

■ Aircraft manufacturers have constantly improved their products to meet competition and satisfy special customer requirements. The most common changes to a basic model are in the horsepower range and interior arrangements. Few manufacturers have gone so far as to provide interchangeable wings of different design to increase the versatility of a standard model.

The most memorable American example of this unusual procedure is the Waco *Taperwing*, which was the standard Waco Model 10 of the 1927-30 period, fitted with a sporty-looking set of tapered wings. These completely altered the appearance and personality of the staid, straight-wing trainer-utility design and turned it into the leading civilian aerobatic design of its production era and many years to follow.

The Waco 10 was introduced in 1927 by the Advance Aircraft Company of Troy, O., as a refinement of its Model 9 of 1925. The Model 9 was one of the first new American production designs to feature welded steel tube construction for fuselage and tail. The word, Waco, was an acronym for a predecessor firm, the Weaver Aircraft Company.

The Model 10 retained the traditional thin-section wooden wings of World War I style but was designed with versatility in mind. It could take any available engine in the 90-220 h.p. range and was actually stressed for more. It was type-certificated in October, 1927, just in time to cash in on the aviation boom touched off by Lindbergh.

Its versatility and general characteristics soon made the Model 10 the leading design of its type in quantities sold. The most popular version was powered with the war surplus 90 h.p. Curtiss OX-5 engine. It sold complete for \$2,460, less propeller. Waco entered four special 10's powered with 220 h.p. Wright Whirlwind J-5 radial engines in the 1927 Ford Reliability Tour. They placed, fifth, seventh, ninth and 12th.

The tour results built up a good market for the 220 h.p. version, but Charlie Meyers, chief test pilot, thought the Model 10 could grab a bigger share of the sportsman's market if the traditional boxy-looking design were jazzed up a bit. He was able to persuade the Waco management to let him try an entirely different wing design on the 10, and the *Taperwing* was the result.

Other than the tapered planform, the major change in the new wings was the use of the new NACA M-6 airfoil in place of the ancient Aeromarine 2A. The chord of the tapered wings was the same as that of the originals at the root, and the sets were quickly interchangeable. Fuselage fittings to which the lower wings attached were not altered. The thicker taperwing spars were merely countersunk to the point where the new wing fittings mated with the old fuselage fittings.

The experimental wings were first tried on a 90 h.p. fuselage early in 1928. This combination proved to be underpowered because of the decreased area of the new wings, but the wings were able to show their potential. Waco

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**220 H.P. WACO 10  
SPECIFICATIONS AND PERFORMANCE**

	Straight-wing (10, 220, ASO)	Taper-wing (10-T, 220 Sport, ATO)
Span (Upper)	30 ft. 7 in.	30 ft. 3 in.
Span (Lower)	29 ft. 5 in.	26 ft. 3 in.
Length	22 ft. 6 in.	22 ft. 6 in.
Wing Area	288 sq. ft.	227 sq. ft.
Power Plant	Wright J-5	Wright J-5
Empty Weight	1,550 lbs.	1,787 lbs.
Gross Weight	2,310 lbs.	2,600 lbs.
Top Speed	126 m.p.h.	135 m.p.h.
Range	500 mi.	800 mi.
	w/54 gal.	w/100 gal.
Cost (1928)	\$7,215	—
Cost (1929)	\$7,335	\$8,525

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then built three special J-5 powered *Taperwings* for the 1928 National Air Races. With cleaned up fuselages and special low drag landing gear, the *Taperwings* placed first, third and fifth in their horsepower class in the New York-Los Angeles transcontinental event, and finished second, third and fourth in the civilian free-for-all pylon event.

Following the races, the *Taperwing* became a standard Waco model. At first, it was known only as the 10-T, the letter identifying the tapered wing. Shortly after this, the company found it necessary to identify the different Model 10 variants by horsepower. The straight-wing models powered with the OX-5 and the J-5 became the 90 and 220, respectively, and the *Taperwing*, produced then only with the J-5, became the 220 *Sport Taperwing*.

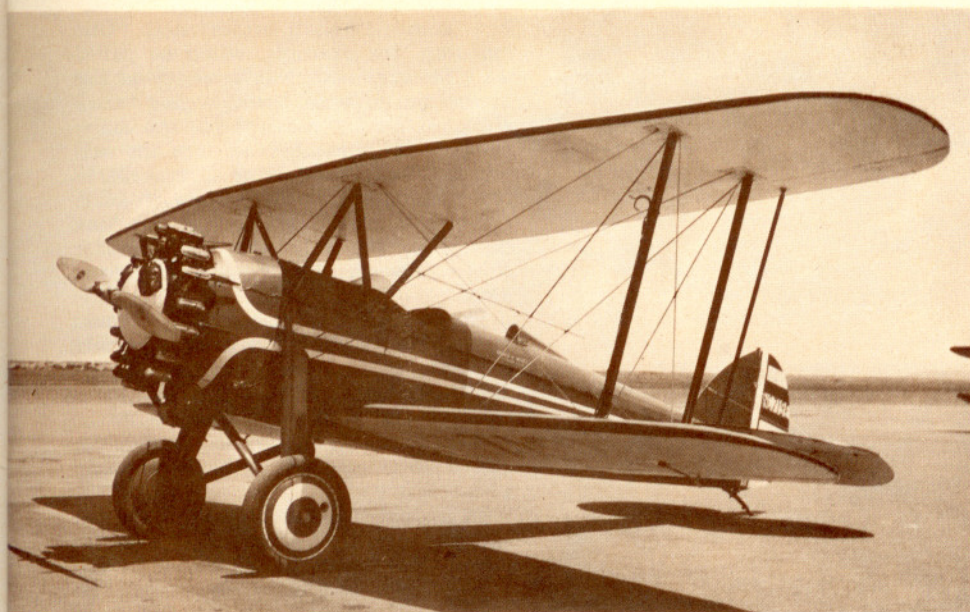
Another designation change soon followed. The 90 became the GXE, the 220 became the ASO (A for J-5 engine, S for straight wing, and O for the fuselage detail), and the *Taperwing* became the ATO. When the J-5 went out of production and was replaced by the J-6 in 1929, the airplane designations reflected the change. With the seven-cylinder 225 h.p. J-6-7, the ASO became the CSO and the ATO became the CTO. Other variants were still to come.

As expected, the new wings made the Model 10 a faster airplane because of both reduced area and improved airfoil. The big surprise, however, was the greatly improved aerobatic capability.

The top tapered wing was four inches shorter than the straight original and the four-foot shorter lower wing greatly reduced the mean wingspan. While this could be expected to increase the rate of roll somewhat, the big boost came from the tapered construction, which moved the center of the wing mass inboard and greatly reduced the rolling inertia.

The 1928 Waco Taperwing, powered with the 220 h.p. Wright J-5 engine, was known successively as the 10-T, the 220 Sport Taperwing, and the ATO. Two passengers sat side by side in the front cockpit of this stock model.

PHOTOS BY GORDON S. WILLIAMS



Another reason for its aerobatic capability was the improved efficiency of the outer portions of the wings and double ailerons as a result of the greatly increased gap-chord ratio of the tapered wing over the straight wing when both had the same gap and chord at the root.

The *Taperwing's* aerobatic capability was unmatched by any contemporary civil design and it quickly became the favorite of such air show professionals as Freddy Lund, Tex Rankin, and Joe Mackey. While some later designs exceeded it in actual maneuverability, mainly by being smaller and lighter, they couldn't carry the power needed for a good "vertical" show and the *Taperwing* was able to dominate the air-show circuit almost until World War II. Most of the later versions, however, were refitted with 330 h.p. Wright J-6-9 engines.

The National Air Races and other competitive flight programs of the late 1920's and early 1930's had quite a few cross-country and pylon events for stock airplanes in several horsepower classes. Some *Taperwing* owners improved the

## YESTERDAY'S WINGS:

# *The Waco Taperwing*

Built for greater speed and durability, the convertible-wing

Waco Model 10 gained an unexpected side feature of greater aerobatic capability.

Nearly a dozen are still in existence

by PETER M. BOWERS / AOPA 54408



The 1929 CTO Taperwing used the 225 h.p. Wright J-6-7 engine. This one, owned by Art Davis, was modified for racing by the addition of a speed ring around the engine and the substitution of special low-drag struts and landing gear for the originals.

streamlining of their standard versions by extensive cleanup and detail refinement and were able to dominate their horsepower classes until the stock events were dropped from the races.

Waco, meanwhile, continued to develop special purpose versions of the *Taperwing*. Several single-seat mailplanes powered with the 330 h.p. J-6-9 were delivered to Northwest Airways under the designation of JYM, and armed single-seat fighters with J-6-7 engines were sold to several Central and South American air forces.

Exact figures are not available, but it appears that between 55 and 60 *Taperwings* were built. While this is not an impressive production figure, even for the depression years, the *Taperwing's* reputation does not rest on numbers. There are nearly a dozen in the hands of Antique Airplane Association members and exhibition pilots today, but even when these are gone the *Taperwing* will always be remembered as the glamour girl of the Waco line. □