



Harold J. Brow in the cockpit of the Curtiss R2C-1 A-6691, with wood propeller at Mitchel Field, September 1923. (USN)

THE CURTISS R2C RACERS

By THOMAS G. FOXWORTH

In 1923 Curtiss reorganized under the title Curtiss Aeroplane and Motor Co. Inc. of Garden City, Long Island, New York, and enjoyed one of its most successful years. Its products won the Pulitzer and Schneider Trophies and set the world's speed record. Furthermore, the practicality of the wing radiator and Reed metal propeller were demonstrated in 1923, Fairey in England was buying rights to manufacture the highly successful D-12 engine which they would call the Felix, and production of the PW-8 pursuit was being set up to make it the standard Army pursuit plane. Finally there was the one 1923 Curtiss product that stood out from all the others, the R2C Navy racer. Its influence on racing and pursuit plane design would be wide-spread and would long outlive it even though the 1923 Pulitzer was the only race in which an R2C would compete.

After the Army's stunning success in 1922 with the Curtiss R-6 racers, the Navy determined to make a comeback by investing in the development of updated racers, and two R2C's were built with this requirement in mind. Their construction at Garden City was followed closely by Harold J. Brow, already chosen by the Navy as one of its racing pilots. The R2C was a direct descendant of the R-6 from which it differed in only minor details. Its design can be largely attributed to William L. Gilmore, Curtiss' chief engineer, who was involved in the creation of all Curtiss racing airplanes from the Texas Wildcat to the R3C (before leaving aviation to make a comfortable fortune from zip fasteners). Arthur Nutt was largely responsible for the new D-12A engine.

At this time the Navy was spending large sums of money to develop two new types of service engines—a bomber/torpedo plane engine of 700 hp and a fighter en-

gine of 500 hp envisioned as an improved D-12. The Navy's 1923 racers were to be flying test-beds for these new engines, and orders for 100 of each variety were to be placed. For the fighter engine Curtiss redesigned the standard 465 hp D-12 with a 1/8" greater bore, and it produced 507 hp at 2300 RPM in a dynamometer run. The increased power was also due in part to its high compression ratio of 5.8, but this necessitated a benzole-gasoline "doped" fuel mixture for continuous high power running which, in turn, severely restricted engine life. However, the racing D-12A engine in the R2C could boast a weight-power ratio of 1-1/3 lbs/hp and probably the highest power-frontal area ratio achieved up to this time. A wood propeller was originally fitted to the first R2C. When it was replaced with one of S. Albert Reed's forged, one-piece duralumin propellers a speed increase of over 10 mph was realized. The second R2C had the metal propeller from its inception.

Other important Navy projects at this time were the development of high-speed techniques, characterized by the high-speed wing, the wing radiator and enclosed shock absorbers. (The cantilever monoplane and retractable landing gear, used on a racer as early as 1920 but hampered by construction difficulties, still had not caught on.) The R2C design was to employ all these high-speed techniques within the limitations of its biplane-fixed gear configuration. Its wing area was increased over the R-6 by 10 square feet and the upper wing lowered to the summit of the fuselage. The spans of the upper and lower wings were just 22 feet and 19 feet 3 inches respectively, and at its gross weight of 2071 pounds the 148 square feet of "sail" gave it a wing loading of 14 lbs/sq. ft. Its power loading was a mere 4.17 lbs/hp



Lt Brow by R2C-1 A-6691 during preliminary flight testing at Mitchel Field in September 1923. (Photo - USN)



Lt (jg) Alford J. Williams and A-6692 at Mitchel Field, September 17, 1923. (Photo - Curtiss T-2546)

at gross weight. These loadings gave it a theoretical climb performance somewhat spectacular: 5,000 feet in 1.6 minutes, 10,000 feet in 3.6 minutes, 15,000 feet in 5.8 minutes and 20,900 feet in 10 minutes. Calculated service ceiling was 31,800 feet.

The landing gear chassis was rigid, the shock absorbers being mounted directly inside the carefully-faired wheels, and for depth, the main lift wires were attached to the rigid chassis instead of the fuselage. As in the R-6, a semi-monocoque wood fuselage was employed, covered with "Curtiss-ply", 3/32" 2-ply spruce veneer, glued and tacked in strips 2 inches wide diagonally to the frame (at 90° to each other, fabric covered, doped and waxed) and giving a beautiful surface throughout. The multi-spar wood wing construction was also retained, as were the wing radiators, which were fabricated at .004" corrugated brass sheet. The entire water supply was circulated through the radiators (carried on top and bottom of both wings) over five times per minute. Aileron and empennage control surfaces had metal frames, doped linen cover and were built so that no control cables or horns protruded into the airstream.

On September 9, 1923, less than a month before the Pulitzer race which originally had been scheduled for October 3, Lieutenant Harold Brow took R2C A-6691 aloft for its first 10 minute test flight. In a test four days later, September 13th, Brow piloted this R2C to 244.3 mph on the level, and although unofficial for the record books, it was the first flight to exceed four miles per minute. All testing was done at Mitchel Field, Long Island. (Mitchel Field was named for John Purroy Mitchel, a former New York mayor, who was killed in World War I as an Air Service major.) The second R2C, A-6692, was also tested at Mitchel Field by its pilot Lt (jg) Al Williams.

The Pulitzer race was rescheduled for October 6 after inclement weather had forced a postponement. The three-day 1923 St. Louis Air Races were until that time, and even for years afterward, the largest and most successful flying meet the world had seen. Orville Wright

attended and commented, "I never thought it would have been possible." The highlight of the meet was the unlimited free-for-all Pulitzer Trophy speed race which covered four triangular laps of 50 km each, for a total of 200 km (124.27 miles). The Navy fielded four entries, the two R2Cs and two Wright F2Ws which were the test-beds for the 700 hp Wright Tornado bomber/torpedo plane engine, and the Army entered three racers, the two 1922 R-6s, one having been fitted with a new D-12A, and a lone Verville-Sperry R-3 monoplane flown by Lt Alex Pearson. But the little blue R2Cs, flown by Williams and Brow, outclassed everything in the air—in fact, Al Williams' winning performance in the race in number 9 (A-6692) beat the world speed record for 100 and 200 km by over 37 mph.

The Navy's careful attention to the development of the R2C and F2W gave them a Roman holiday in the race, the four Navy planes capturing the first four places. Since the Army had spent virtually nothing toward racing in 1923, the real battle that evolved was between Curtiss and Wright, but even with the high-powered Tornado engines, the Wright racers were no match for the sleek R2Cs, fashioned with the most immaculate care to detail, and they finished over 10 mph off the pace. Williams and Brow had practiced high-g turns around the course until they knew the landmarks perfectly. Williams even covered over part of the windshield of his practice machine to simulate the almost blind 2"x6" panels of the R2C windshield. "Spad" belts, which included a shoulder harness arrangement, had been provided in the R2C, and it was estimated that up to 6-7 g's were pulled in pylon turns during the race. Williams averaged 243.67 mph to win and Brow posted a close second in number 10 at 241.78 mph despite the fact that he had experienced a serious overheat problem during the third lap. His water temperature gauge hit the peg at 212°F, then the RPM started falling off. It fell from 2300 to 2250 for the last lap, but Brow decided not to abort and kept the throttle "two-blocked". After he landed, capturing second place, and cut his switch the steaming engine continued to diesel for almost a full minute.



Navy R2C-1s and Wright F2W-1s lined up for the Pulitzer Trophy Race in St. Louis on October 6, 1923. (NAM 42060B)



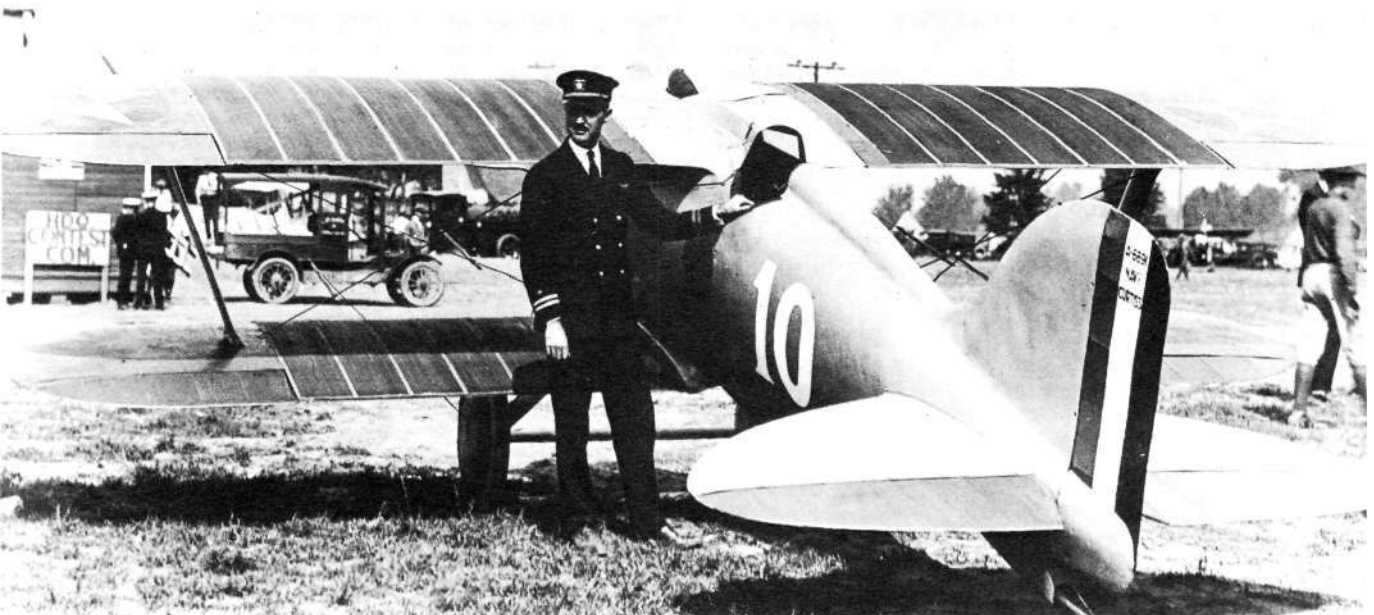
Lt (jg) A. J. Williams, winner of the 1923 Pulitzer, standing before his A-6692, number 9. (USAF 12283AS)



Sleek lines of the 1923 Pulitzer winner are apparent on number 9 as it awaits the big race at St. Louis. (USN)



Spewing up dust, Al Williams' R2C-1 gathers speed for a takeoff at St. Louis in October 1923. (Photo - US Navy)



Lt Harold J. Brow standing beside the cockpit of number 10, A-6691 in St. Louis, October 1923. (Photo - USN)

On October 7, the day following the race, Al Williams was to make speed trials over a measured three kilometer course at St. Louis with number 9, but these were called off by RADM W. A. Moffett, Chief of the Bureau of Aeronautics. Nevertheless, Al put on a thrilling demonstration of the amazing aerobatic qualities of the little racer for the crowd.

The R2Cs were shipped back to New York and a month after the race, in a thrilling duel of the air, the standing speed record, held by Russell Maughan of the Army, was shattered several times. (Maughan's record had been set in an R-6 on March 29, 1923, over a one kilometer course; the R2Cs had to fly over a three kilometer course in accordance with the new FAI rules effective April 1, 1923.) The course was measured between the SE corner of Mitchel Field in Mineola and the NW corner of Curtiss Field in Garden City. The average of the speeds (not times, a mistake that had been made before) of the best four consecutive passes was to be taken, and the planes were restricted to 50 meters (164 feet) altitude. The "duel" started on November 2, 1923, Brow and Williams taking turns batting the record back and forth in a good natured but competitive "Alphonse and Gaston" style. The November 2 results were: Brow 257.42 mph; Williams 258.61 mph; Brow 259.15 mph. (This was officially homologated by the FAI as a world's maximum speed record.)

No trials were run on November 3 due to bad winds, but on November 4 the speed record was broken three times in two hours with Brow holding the record at the start of the day's activities. Williams had first honors and in the best consecutive four out of 12 passes, he averaged 263.3 mph. Brow then pushed number 10 to 265.69 mph in four straight passes with his best single lap being a sizzling 274.2 mph downwind. Williams, who had considered his flying over for the day after the first hop and was preparing to leave, made a good-natured crack to Brow and with little hesitation mounted number 9. Three mechanics gripped arms and swung the D-12A into action, its staccato exhaust barking out in that deep, sharp manner unlike any other engine that ever flew. He was quickly off, to the anticipation of several hundred curious spectators lining the field boundary who had come to see the two classic planes in their supreme battle. The tiny plane almost disappeared at its peak altitude of 9,000 feet; then Williams came shrieking down, waiting until the last possible moment to flatten his dive and hurtle across the course at barely 30 feet altitude. Panels on the ground arranged in plus or minus signs signaled his results after each pass. Pulling up after his sixth and last pass, he streaked through the middle of a ponderous flight of Martin bombers at over 260 mph. They were approaching for landings at Mitchel Field, unaware of the speed contest, and a spectacular collision was avoided by mere chance. The best average made, 266.6 mph (429.025 km.ph), was officially recognized as a maximum speed record and stood for over 13 months until December 1924 when Warrant Officer Bonnet, in a 450 hp Ferbois monoplane, beat it by less than 12 mph. On November 5 both Secretary of the Navy Denby and RADM Moffett telegraphed congratulations to the fliers, Moffett adding in his wire, "Discontinue speed tests but permit both pilots to fly planes for Army Relief Benefit."

Moffett's conservatism was typical of the attitude of many people who were convinced that the ultimate speed possible was being approached. Even Sadi Lecointe, the premier French speed king who had set 19 records since the Armistice, considered 500 km.ph (312 mph) as the top speed possible by humans. But certain people such as Brig. Gen. William "Billy" Mitchell scoffed at this. (He, himself, in typical swashbuckling fashion, had set up a maximum speed record in the R-6 a year earlier when most men his age were relegated to the easy chair.) "Billy" proclaimed that planes would fly "300 mph in five years" as early as 1922, and that the eventual speed man could reach would not be known for years

to come and might never be known. (Both prophecies came true; it is easy to understand why "Billy" was such a hero to the young aviators of that day.)

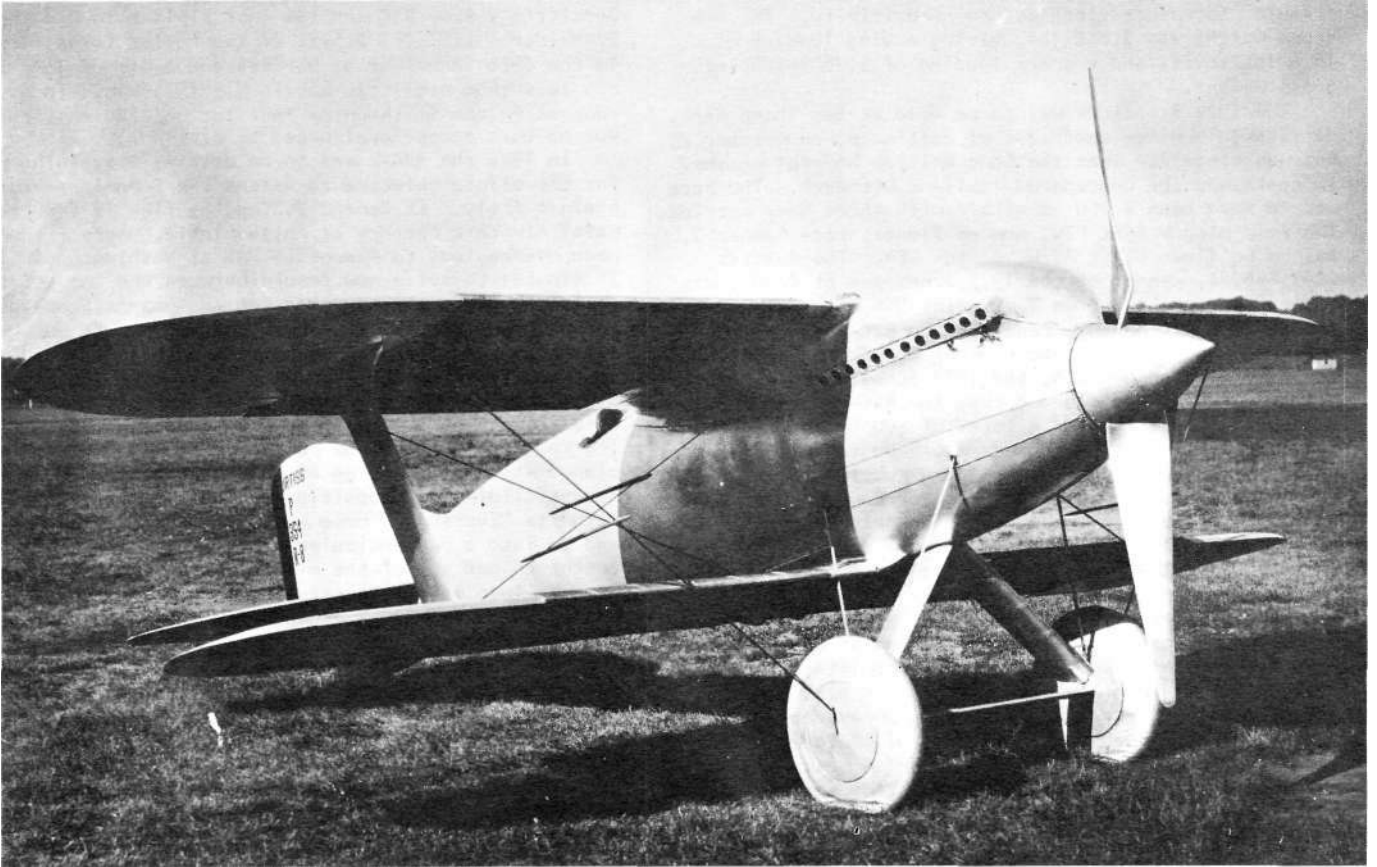
In a month Al Williams had flown the R2C to a Pulitzer win and a world's speed record; and after a rousing (20,000 people) parade at Van Cortlandt Park for the big ex-pitcher (New York Giants, two seasons) he was back at Mitchel Field for the Election Day Air Carnival (Army Relief Benefit) on November 6. Since further speed trials were forbidden, both he and Brow stunted their R2Cs for the crowd, and Williams made a spectacular climb to 5,000 feet in less than one minute from a low pass. The visiting French war ace, Charles Nungesser said, "If I had a plane like that with two guns, I could drive down anything."

Brow's 20 minute exhibition flight that day was his last (of a total of nine) in the R2C A-6691; he had amassed 4:25 R2C time in two months. That scant time had included a first test flight in type, a second place in the world's premier speed classic, and a world's speed record! On November 10 the Mitchel Field Air Carnival was repeated and RADM Moffett gave Army Lt Edward E. Johnson permission to give an exhibition in R2C number 9. In its last known flight as a land plane, this machine was put through daring acrobatics at up to 250 mph for the crowd.

At this point R2C A-6691 (number 10) was turned over to the Army Engineering Division at Wright Field—the Navy reputedly collected the sum of one dollar for this transaction—and it acquired the Army designation R-8, with Air Service serial number 23-1235 and project number P-354. It also acquired a silver color scheme and was groomed for the 1924 Pulitzer Race at Dayton, with Lt Alex Pearson selected to fly it. On September 2, 1924, the three 1924 Army Pulitzer pilots, Burt Skeel, (later killed during the race in Maughan's 1922 R-6) Wendell H. Brookley and Pearson were on trial runs in the two R-6s and the R-8 at Wilbur Wright Field. While flattening out from a dive on the measured 3 km course, the R-8's wings "collapsed" at 300 feet. (This has been attributed to the failure of one of the I-type laminated wood interplane struts, from which the inner layers of the laminate were cut to save weight, making the strut hollow and subject to high-speed flutter.) Pearson was either thrown from the plane, or jumped, in a desperate attempt to save his life, but rescuers found him dead on the ground. Pearson had been a crack Army pilot, beating 73 other fliers in a New York-San Francisco race in 1919, and he was down in Mexico for over a week after becoming lost in a later transcontinental attempt. He was forced out of the 1923 Pulitzer while piloting the R-3 racer, the same plane that his alternate, Lt Harry H. Mills, used in winning the 1924 race a few weeks later. The R-8 was surveyed September 8, 1924, written off the Army inventory six days after the accident.

R2C A-6692 was put in storage after its November 10 exhibition, and the great Navy team of Brow and Williams never raced together again, although Al Williams went on to fly the 1925 R3C and other racers and, of course, achieved fame (and a 1929 DFC) for later exploits in aerobatic flying. Years later, Harold Brow had the pleasure of giving Al Williams his first carrier landing, Al riding the observer's seat in one of the planes of the torpedo squadron of which Brow was CO.

The Navy later detailed Curtiss to redesign its famous 1923 racer as a seaplane for the upcoming defense of the Schneider Trophy in 1924. A-6692 was taken out of storage and its engineering data thoroughly overhauled. It retained the 500 hp Curtiss D-12A engine; pontoons were fitted without alteration of the wings or fuselage, but wind tunnel tests led to the adoption of larger control surfaces. The gasoline capacity was increased by placing tanks in the pontoons, and the engine mount was fabricated of steel tubes and designed to be readily detachable. Aileron control was by torque tube, with the elevator and rudder being cable operated, but with operating quadrants now cam-shaped instead of



Turned over to the Army Air Service at the end of 1923, the R2C-1 became the R-8 Army Racer, 23-1235. (Photo USAF)



With the addition of floats, A-6692 became 1st R2C-2 with racing number 6 for the 1924 Schneider Trophy Race. (USN)

circular to reduce pitch control sensitivity. The new gross weight was 2,640 lbs, giving a wing loading of 18.6 lbs/sq.ft. and a power loading of 5.26 lbs/hp at gross weight.

The 1924 Schneider was to be held at Bay Shore Park, Maryland, 14 miles southeast of Baltimore, on October 25, but was cancelled when the lone British hopeful crashed in tests and the unprepared Italians withdrew. The race was to have been a 350 km affair with three Navy entries. The remaining Wright F2W, now on floats, race number 7, was to be flown by Lt A. W. Gorton USN. The Curtiss CR-3 A-6081, winner of the 1923 Schneider at Cowes, was to be flown by Lt George T. Cuddihy USN with race number 8. The R2C A-6691, redesignated R2C-2 since its conversion to a seaplane, race number 6, was to be flown by Lt David Rittenhouse USN, the 1923 Schneider's winning pilot. It was also planned that the R2C-2 would continue around the course for a total of 500 km for an attempt on every seaplane speed record up to that distance. After the Schneider was cancelled a substitute seaplane meeting was held on Saturday, October 26, 1924, and the two CR-3s raced over the intended Schneider course setting several records. It had been decided to "save" the R2C-2 for the 1925 Schneider, and its only flights in 1924 were contractor trials.

On September 27, 1924, in the first of these trials, Rittenhouse took the plane from the hangar of the Curtiss Trans-Oceanic Co. (Curtiss Metropolitan Airplane Co.) at Port Washington, Long Island for a 30 minute flight. With no preliminary testing he averaged 227.5 mph in several passes over the 4.26 miles between Execution Light and Stepping Stone, and on one downwind pass he clocked himself with a hand-held stopwatch at 242 mph. This average beat his own record, set in a CR-3 during the 1923 Schneider race, by over 30 mph, but these trials were unofficial and merely a part of contractor guarantees.

In 1925 the three highly successful R3C racers made their appearance and scored well-deserved wins in both the Pulitzer and Schneider races of that year. The advent of these updated airplanes overshadowed the R2C-2. Nevertheless the initial list of U. S. entries for the 1925 Schneider included the R2C-2 which Lt Frank "Hersey" Conant USN had been detailed to fly. Later, however, the Army arranged to enter its lone R3C in place of the R2C-2, converting it to a seaplane in the two weeks before the race. The R2C-2 thus became the U. S. team's alternate. The entry of the Army plane enabled Jimmy Doolittle to notch his racing stock with the 1925 Schneider win, both Navy R3C's in the race failing to finish the course. Jimmy beat all seaplane speed records from 50 km to 350 km by from 47 to 65 mph, and the next day he added another Army triumph by setting the world's maximum seaplane speed mark over a 3 km course.

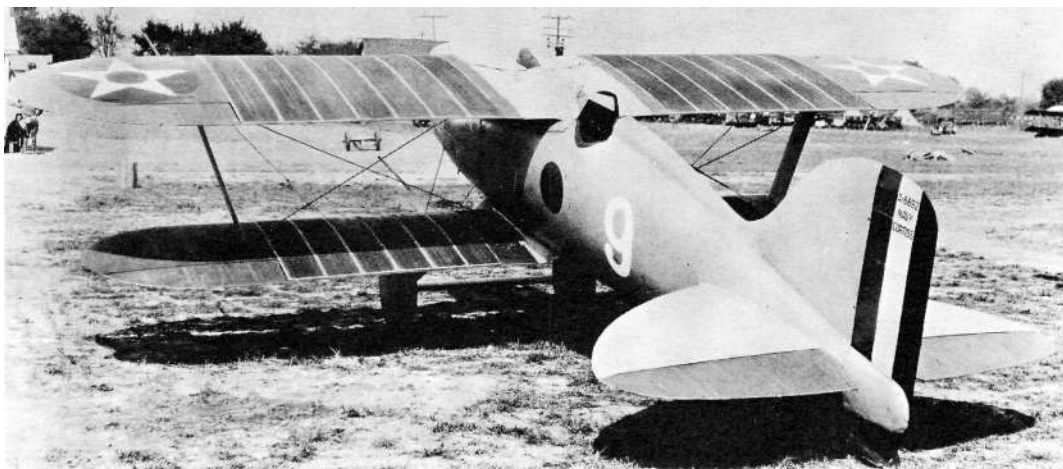
Doolittle's Army R3C was the last biplane to win the Schneider. Lt C. F. Schilt of the Marine Corps flew it in the 1926 Schneider at Norfolk and averaged just one mph less than Doolittle had in his 1925 win. Today it reposes in the Smithsonian Institution, the only survivor of this exceptional breed of airplane.

In 1926 the R2C-2 was to be used as a training plane for the pilots selected to defend the Schneider Trophy against Italy. Lt George T. Cuddihy flew it from the Naval Aircraft Factory at Philadelphia, where it had been overhauled, to Anacostia NAS at Washington in just 32 minutes to set a new record between the two points. The three U. S. pilots named for the year's Schneider were Lt Cuddihy USN, Lt Conant USN and 1st Lt Harmon J. Norton USMC. On September 13, 1926, while practicing in the R2C-2 over the Potomac River near Anacostia, Lt Norton crashed and was killed. After finishing a speed trial flight over a measured course Norton was returning to Anacostia when he pulled up behind two Army airplanes which were flying at about 2000 feet. Just as he was sliding into position the rakish little R2C-2 with its "Eversharp" nose was seen to suddenly nose over and go into a perpendicular dive. Norton apparently fought to get out of the dive by trying to roll the racer over just before it struck the water, but he was unsuccessful. The R2C-2 crashed in six feet of water just south of Haines Point.

This was a severe blow to the U. S. Schneider team, for Norton had been one of the Marines' top pilots. Then Hersey Conant was killed a few days later, and one of the R3C's was wrecked in trials. These accidents decimated the U. S. hopes for its third and conclusive Schneider win, and Italy with its sleek Macchi M-39 monoplanes (which outclassed the biplanes in any event) walked home with the trophy.

Thus ended the United States' active participation in the great speed classics, and the crash of the last R2C had signalled the close of a splendid chapter in the history of American aviation. The Pulitzer races had died out, and the Schneider went abroad. Little work was done thereafter on specialized racing types in the U.S., but the influence which the innovations pioneered by the R2C had on the classic racing planes that followed it cannot be accurately measured.

ABOUT THE AUTHOR: Tom Foxworth soloed at 16, received an aeronautical engineering degree from Princeton in 1959, served in Naval Aviation for six years, and is now a co-pilot on Boeing 707s for Pan American. Living at 192-20B 67th Ave., Flushing, N. Y. and active with the E.A.A., his chief interest now is in detailing the history of air racing in the 1920s. With much documentation and some 3000 photos in his collection, he is well on the way to a book that will truly cover the subject.



R2C-1 in St. Louis in October 1923 clearly showing wing, skin radiators. (USAF 11202AS)