

When open-cockpit biplanes began going out of style, Waco cranked a cabin into its design and produced numerous versions. Some had ailerons on all four wing panels, others only on the upper wing, still others had flaps in the upper wing



A Waco YKC, representative of most of the Waco cabin models from 1931 through 1936. Smaller lower wings and revised landing gear began to appear on the 1936 models. The triangular windows behind the cabin disappeared by that time. A.U. Schmidt collection

■ ■ When most people think back to the biplane era, they think in terms of open cockpits. This is logical, since cabin biplanes were rare in the peak biplane production period of 1927-1929 and most of the light transport and airline business went to cabin monoplanes. There were a few single-engine cabin biplanes at the time, but they were quite limited in actual design numbers and in units manufactured.

The era of big biplane production virtually ended in 1930 due to a combination of circumstances—the depression, the advent of new low-power engines that were suited only to small monoplanes and, of course, the whole new crop of low-cost, easy-to-maintain monoplanes in the 40 hp to 90 hp range. Only two of the major manufacturers

stayed in the open-cockpit business with biplanes over 200 hp—The Waco Aircraft Company of Troy, Ohio, and Stearman Aircraft Company of Wichita, Kan. [Jan. 1972 *PILOT*, page 34]. Since Stearman's business was mostly military from 1934 on, Waco enjoyed a virtual monopoly in the civil field.

Although the biplane was clearly on its way out of general aviation by 1931, Waco chose that year to introduce a new model—a four-place cabin biplane. With the exception of the Beech Model 17, introduced the following year and aimed at a different market, the cabin Waco also had its field to itself. It remained in production for over a decade and went through an amazing number of variations.

Waco's approach to cabin design was

mostly a case of adapting what was already on hand. The four-place Model QDC used the tail, landing gear, and slightly modified wings from contemporary open-cockpit Waco models and fitted them to a new fuselage. It was in the fuselage that Waco made a major break with previous cabin biplanes. Most of these had been in the traditional open-cockpit biplane form, with the top wing well above the fuselage and the passengers jammed into a low-ceiling cabin. Waco gave the passengers more headroom by the simple expedient of raising the upper longerons to the upper wing, creating what might be regarded as a high-wing monoplane that happened to have a bottom wing.

The "two-winged monoplane" idea isn't too fanciful, for Waco made an-

The Cabin Wacos (WAH-cos)

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A UKC seaplane of the 1934-1936 era. Note additional fin area added under the fuselage for seaplane operation. On some Wacos, pronounced WAH-cos, a wide fairing on the diagonal of the N-strut could be turned 90 degrees to the airstream to act as a small air brake. Photo by Robert Esposito



A ZQC-6 of 1936, with revised landing gear, smooth cowling, and small lower wing. Flaps have been added to the wing, inboard and ahead of the aileron spar. Trailing edge flaps came in with the 1937 models. Compare wingtip shapes to the YKC and UKC. Photo by William Plommer

other break with biplane tradition. Instead of using wires to carry the wing loads, the company used a single diagonal strut, which ran from the upper longeron joint with the upper rear wing spar to the lower front wing spar at the interplane struts, and carried the flying loads in compression. Strut bracing was common on monoplanes of the period but it was a new idea for biplanes that remained almost an exclusive feature with Waco.

Otherwise, the cabin Waco was strictly conventional for its time. The fuselage and tail were welded steel tube, fabric-covered, while the wings were wood frame, also fabric-covered. Some models carried crimped sheet metal ailerons; some had frame-and-fabric. Some had

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Waco Cabin Models

SPECIFICATIONS AND PERFORMANCE

	UEC (1932)	EGC-7 (1937)	SRE (1940)
Span	33 ft 0 in.	34 ft 8 $\frac{3}{4}$ in.	34 ft 9 in.
Length	24 ft 10 in.	26 ft 2 $\frac{7}{8}$ in.	27 ft 9 $\frac{3}{4}$ in.
Powerplant	Continental R-670 210 hp @ 2,000 rpm	Wright R-670E-2 320 hp @ 2,200 rpm	P&W "Wasp, Jr." 450 hp @ 2,300 rpm
Empty weight	1,685 lb	2,280 lb	2,734 lb
Gross weight	2,700 lb	3,650 lb	4,200 lb
High speed	130 mph	170 mph	200 mph
Cruise speed	116 mph	153 mph @ 6,000 ft	195 mph
Climb	1,000 ft/min	900 ft/min	1,550 ft/min
Service ceiling	14,400 ft	18,500 ft	23,500 ft
Range	425 mi	716 mi	880 mi
Price	\$5,985	\$11,125	\$18,900

The Cabin Wacos

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aileron in all four wing panels. Others had them only on the upper wing. Still others had flaps in the upper wing. With the exception of a couple of test models, all the cabin Wacos used air-cooled radial engines in the 165–450 hp range.

After the QDC was certificated in March 1931, Waco put the new cabin model into production. However, it didn't remain the QDC for long. A series of minor and major modifications was inaugurated that continued right to the end of production. There were changes in make and model of engines and the structural and fuel quantity changes needed to support them. There were also changes in fuselage lines and cabin detail, changes in wingtip shape and the relative size of one wing to the other, and a variety of windshield and cabin arrangements. The landing gear underwent changes in strut arrangement and wheel track and even went so far as to become tricycle on some models. On the last model it developed, Waco even abandoned the diagonal wing strut and reverted to old-fashioned wires!

All of these variations resulted in a considerable number of model designations, naturally, and new approved type certificates (ATCs) to go with them. Altogether, a total of 22 separate ATCs were issued to Waco, for cabin models alone, between 1931 and 1941. Although some of the differences were relatively minor and make one wonder why Waco went to the trouble to obtain separate approvals, some of the ATCs covered similar airframes fitted with five different engine models from three manufacturers.

Each of the Waco models from 1930 on had a three-letter designation. This designation appears to be random, but it is actually quite systematic.



The AVN-8 of 1938 was a big, five-seater. Only 18 AVN/ZVNs were produced. The best-selling "Specials" of the 1936–1942 era resembled the older YKCs but they had the smooth cowling and modified landing gear of the ZQC-6.
Photo by E. M. Sommerich

The first letter of the three-letter designation identified the engine used. Five different manufacturers supplied various engines for a total of 11 code letters used on production cabin Wacos:

- Q Continental A-70, 165 hp
- U Continental R-670, 210 hp
- Y Jacobs L-4, 225 hp
- C Wright R-760 (J-6-7), 250 hp
- Z Jacobs L-5, 285 hp
- D Wright R-670E-1, 285 hp
- E Wright R-760E-2, 320 hp
- V Continental W-670M, 240 hp
- A Jacobs L-6, 300 hp
- H Lycoming R-680, 300 hp
- S Pratt & Whitney "Wasp, Jr.," 300 hp

The second letter identified the actual airframe configuration but could not be pinned to a single visible feature like a set of four-aileron wings or a narrow-track landing gear. Again, 11 letters were used in the second position of the Waco cabin designations.

The third letter identified what might be considered the "style" of the airplane; only four letters were used here. The first one used was "C," as in QDC, which was generally assumed to mean "cabin." Actually, the letter "C" stood for "custom." This was followed in 1936 by "S" for "Special," as in ZKS, after which "N" for the tricycle landing gear models and "E" for the "Executive" models appeared. These last two were both custom models without the specific designation.

Things get confused here, because "standards" were introduced in 1935 as standardized versions of the established "custom" models, with the designations appearing as UKC-S, CJC-S, etc.

Dash numbers, such as CUC-1 and CUC-2, appeared in 1935 to distinguish between models with the Wright R-760E-1 and -2 engines, before the engine identity letters "D" and "E" were adopted. In 1936, dash numbers were used to indicate the year of manufacture, as in the 1936 EQC-6. However, this was not an accurate indication for long; the FAA didn't go for the idea of a new number every year for the same model; so the dash numbers stopped at -8. As a result, some models like the VKS-7 were in production in 1942 with notable year-to-year refinements but the same "dash" number.

Unfortunately, there are too many cabin Waco models to even describe each one briefly in this article. Representative models are shown in the accompanying photos.



The last and hottest of the cabin Wacos—the 450 hp SRE of the 1940-1941 period. Originally this was NC-31657. It was "drafted" into the Army and became UC-72 42-38271. Note the long, slim fuselage and the use of wires instead of a diagonal strut for wing bracing.

Photo by John Collins

The cabin Wacos enjoyed wide use as corporation aircraft and as private owner and charter types. They were also workhorses in Alaska and the western mountains, where speed was secondary to the payload-to-power ratio and short-field performance. While biplanes on floats have always been a relative rarity in civil aviation, a considerable number of the cabin Wacos operated as seaplanes. Their good points were sufficient to overcome the obvious handicaps that went with all biplane and low-wing (monoplane) seaplanes—interference between the low wing and docks and riverbanks when operating away from established seaplane bases.

Waco built a few cabin models for military air forces of small countries and turned out three EQC-6s for the U.S. Coast Guard, which designated them J2W-1. While neither the Army nor the Navy bought new cabin models from Waco, they did acquire some from civilian owners during the big buildup of 1941–1942. The Army drafted a total of 43, divided among 15 different models, and assigned Army designations from UC-72 through UC-72P (skipping the letters I and O). The Navy didn't apply standard naval designations to its drafted aircraft; its three YKS-7s were operated under their original designations. Most of the military Wacos ended up on the surplus market after the war and some of their present-day owners may be surprised to find that they are flying former military aircraft.

Waco, pronounced WAH-co, was founded in 1921 and has no connection with the well-known Texas city pronounced WAY-co. The letters stood originally for Weaver Aircraft Company, whose plant was located at Troy, Ohio. Because of inevitable confusion with another city of the same name, the company put the following legend on some of its airplane nameplates:

"Troy, Ohio, NOT New York."

Waco, later renamed Advance Aircraft Corporation but still calling its airplanes Waco, hit its stride as a major manufacturer with production of the Model 9 in 1926. This was followed by the Model 10, the OX-5 powered version which was later designated Waco 90, then GXE. The company was renamed Waco Aircraft Company in June 1929. With the exception of a single experiment after World War II, Waco airplane production ended in 1942. Subsequent production was of cargo gliders for the war effort.

The reappearance of the Waco name on a new monoplane in 1968 involved use of the old name only—there was no continuity of personnel or technology from the original organization. The old biplanes carry on, however, with some 200 cabin Wacos still on the civil register. In combination with the open-cockpit models, the Wacos, after the Boeing/Stearman "Kaydet" [Nov. 1967 PILOT, page 44], are the most numerous American biplanes now flying. □