Yesterday's Wings

The Buhl Pup

The little single-seater had rough going in the 1930s, but now holds its own in two categories: homebuilt and antique airplanes

by PETER M. BOWERS / AOPA 54408

The little Buhl Flying Bull Pup was a versatile machine. This is the second prototype on skis. The use of a registration number alone, as shown here, means that the airplane is merely identified on government records and not yet licensed.

Courtesy John Underwood

■■ While single-seaters make up the majority of the country's amateur-built (or "homebuilt") airplane population, they are rare almost to the point of nonexistence among the factory-built types. A few "pro" single-seaters have been on the market from the mid-1920s to the late 1950s, but they have mostly been the products of small firms that were not generally regarded as significant units of the established industry.

Only one major manufacturer, Buhl Aircraft of Marysville, Mich., put a single-seater on the market in significant quantity. This was the 45 h.p. Buhl *Flying Bull Pup* of 1931.

Buhl got its start in aircraft in 1925, when the Buhl Stamping Company of Detroit backed the Buhl-Verville Aircraft Company of Detroit. Chief designer was Alfred Verville, recently of the U.S. Army Air Service Engineering Division. The first product of the new company was a 200 h.p., three-seat, folding-wing biplane known as the *Airster*. While this was a somewhat more advanced design than its contemporaries, it did not achieve large-scale production. The *Airster*'s only claim to fame is that it was the first airplane to win an Approved Type Certificate (ATC) under the new airworthiness requirements of 1927. It received ATC No. 1 on March 27, 1927.

The Buhl-Verville partnership broke up when Verville left to form his own company. With Etienne Dormoy, another ex-Air Service engineer as the new designer, the aircraft company was reorganized as the Buhl Aircraft Company and moved into a new and larger factory in Marysville. From 1927 to 1930 it concentrated on a series of radial-engine cabin sesquiplanes, known as the *Airsedan*, that will be described in a later installment of this series.

By 1930, the "Lindbergh boom" had so stimulated the growth of civil aviation that major manufacturers began to expand their product lines to include low-cost lightplanes as well as the big commercial types and 90 h.p. trainers. This was made possible by the appearance of a variety of small air-cooled engines in the 30–60 h.p. range. Some of the new lightplanes were merely scaled-down versions of the bigger standard models, and their performance suffered accordingly. Others were designed with full appreciation of the problems of flight on low power, and were virtually powered gliders.

Practically all of these new industry-produced lightplanes were designed as two-seaters. This meant that most of them were pretty good little airplanes as long as only one person at a time flew in them. Dormoy, who had helped design the famous *Spad* fighters of World War I before coming to the United States in 1917 as a member of the French aviation mission, and who had a wealth of ultralight design experience on his own in the postwar years, took a different approach. He designed a sport airplane that was a single-seater to begin with. The reasoning here was that less actual airplane was needed to carry only one person. With less airplane to haul, the same standard engine used for the two-seaters would result in greatly improved performance that should appeal to the pilot who wanted a lively little airplane that he could throw around a bit.

Dormoy's new lightplane design, with a most interesting mixture of old and new structural features, was the Buhl LA-1, officially named the Buhl *Flying Bull Pup*. General aviation quickly shortened this to Buhl *Pup* or plain *Pup*.

Since the *Pup* was a wire-braced, shoulder-wing monoplane, there was a definitely ancient look about it, something like one of the old German Fokker *Eindeckers* or French Morane midwings of early World War I. This was particularly so because the streamlined landing wires were anchored to the top of a steel-tube pylon ahead of the cockpit. Since the wing attached to the fuselage right at the level of the pilot's shoulders, and the pilot was seated right between the two wing spar bulkheads for balance purposes, his downward visibility was severely limited. This deficiency was remedied by undercutting the bottom surface of the wing between the two inner ribs and the spars, and covering the upper surface in this area with clear plastic. (We'd call it plexiglass today, even though the word "Plexiglas" is the copyrighted trade name of a particular brand of plastic.)

With the cockpit right in the middle of the wing, access was a bit of a problem. This was resolved by a telescoping steel-tube step that slid out of the lower part of the fuselage behind the wing. It was spring-loaded to the "in" position and couldn't be reached from above. A *Pup* pilot debarking without assistance was expected to jump to the ground from the wing walkway.

The landing gear, which didn't really need shock absorbers after the first few production articles, thanks to the use of big, soft, 18 by 8 by 3 Goodyear Airwheels, was a tripod assembly with telescoping tubing for the shock strut and external wrappings of rubber shock cord tied around one T-tube fixed to each unit of the telescope. As originally built, none of the *Pups* had brakes. All used spring-leaf tail skids attached to a small underfin. The increasing use of paved runways and taxiways at general aviation airports soon dictated a gradual change to tailwheels. These in turn called for brakes, which were especially desirable when the tailwheels were not steerable.

The two-piece wood-frame wing, with 30-foot span, used the relatively hot NACA M-12 airfoil. Spars were solid

BUHL PUP SPECIFICATIONS AND PERFORMANCE

Span	30 ft.
Length	19 ft.
Wing area	122 sq. ft.
Powerplant	Szekely SR-3-0 45 h.p. @ 1750 r.p.m.
Empty weight	550 lbs.
Gross weight	850 lbs.
High speed	95 m.p.h.
Cruising speed	76 m.p.h.
Adv. landing speed	32 m.p.h.
Service ceiling	14,000 ft.

spruce, and the ribs were built-up wood trusses. The semicircular wingtip bows were laminated wood. The ailerons were aluminum frame skinned with flat sheet aluminum and were operated by torque tubes connected by push rods to a rocking shaft in the fuselage in the manner of the World War I French Nieuports. While the *Pup*'s aileron action wouldn't impress the pilot of a current production model, the ailerons were remarkably light compared to those of its contemporaries and were largely responsible for the *Pup*'s delightful flying characteristics.

The vertical fin was a built-up sheet-aluminum structure with aluminum skin, while the rudder and horizontal tail surfaces were welded steel-tube frames with fabric covering. The tail assembly was wire braced.

The fuselage construction was unique, and pioneered the trend of the later 1930s toward sheet-metal fuselage construction for lightplanes. Three triangular longerons, pressed from flat aluminum, ran the full length of the fuselage, with two at the top and one at the bottom. From the cockpit aft, the skin was flat-wrap aluminum sheet attached to two-piece sheet-metal formers that rounded out the cross-section. No skin went across the top longerons to close the box and make it torsionally stiff. This job was done by tubular crosspieces and diagonal brace wires. The flat-wrap metal turtledeck from cockpit to tail was removable and did not contribute to the structural integrity. This feature, too, was a carry-over from World War I design practice. It was attached to the main fuselage by small bolts through flanges. These were covered by a special stamped aluminum channel section that ran in a groove the full length of the turtledeck.

The forward portion of the fuselage reflected the Buhl Aircraft Company's association with the stamping company. The compound curve area from the cockpit to the engine mount was made up of two large aluminum stampings, one right and one left, riveted to the triangular longerons, which were also stamped into the proper curve. The engine was bolted directly to a stamped-steel bulkhead riveted to the aluminum stamping and the longeron. The two magnetos projected aft through a hole in the mounting bulkhead into an accessory compartment that was accessible through two removable panels in the formed skin.

The engine was the three-cylinder, 45 h.p. Szekely SR-3-0 (for overhead valves) radial. (Because of the spelling, this has been pronounced in all sorts of ways over the years. The engine was named for its Hungarian designer, O. A. Szekely, and is correctly pronounced "Say-kai," according to a member of the family.) In time, this engine proved to be somewhat of a handicap to the *Pup* and such contemporary designs as used it. In addition to having some unconventional mechanical features that contributed to maintenance problems, the cast-iron cylinders of the SR-3 had a tendency to crack around the mounting flanges. This led to a government bulletin calling for a system of steel cables and turnbuckles connecting the three cylinders by means of the heads, to keep them in place until the plane could land after a crack developed.

While the *Pup* was no fighter, it was

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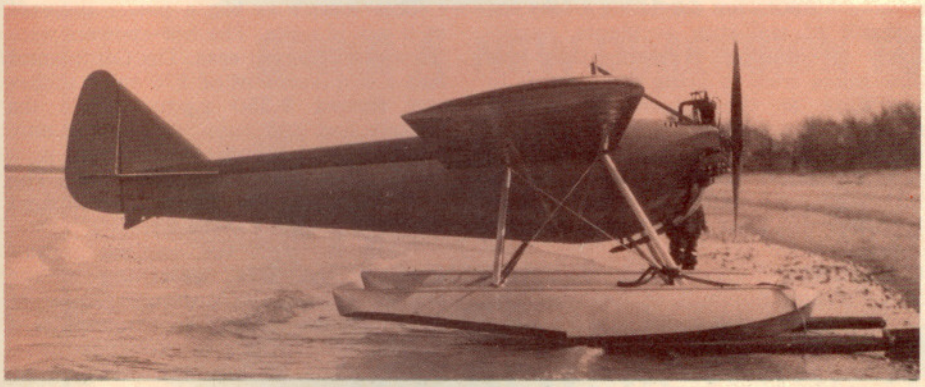

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1. The Pups could be licensed on floats, but the modification was not popular. The pilot operating alone must have had a terrific problem in standing on the right float to prop the engine from behind and then working his way aft to the cockpit step on the left side of the fuselage behind the wing.
Courtesy John Underwood

2. Underside view of a standard Pup, showing the windows in the wing roots and the Goodyear Airwheels. Deleting the sheet-metal fairings around the engine crankcase was common practice. Note the old-fashioned vane-type airspeed indicator over the right wing.
Photo by Gordon S. Williams

3. A modernized Pup with 65 h.p. Continental A65 engine replacing the original Szekely. Other improvements include steerable tailwheel and 8 by 4 wheels, with hydraulic brakes, from a Piper Cub. This one has pitot-static tube for airspeed indicator sticking out of the left wing.
Photo by Peter M. Bowers

4. The author in a Continental-powered Pup, January 1970. Note that the pitot mast on this one is on the pylon and projects above the propeller arc. The author and a partner have owned an unmodified Pup since 1950, but have only recently acquired a complete Szekely engine for it. *Photo by David R. Bowers*

frisky and light on the controls for only 45 h.p. Aerobatic capability was not equal to that of today's single-seaters, mainly because of the low power, but it was terrific for its day. Still, it was not so small that it landed like a hot rock. For those who wanted a still livelier ship, shorter wings with a span of 28 feet were available. With such wings, the *Pup* became Model LA-1A. A longer-span 32-foot wing made the LA-1B version more gentle. Useful load was only 300 pounds, which included the pilots, 10 gallons of gas, and 30 pounds of baggage. If the pilot wore a parachute, the 20 pounds was deducted from the baggage allowance.

The *Pup* acquired a somewhat undeserved reputation for being tricky, as a result of stall-spin accidents, particularly on landing. It seems that low-time pilots tried to bring the aircraft in according to the advertised landing speed figures, which were far too low. When the wing was rigged flat—that is, with no aerodynamic twist or "wash-out"—the stall could be pretty abrupt. A little wash-out easily tamed this characteristic.

Only 100 *Pups* were built. The design died through no fault of its own. The depression had just about wiped out the personal airplane business by 1932, and the *Pup*, while a single-seater, was not appreciably cheaper than the contemporary two-seaters. Smaller size alone had little effect on price. There were somewhat fewer pounds of material to buy, but the cost of engine, wheels, instruments, etc., was the same as for the two-seaters using the same items. The hours required for assembly were roughly the same for a considerable spread of airplane size, so there was no big price break for the single-seater customer.

Buhl went out of business along with many other firms, and the *Pup* became an orphan. According to the classified ads in contemporary magazines, prices dropped drastically, and one could buy a good low-time *Pup* in 1934 for as little as $300. However, in spite of their status, limited utility, and troublesome engines, the little *Pups* were popular with their owners. The surprising total of 40 out of the original 100 survived to the end of World War II.

However, antiquity gave these no special status in the immediate postwar years. Although somewhat of a curiosity because of their single-seat configuration and wire bracing, they were like most other antique lightplanes at the time—cheapies that were used in lieu of something more costly. When antique airplanes suddenly ceased to be junk and became treasures at the start of the antique airplane boom of the 1950s, the surviving *Pups* got a new lease on life. Most of them underwent one notable change: the thoroughly reliable Continental A65 engine was substituted for the cranky old Szekely.

This wasn't as big a power increase as it would seem. The horsepowers were from two different eras. The Continental had a displacement of 170 cubic inches and turned 2,350 r.p.m., while the Szekely had 190 cubic inches and only turned 1,750 r.p.m. The slower prop speed alone was a big advantage. The A65 weighed 170 pounds, compared with 153 pounds for the SR-3.

While it spoils the original appearance of the ship, according to the purists among the antiquers, most of the pilots are willing to compromise a little on authenticity in exchange for reliability. The 65 h.p. conversion is remarkably easy to make according to the Supplementary Type Certificate issued to Joe Pfeiffer of Industrial Aviation, Columbia, Calif. By means of simple adapter fittings, the 65 is bolted to the same mounting bulkhead that held the Szekely. Since the oil tank is on the bottom of the Continental, the extra section of the *Pup* tank that was used for oil can be added to the original 10-gallon gasoline capacity. Other modifications commonly made to the *Pups* to adapt them to modern operations are the installation of steerable tailwheels and main wheel brakes.

As it approaches the end of its fourth decade, the modernized *Pup* leads an interesting double life. It holds its own in the sport-flying activities of the current 65 h.p. homebuilts, and it is also an admired classic in antique airplane circles. □

Financial Summary

AIRCRAFT OWNERS AND PILOTS ASSOCIATION—1969

For the calendar year 1969, AOPA had gross income from all sources of $3,913,845.

Of this, $1,995,663 (50.1%) went for direct membership benefits, namely, production of members' magazines and annual Airport Directory, printing of releases and newsletters, special reports, premium payments for members' accident insurance, including printing, addressing and postage on all items; $12,425 (0.3%) went for aeronautical charting, booklets, lapel wings, Airaids and decals provided to the membership. An additional $89,098 (2.3%) was expended for product testing and development of aircraft, flight safety devices and flight proficiency programs; $518,095 (13.0%) was used for sundry operational expenses, such as maintenance of National Headquarters, Oklahoma City offices and international representation, general activities, miscellaneous insurance programs, machines and supplies utilized for membership servicing by the office of 134 full-time and numerous part-time employees, who were paid $1,344,411 (34.3%) including payroll taxes, unemployment insurance, contributory benefit programs, etc.

Thus, AOPA's total expense of $3,959,692 exceeded its total income by $45,847 (1.2%).

The figures are subject to audit and certification as correct by Lambert and Jones, Certified Public Accountants.