18" is for his 18th basic aircraft design). This two-place, side-by-side sportplane earned its nickname when the first builder, Bill Warwick, of Torrance, Calif., climbed out after his first flight and commented, "It sure flies nice, but it's a little like having a tiger by the tail."

Over nine years and 900 hours later, Warwick still flies the same T-18, only now he has a multihued, oversized tiger painted on both sides of the fuselage.

I've flown a number of versions of the T-18, including Warwick's, Thorp's own ship, and one completed by airline pilot Gene Eckels, who installed a 180-hp Lycoming and a controllable prop. Eckels is getting more than 200 mph out of his T-18. Several years ago, I checked out Rudy Adler (AOPA 425864) in his 125-hp GPU (ground power unit) T-18. Both Adler and I are 6 feet 2 inches and not as lean as we once were, yet we can cruise his ship at 160 mph. The "Tiger" is a sensitive, spirited little bird with just 9 feet 8 inches of wing (20-foot-10-inch span) hanging out each side of the fuselage.

Nine hundred sets of T-18 plans have been sold, and there are just over 100 of these planes in the air. Thorp is reluctantly going into the parts business,

since FAA regulations permit prefabrication of complex parts beyond "the equipment and skills . . . normally possessed by the amateur." He's building complete T-18 cowlings that sell for \$495; however, he says, "It's almost all handwork, and it's going to take a long time to get the tooling investment back. We're considering using templates to scribe sheet aluminum for all the flat metal parts, then rolling them up and sending them out to the builder for cutting and drilling. That way we wouldn't do anything but mark the metal.

"The trend toward supplying hard-to-build parts will produce a higher completion ratio of plans to flying aircraft," continued Thorp. "One of the many advantages of homebuilding is purely economic. The builder doesn't have to put out a large amount of money, at least not all at once. He can purchase plans and a 'starter kit,' then add components as time and money permit." (FAA estimates the average homebuilder buys anywhere from \$2,000 to \$3,000 worth of supplies and equipment.)

One of the most colorful homebuilt designers is 76-year-young P. H. Spencer (AOPA 129012), "father" of the Republic "Seabee." Spencer has been active in aviation since 1913 when he soloed a hydro glider. A year later he completed a partially built, 50-hp Curtiss-type flying boat and soloed that. "I flew five miles down the river with the Curtiss shoulder yoke control." He designed the "Seabee" and sold it to Republic shortly before the beginning of World War II. With the project shelved "for the duration," "Spence" became a factory test pilot on P-43s and P-47s. He remained with Republic after World War II until the "Seabee" project was safely on its way (1,250 were built), and then he

*Ultralight 108-pound "Whing Ding," developed by Lockheed engineer Robert Hovey, Newhall, Calif. The aircraft is powered by a 13-to-15-hp McCulloch chain saw. Wingspan is 17 feet. The designer, says author, "suggested this not be flown at an altitude higher than you wish to fall." Photo courtesy of designer*



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"retired" to Florida in 1947. But he didn't stay retired for long.

He flew a Fairchild 91 for over a year, serving as personal pilot for Juan Trippe of Pan American Airways. (Only nine of these 12-passenger amphibians were built.) More than 25% of Spencer's 5,000-hours-plus has been in water birds, and this penchant for the pontoons and amphibians drew him into the homebuilt ranks.

Aided by Col. Dale L. Anderson, a Sepulveda (Calif.) Junior High School math teacher, Spencer built the prototype "Amphibian Air Car" in 18½ months in a two-car garage. His brochure on the aircraft reports use of "only the usual hobby-shop machine tools, with the exception of certain parts of the landing gear. Cost of construction was \$4,700, less engine, propeller, instruments, and radios. Completed cost was \$8,700, which included a low-time, 180-hp O-360 Lycoming."

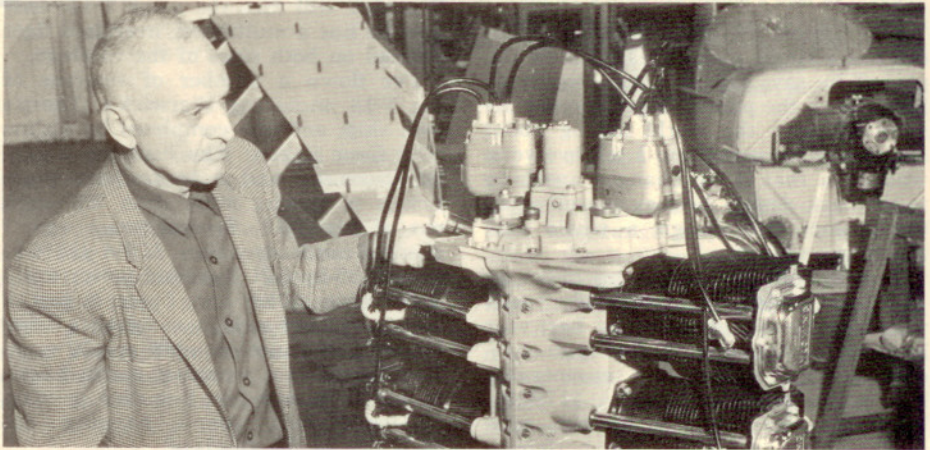
In the past 2½ years, Spencer has sold 75 sets of plans (\$185 each) for the Air Car. Molded fiber-glass parts, complex metal assemblies for the gear, and steel-tube car frame are available to builders on a "prefab" basis. Engines, including the new Teledyne Continental Tiara, are available to Air Car builders, at substantial discounts, as are Hartzell propellers, Spencer said. He recently ordered five 300-hp Tiaras for his most active builders, plus one for himself.

"Homebuilding has made tremendous progress, despite some early objections from the FAA," Spencer stated. "Now I feel that it's a real business proposition. It's amazing to me to see the type of people who are building that Air Car of mine. They're first class, all the way. With that Tiara engine and any nav/com equipment at all, you have at least \$12,000 in an amphibian that will carry four people 'and stuff.' At least 28 of the 75 people who have my plans are 'pro' amateur builders, and have at least one previous homebuilt under their belts. We'll soon have a number of Air Cars in the air and on the water."

The business of selling plans and partial kits for homebuilts is on the increase. New designs—some complete, some still skin-and-bones (more bones than skin)—show up at fly-ins all over the country. For example, Spencer and Colonel Anderson took 21 days, late last summer, to cover 5,000 miles. They logged 57½ hours, including a visit to the EAA "spectacular" at Oshkosh, Wis., and the Abbotsford, B.C., Canadian Air Show. Demonstrations were made at South Lake Tahoe, Calif., where the density altitude was 8,400 feet. With the Air Car at 2,700 pounds gross weight and heading into a 5-mph wind, takeoffs took 21 seconds. At the conclusion of last year's sales and demonstration tour, Spencer's prototype Air Car had logged 352 hours in the air and had made two round trips across the United States. A total of 637 landings (326 on water) were made during the trip. "A



Pazmany PL-4A, with Pete Girard at the controls. A canopy was subsequently added to this homebuilt. The design has created much interest within the homebuilders' ranks. The aircraft is powered by a Volkswagen engine. Photo courtesy of designer



Veteran designer John Thorp (AOPA 22461), who has designed 18 different aircraft, explains modifications he has made on a standard Lycoming engine.

majority of the landings were on salt water, and there was no evidence of corrosion," Spencer said.

Ladislao Pazmany, an Argentinean now living in San Diego, sold 133 sets of plans for his VW-powered PL-4A single-seater during the first four months after it was announced the plans were available. Forty drawings, on 21-inch by 60-inch lithograph sheets, cost \$60. None of the plans were sold until after the aircraft had been test-flown and all the major "bugs" had been removed. Test flights without a canopy were made by former Ryan test pilot Pete Girard. Addition of a large canopy upped the rate of climb to 650 fpm and increased the cruise to 95 mph. Five "V" belts cut the 4,000 engine rpm to 1,745 propeller rpm.

More than 20 pilots flew Pazmany's PL-4A shortly after the "bugs" had been worked out. I was No. 7 on the list. One pilot took the plane to 13,000 feet. The

rate of climb continued to register at 120 fpm at this altitude, but the VW engine finally quit because it had no mixture control. It restarted easily, though, in a lower, denser atmosphere.

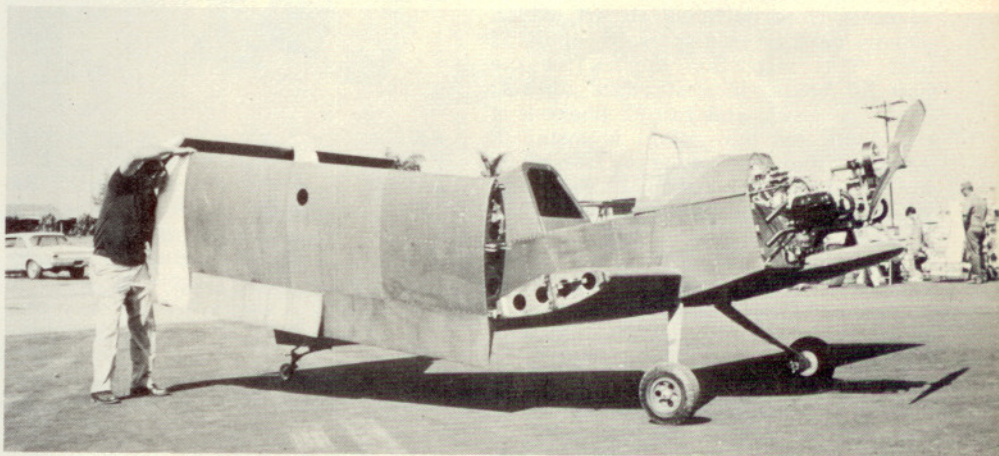
The PL-4A was designed at the request of Experimental Aircraft Association (EAA) President Paul Poberezny (AOPA 117957), who wanted "a flivver ship that could cost between \$1,000 and \$2,000. . . . One desirable feature would be to have wings that could be removed or fold easily, so that it could be kept at home. . . . I would suggest a single seat for a start and Volkswagen-powered. It should have enough wingspan to give a reasonable glide ratio, so that in the event of power failure its handling would be within the capabilities of the average pilot."

After reading *The History of British Light Aviation*, which covers the long-distance rallies between World War I and World War II, Pazmany is now



Prototype Spencer "Air Car," a four-place amphibian, takes off at Cable Airport (Cable-Claremont), Upland, Calif.

Folding-wing design of the PL-4A is demonstrated on the prototype during its construction.



proposing a homebuilt rally, perhaps with Alaska as a destination, for a start. He also said he would eventually like to see an efficiency contest flown from the United States to his homeland, Argentina.

"We have been kicking around some new names for the amateur-built program," explained EAA's Poberezny. "We feel that 'experimental' and 'amateur' are not very popular with general aviation, with the press, or even with congressmen. . . . On those aircraft that have met their 50 or 75 hours' flying requirement, along with some other simple standards, we feel they should be moved from the 'experimental' category into a new category called 'sport' or 'custom'. . . . [This] could make a difference in personal life insurance policies. Many policies carry the statement . . . that the individual is not covered while flying an 'experimental' aircraft . . . The FAA is looking very favorably on this matter."

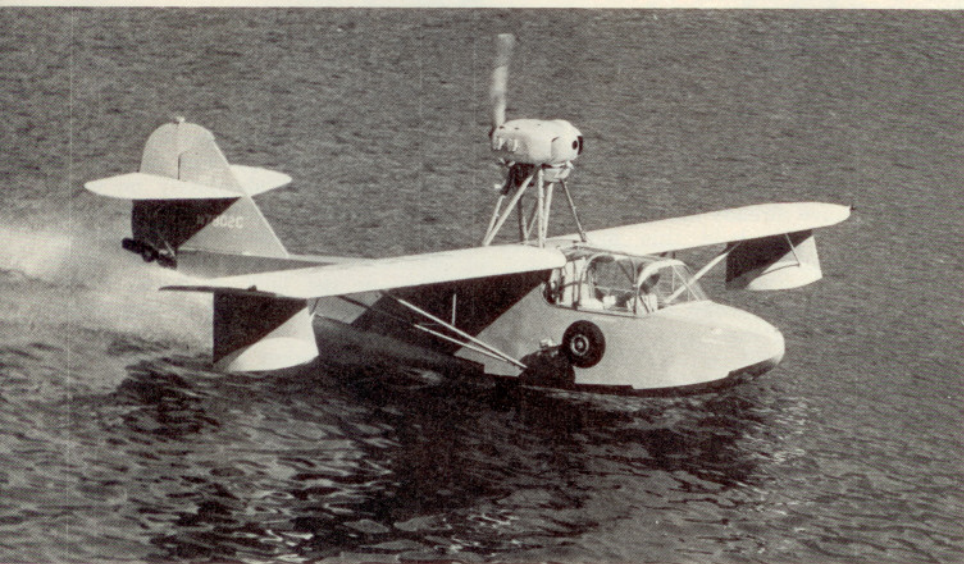
Last year, about 30 of the country's leading designers who sell plans and material for homebuilts formed the National Association of Sport Aircraft Designers (NASAD). Purpose of the

new organization is to seek compliance with self-imposed minimum requirements of excellence in the design and construction of their aircraft. Dr. Igor B. Bensen (AOPA 151081) was elected president of NASAD. He told *The PILOT* that "the establishment of NASAD standards is only the first step toward improving the image of non-type-certificated aircraft, both with the public and the FAA."

NASAD standards require that a

minimum of 150 hours be logged by the designer's prototype before Class AA (designed for the average amateur without previous experience in aircraft) plans and kits are sold to the public by any NASAD member. Another standard specifies that no drawings or informational data packages may be advertised for sale until after the prototype has logged at least five hours of prescribed flight time.

NASAD's charter members reportedly have an average of 26.4 years of experience with aircraft, and their average age is 48½. Regarding their homebuilt designs, 81% test-flew their own prototypes, and 11% sold plans for their creations before their prototypes had even flown. Of the remaining members, 56% sold plans within a year after the first flight of their aircraft, and 33% waited for more than a year. At the time NASAD was formed, 64% of the designers—nearly two-thirds—indicated they were continuing to refine their designs, while the remaining 36% had "frozen" further development. Costs of plans sold by NASAD members range from \$15 to \$150 and involve from five



The venerable "Sportsman" amphibian, whose design dates back to 1957. Seventy reportedly are now flying, and about 700 sets of plans (\$125 per set) have been sold to homebuilders. Photo courtesy of designer

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to 350 sheets of drawings. About 92% of the designers said they felt that an amateur hobbyist without previous aircraft-construction experience could build their creations, but more than half stated that some previous shop experience would be required.

The nearest FAA General Aviation District Office (GADO) or FAA Engineering and Manufacturing District Office should be notified whenever a person starts a homebuilt project. An FAA maintenance inspector must check each homebuilder's work before any sections are "closed up," and after taxi tests the FAA official must again inspect the aircraft before it attempts its maiden flight. After the first flight, the new homebuilt is restricted to a radius of 25 miles from its home airport, which usually must be in a sparsely populated area. This restriction applies for the first 50 hours, if a standard aircraft engine is used, and for 75 hours if a noncertificated powerplant is installed. After all that, the owner is free to fly his homebuilt—but not for hire—except subject to certain limitations (FAR 91.42).

Most homebuilders caution newcomers to "look before you leap." They recommend that newcomers attend a fly-in of homebuilt aircraft and talk with those who have already built their aircraft, and with the homebuilt designers in attendance. Kick a few tires, they say, and ask for the opportunity to sit in some of the single-place jobs. Perhaps talk yourself into a ride in a two-placer of your choice. Most homebuilders are justifiably proud of their creations and many are willing to demonstrate their particular aircraft to anyone who is seriously thinking of building a similar model.

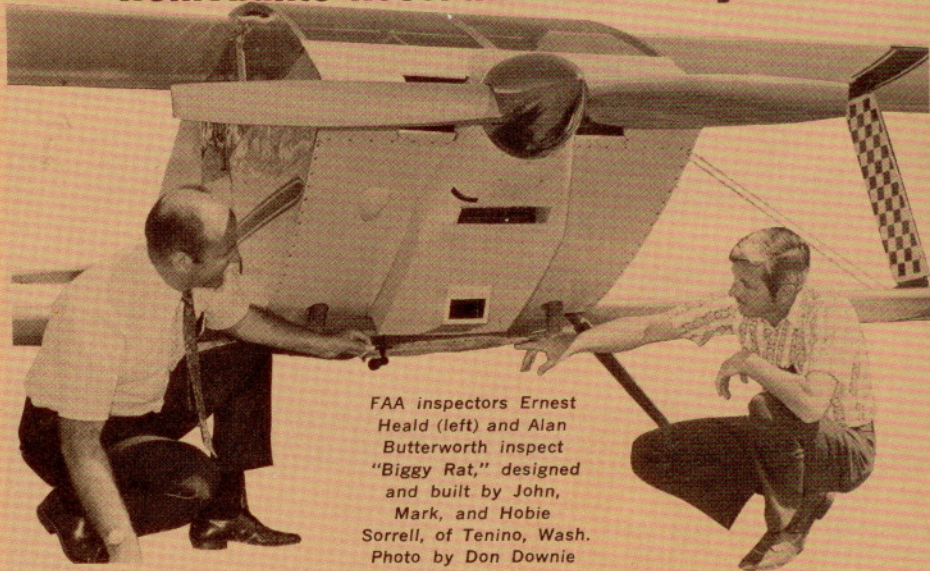
Regarding this latter point, though, Lou Stolp commented: "Many fine homebuilders spend much more of their time and energy in building than in flying. Thus, some of the immaculate homebuilts are somewhat beyond the piloting capabilities of the builder. . . . The builder of an open biplane sometimes thinks he's automatically an aerobatic pilot, and usually he isn't."

According to FAA, "Building an aircraft from scratch is probably one of the most demanding tasks any human being can set out upon."

There's little question but what you have to have plenty of both spare time and sustained enthusiasm. "And don't forget," cautions John Thorp, "that the cost of a good homebuilt is about the same as a 'storebuilt' with the same type of engine."

All these factors should be carefully studied, weighed, and faced before you embark upon a homebuilt project. But if you have the available time, the temperament, the tenacity, and the treasury notes, there's a good chance that you too might someday stand next to a winged steed bearing the proud label "Flown and built by. . . ." □

## Homebuilts Recertificated At Fly-Ins



FAA inspectors Ernest Heald (left) and Alan Butterworth inspect "Biggy Rat," designed and built by John, Mark, and Hobie Sorrell, of Tenino, Wash. Photo by Don Downie

■ Each year, homebuilt aircraft must have a visual inspection by an FAA GADO (General Aviation District Office) maintenance inspector for recertification. "Storebought" aircraft can be inspected and certificated by a non-FAA designee.

Inspecting homebuilts one at a time for recertification is a time-consuming process. Last year, 140 of the 200 homebuilts in western Washington State were inspected at five scheduled fly-ins.

"I'd estimate that we saved at least 60 man-days, or roughly \$3,800, over the previous system where an inspector has to drive or fly to an outlying field just to inspect one aircraft," explained Ernest J. Heald (AOPA 164323), principal maintenance inspector for FAA's Northwest Region. "In an effort to streamline amateur-built experimental recertification, we set up a schedule of summer weekend fly-ins, each with a rain date. Amateur builders were encouraged to fly their homebuilts to these fly-ins, which I would attend with at least one other member of our three-man maintenance staff. We'd inspect the aircraft, fill in the paperwork, and send the pilots on their merry way with new airworthiness certificates allowing them to fly their homebuilts for another year."

Four recertification fly-ins have been scheduled for Washington State in 1973. Two have already taken place; the others are to be held this month—one at Chehalis on May 12, and one at Bellingham on May 26.

On recertification day, the FAA inspectors arrive at the airport at 9 a.m. and remain until all certification activities are over.

"By having these inspections in various areas, on weekends when most private pilots are active, these recertification dates also serve as an impromptu gathering that helps promote the amateur-built movement and aviation in general," said Heald. "The program

is geared for weekend meetings so that owners won't have to take a day away from their regular jobs to be available for annual recertification."

FAA Northwest Regional Director C. B. Walk, Jr., is keeping a watchful eye on the success of the time-saving "fly-in" recertification program. It is possible that such a program may expand to a national basis as the number of man-hours required for inspections goes down.

Historically, this type of maintenance inspection program was begun by the CAA (now FAA) in the 1930s, when inspectors traveled to various airports in their assigned areas to revalidate licenses of both production aircraft and the small number of homebuilts flying at that time. Since then, the designated aircraft maintenance inspector has gone into operation, and the present system, permitting certification of production aircraft by authorized inspectors, has evolved. FAA inspection is still required, however, for annual recertification of homebuilts.

"When a man builds his own airplane, he knows much more about it than the owner of a production aircraft," said Heald. "He usually spends more time in maintenance, polishing, and general 'TLC' [tender, loving care] on his homebuilt than does the production owner. In 90 percent of our inspections, we find absolutely no problems and merely update the paperwork."

"We had no amateur-built accidents in Washington attributed to maintenance—or the lack of it—in 1972," explained Heald. "So the system seems to be working."

Northwest Region homebuilders continue to have the fun of a fly-in and the convenience of picking up their annual recertification paperwork at the same time. Other FAA regions might take a close look at the program's success, with an eye toward improving service and convenience to their "customers." —D.D.