

Keith Rider, prolific racing plane designer of the turbulent thirties, never achieved his most fervent desire—building a plane to capture the world speed record, the main reason being the scarcity of money for such frivolous projects during the Great Depression. Nevertheless, he kept a current design handy, in his coat pocket, in case an “angel” with an open checkbook happened along.

In an article published in *Popular Aviation* September 1934, Rider proposed a “Super Speed Racer” capable of 465 mph.¹ He described the powerplant as a V-16 of 2500 hp and physically small enough to hide behind a frontal area of only 31 by 18 inches. Other specifications were:

Wing Span 26'8"	Fuel Capacity 160 gals.
Length 27'9"	Fuel Consumption 4 gals. per min.
Weight 3,000 lbs. approx.	Duration 40 min.

An interesting insight into the Keith Rider design concept may be found in the following quotes from the same article:

“A pure speed machine would consist of a propeller, engine and wing, if some other means of controlling the plane could be devised. The inefficient control surfaces of the tail could be removed and the entire tail eliminated. Until that time, we compromise by making the tail surfaces as small as possible.

“A racing plane wing is only large enough to enable the plane to carry its own weight. Every square inch removed from the wing reduces its drag, allowing the plane to travel faster.”

At the time Keith Rider’s article was published, his R-3 racer for Jim Granger was completed, most of the financing provided by Edith Boydston Clark. The airplane was tailored specifically to compete in the MacRobertson London-to-Melbourne race, however, except for the P&W Wasp Jr. powerplant, the R-3

closely followed the specifications and general outline of the “Super-Speed Racer” described in the *Popular Aviation* article. It’s interesting to speculate on the success the R-3 might have achieved had the money been available to develop the special 2500-hp V-16 engine or even the substitution of a Curtiss Conqueror at 750 hp.

By 1937 Keith Rider had a tidy economy package to offer: a world’s record machine that could be built for a mere \$60,000. Again, by way of a magazine article in *Popular Mechanics* titled “Secrets of Speed,” Rider outlined the record breaker. The photos accompanying the article showed the R-6 racer EIGHT BALL under construction for the Union Airplane Company. Three-view sketches showed counter-rotating propellers and a different powerplant. In the article, Rider allowed that 1500 hp would get the racer over 500 mph. Elaborating on the engine, he described two V-8 units hooked back-to-back driving the two oppositely rotating propellers to get the job done. The engine package was to be five feet long and project a frontal area two feet by two feet. Rider guesstimated about half of the \$60,000

The Keith Rider R-6

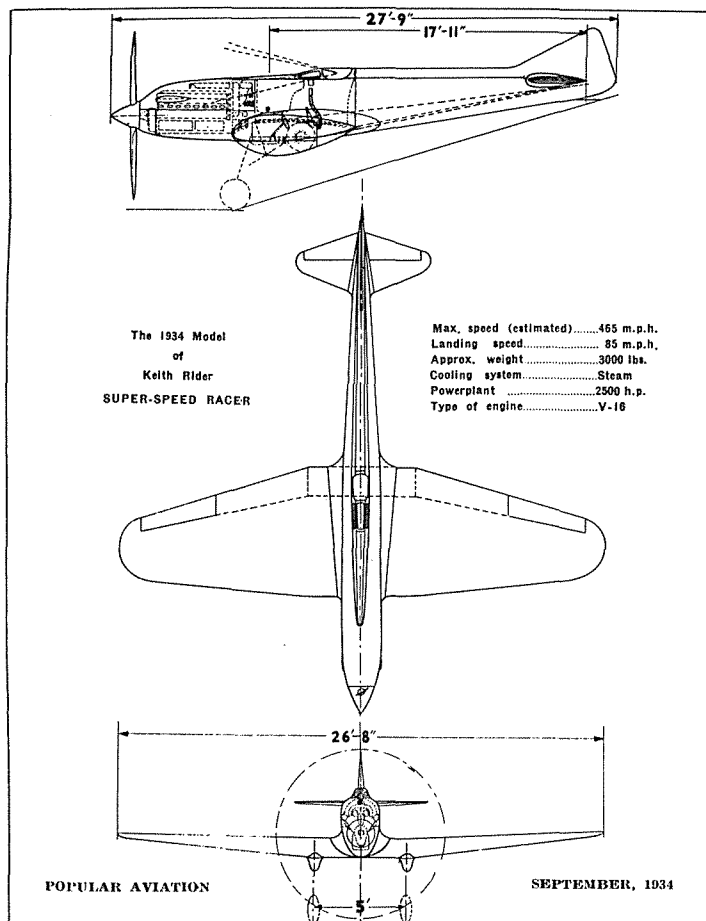
BEHIND THE EIGHT BALL

by Mike Kusenda

All drawings and photos from Dusty Carter Collection unless otherwise noted.



1. The R-6 is a slender, fast and sleek racer. This one, blue racer.



Keith Rider's proposed racer of 1934.

total cost of the airplane would have to be spent on this engine development. By today's yardstick, a rather small price tag for the world speed record.

The Union Airplane Company was, in reality, the Story-Gawley Company of Glendale, well known in racing circles as a top-notch propeller manufacturer. The propeller company became an airplane maker rather unexpectedly when designer Keith Rider could not come up with payment for work ordered from Story-Gawley.

Late in 1936 Rider decided to construct the R-6 entirely of plywood for several reasons. All previous Rider racers had had plywood-covered wooden wings with various types of fuselage construction. He felt the plywood made it possible to maintain a more uniform and accurate air foil section throughout the wing construction. Probably most important, wood workers seemed more plentiful and easier to recruit. The idea of molding two very smooth plywood fuselage halves in female concrete molds, as pioneered by Lockheed with its Vegas, Sirius and Orions, seemed the ideal route to take.

Rider turned to Story-Gawley, with its vast experience and equipment for wood working, for advice on the feasibility of making up the concrete fuselage molds. Somehow, the project got underway at Story-Gawley, although Rider was still looking desperately for financial backing for the construction of the plane. This type of situation was not particularly distressing but rather the norm for racing plane projects in the depression-plagued thirties.

When the fuselage molds were completed, there was no money to pay for the work done by Story-Gawley; consequently,

the molds gathered dust for several months. The stalemate was broken with the proposal to form the Union Airplane Company. Based on the R-6 racer, Keith Rider laid out a two-place sport trainer with possible military sales appeal. By using some inserts, the existing concrete molds could turn out the proposed sport trainer fuselages. As the Union Airplane Company, Story-Gawley would be reimbursed for the cost of the molds from the prize money earned by the R-6 racer. With hopes of getting the plane completed in time for the 1937 National Air Races at Cleveland, construction got underway enthusiastically.

The R-6 acquired the name EIGHT BALL, the feeling being that by its superior performance it would put its competitors behind it. However, as events began to unfold, the name reverted to the more commonly understood symbol of bad luck.

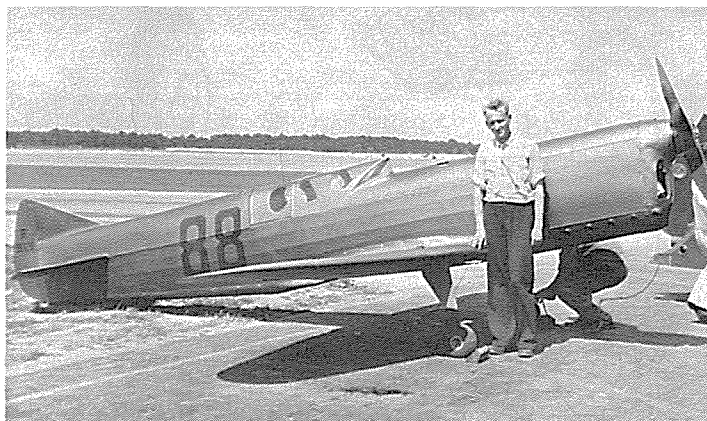
During the fuselage mold stalemate, the wing had been started and was now nearing completion. An undue amount of flexibility was discovered as the wing was being handled by the work crew. Further examination revealed some questionable workmanship and the wing was scrapped.

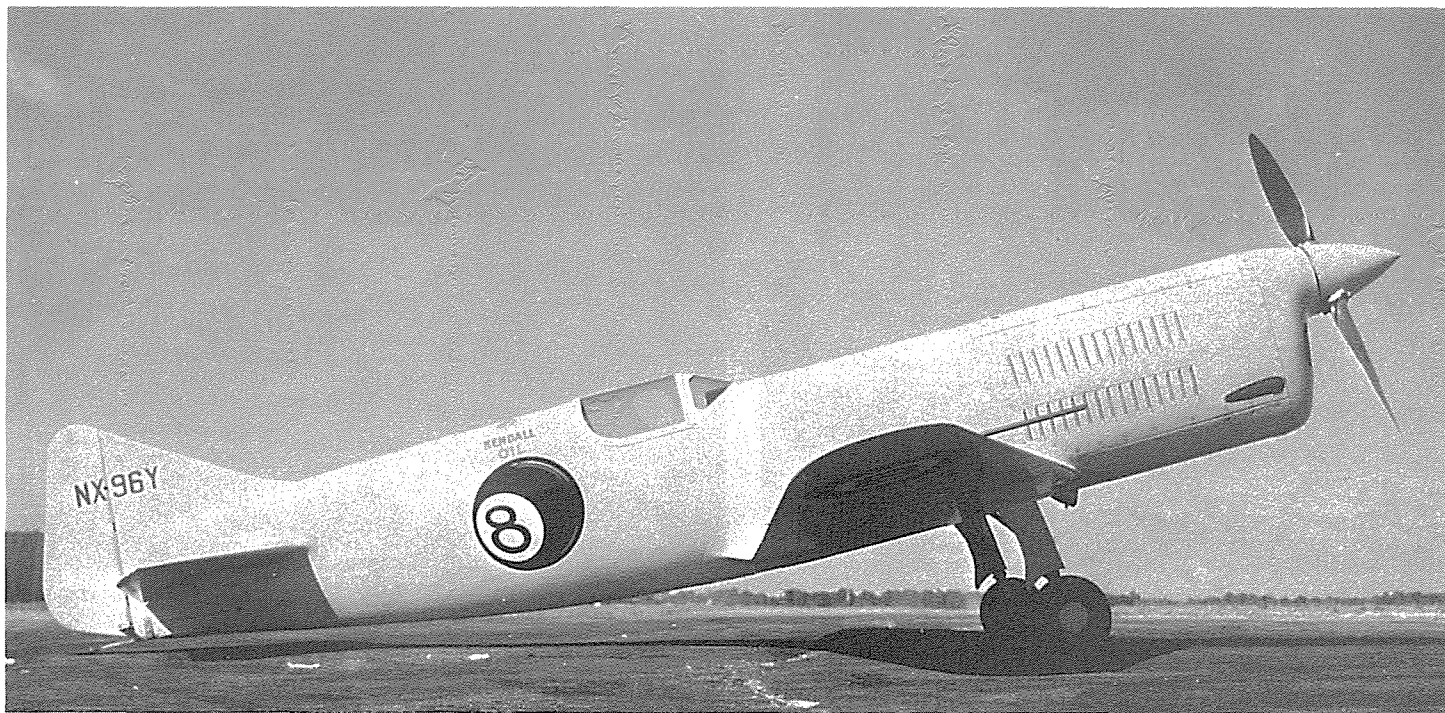
A new wing was started immediately using the same layout and patterns, but incorporating deeper section main and rear spar at the root chord area that would be covered by the fuselage. The spars actually emerged through the upper plywood covering in this area. This was a clever and quick fix that Keith Rider gambled on to solve a rather serious design error.²

Unfortunately, as later flight tests would prove, the added strength was applied in the wrong area of the wing. The sharply swept back leading edge located the wing ribs progressively in a rearward direction while the straight main spar and parallel rear spar, of necessity, fell in the shallow sections of the ribs as they approached the wingtips. In the area adjacent to the ailerons, very little spar strength remained to resist the twisting moments imposed by the ailerons in a high-speed banking turn. The pressure to get the plane completed in time for the 1937 National Air Races to be held in Cleveland September 3rd to the 6th overruled a complete redesign of the faulty wing.

While the Rider crew was rushing to rig up the new wing, Frank Haines, who had been involved in construction of the discarded original wing, rescued it from the rubbish and proceeded to build a racing plane of his own. His fuselage was a slightly modified copy of the Rider R-4/R-5 with a Menasco B-6 (48 cu. in.), reportedly obtained from the liquidation of the Wedell-Williams organization. The engine cowling was from the

Haines H-3 utilizing the discarded first *Eight Ball* wing in Cleveland in 1937. Frank Haines crashed fatally in this ship at the Miami All American Air Maneuvers in December 1937. (Rudy Profant Collection)





Side view of the 1938 version of the R-6 shows its sleek smooth lines.



The *Eight Ball* wing being mated to the fuselage in Cleveland in August 1938. The man under the felt hat at the trailing edge is Tony LeVier, exhibiting his usual good sportsmanship. (Mike Kusenda)

Details of the landing gear. Note adjustable scoop.

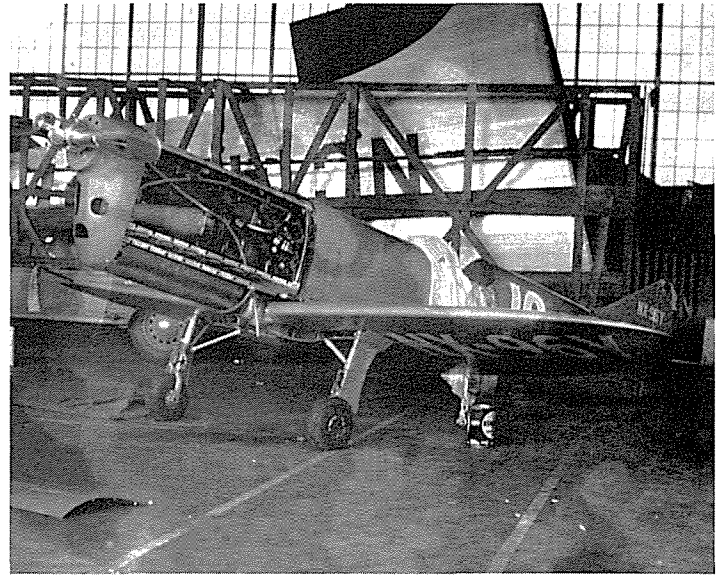


The wing of the R-6. The front and rear spars can be seen protruding above the wing mold line. The two openings near the forward portion of the wing are for the landing gear. The two tunnel-like openings between the spars are apparently clearance for the heels to operate the rudder bar.





This hangar shot shows the engine installation. The engine bearer can be seen above the engine mounting pads.



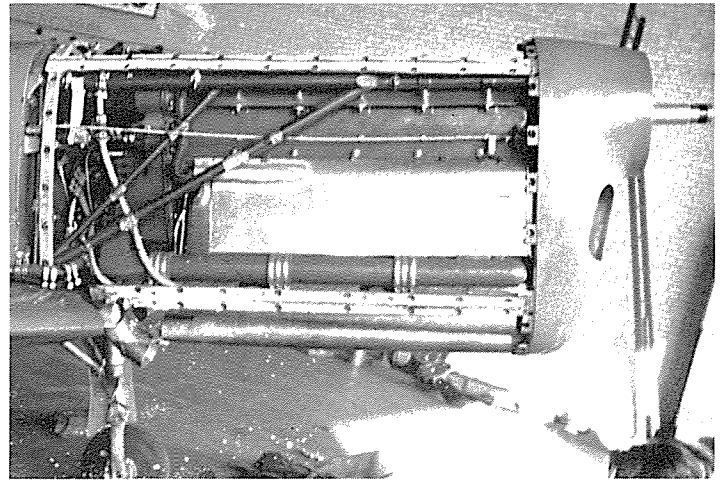
A hangar shot of the 1939 R-6.

1936 Rider R-4 donated by new owner Bill Schoenfeldt. The Haines H-3 made an appearance at the 1937 Cleveland N.A.R. and managed to turn in a time of 188.535 mph while placing last in the Greve qualifying race. A number of protests were filed by pilots charging that the plane was structurally unsound and Haines with lack of experience. No actions were taken by either the contest or technical committees. The poor speed kept the Haines H-3 out of competition for the duration of the 1937 Cleveland N.A.R., the important point being that it flew a full 10 months before the Rider R-6 EIGHT BALL.

At the All American Air Maneuvers in Miami on December 3, 1937, a 30-lap race around a five-mile triangular course, Frank Haines was killed instantly in the crash of his H-3 at the scattering pylon moments after takeoff. The crash made nationwide headlines because Rudy Kling, who had won the Thompson and Greve races three months earlier at Cleveland, also crashed fatally at almost the same moment. The newspapers mentioned mysterious "downdrafts" and "air pockets" as the cause. Knowledgeable witnesses agree that both were woefully inexperienced race pilots and did not exercise good judgment in their zeal to get around the 180-degree pylon turn without sufficient air speed.³ Back in California where the EIGHT BALL was nearing completion, the news of the Haines crash introduced a feeling of apprehension about the strength of the new wing. The possibility of structural weakness of the wing being a strong factor in the Haines crash could not be discounted.

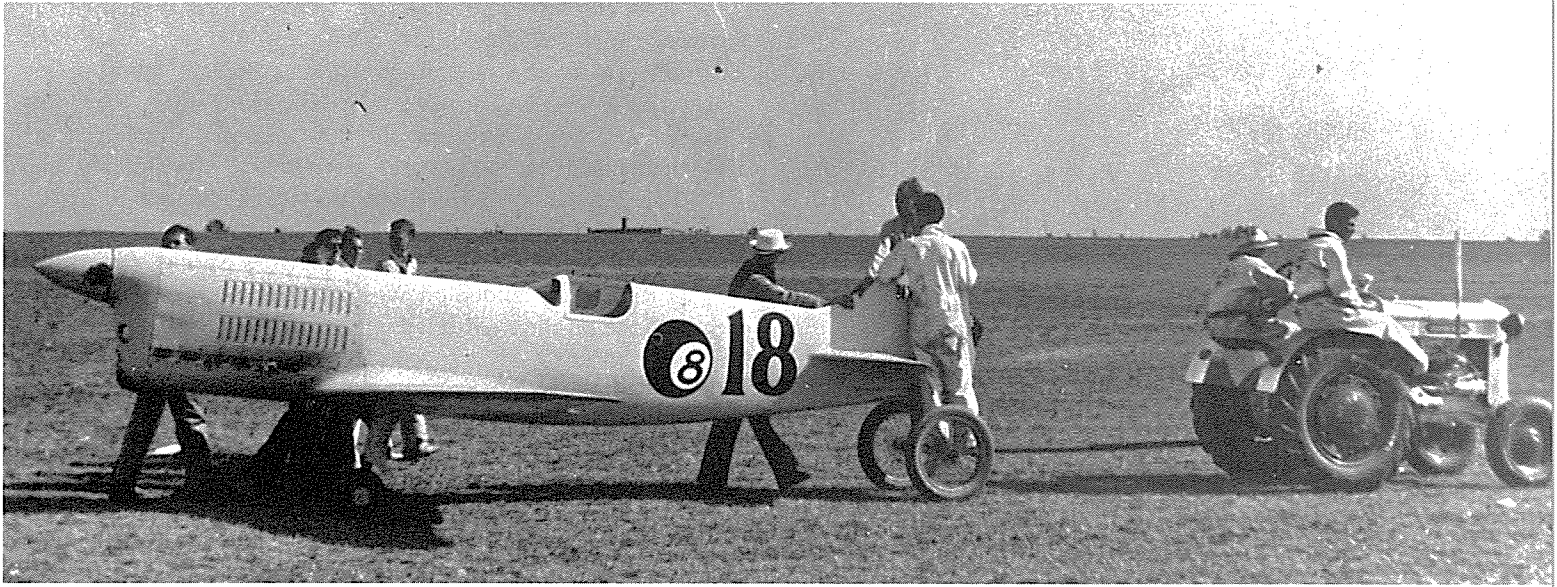
On May 30, 1938, at Oakland's Pacific International Air Races, the Rider R-6 EIGHT BALL made its first public appearance. Aesthetically, the EIGHT BALL's overall appearance was described as "nothing short of breathtaking." Finished in pale "Azure Blue," furnished by Frank Fuller, executive of the Fuller Paint Co., the plane was flawlessly smooth, reflecting painstakingly near-perfect workmanship by the Rider crew. The black stylized racing and registration numbers were painted by erstwhile jack-of-all-trades Rodney Nimmo, veteran of several Keith Rider racing plane projects.

Closer examination of the new ship revealed some rather curious details in its make-up. The sharp elongated prop spinner that contributed a great deal to the sleek appearance of the



A closeup of the engine mount shows the suspended mounting system used on the R-6.

plane, actually was the result of an error by the metalsmith. When the wooden form over which the spinner was to be shaped was being laminated, $\frac{3}{4}$ -inch-thick wood discs were inadvertently used instead of the specified $\frac{1}{2}$ -inch-thick stock, thus the spinner grew $\frac{1}{4}$ inch longer with each lamination. The spinner gave no trouble when tested so no attempt was made to replace it. The propeller was similar to ones Story-Gawley had made up for the Lawrence Brown racers previously, consisting of a Hamilton Standard steel hub and modified aluminum blades capable of being adjusted to various angles on the ground. With the cowl panels removed, the Menasco C6-S4 super Buccaneer showed no outward signs of extensive hop-up modifications. The small side-mounted oil cooler stood out as the clue. To realize at least 350 hp in the 3000-rpm range at racing speeds, William Schoenfeldt, Art Chester and Harry Crosby had supplemented this oil cooler with a skin type to help dissipate the tremendous engine heat. Another rather curious detail of the engine installation—instead of the tubular engine mounts passing under the Menasco mounting lugs in the conventional manner, the method was reversed and the entire weight of the engine hung from the mounts on ten $\frac{5}{16}$ diameter bolts, a rather frightening arrangement for those who recalled the 1934



1938 Cleveland Air Races. The R-6, now with its official race number, being towed to start line.

incident at New Orleans when the engine fell out of Ralph Bushey's then-new *Brown B-1* racer.

Veteran racing pilot Roger Don Rae, now a full-time TWA employee, was on hand to put the EIGHT BALL through its paces. Rae was a rare combination: a born pilot, easily adaptable to any flying machine and capable of instantly diagnosing a new plane's behavioral problems, which made him very much in demand as a test pilot by race plane builders. TWA, like most major airlines, prohibited their pilots from such frivolous off-time pursuits as pylon racing and aerobatics, citing bad public relations as the primary reason. Rules notwithstanding, Rae strapped on his trusty backpack chute and got the EIGHT BALL into the air so easily few spectators were aware that this was its initial flight. After a short familiarization, Rae had the EIGHT BALL back on the ground. It was obvious from the animated conference that followed between Rae and Rider that a problem involving lateral control existed. At speeds approaching 230 mph, aileron movement to initiate a bank twisted the thin swept-back wing torsionally, causing an increase in the angle of incidence at one wingtip while decreasing it at the opposite tip, nullifying the aileron effect. While Keith Rider wrestled with this dilemma, Roger Don Rae flew the plane in the straight-away Joel Thorne Speed Dash event, turning a cautious 224.353 mph.

The obvious solution to the weak wing, of course, would have been the construction of a new, more sturdy one. The three months remaining before the coming 1938 Cleveland National Air Races was plenty of time to build a new wing, but the project was now financially in the red with no money to construct another wing. To salvage the project in hopes of making some "place" and "show" money at Cleveland, some adjustments were made to the ratio of up-and-down travel of the ailerons which did, to a small degree, minimize the wing twisting at speeds below 225 mph. Together with these adjustments, Roger Don Rae developed a technique that eased the EIGHT BALL around the pylon turns in somewhat more conservative style than usually displayed by the flamboyant pilot, but nevertheless got it around.

For the upcoming Cleveland National Air Races September 3, 4 and 5, the question remained: how to keep news publicity of

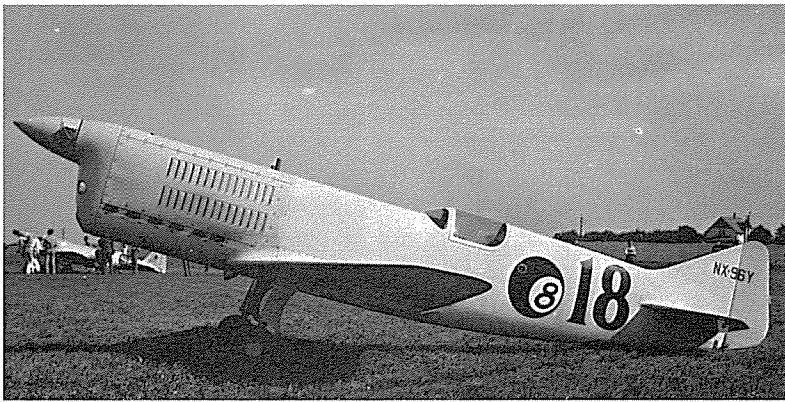
Roger Don Rae's racing activity from jeopardizing his TWA career. The entry form mailed to Cleveland named one A.G. Lary as pilot of the EIGHT BALL, and in parenthesis Roger Don Rae was listed as alternate pilot. This scheme might have worked with some degree of success had Lary accompanied the EIGHT BALL crew to Cleveland, but he remained in Los Angeles awaiting the start of the Bendix Transcontinental Race in which he was to act as copilot with Ross Hadley. Keith Rider, Roger Don Rae and the EIGHT BALL crew arrived in Cleveland the latter part of August with the disassembled plane on a trailer. The assembly and adjustments to the EIGHT BALL began immediately. Rae was anxious to test fly the ship as soon as possible so that the ailerons could be set up to minimize the troublesome wing distortion.

As Roger Don Rae went through a series of test flights in the EIGHT BALL, news media reporters were frustrated in not being able to find any biographical material on mystery pilot A.G. Lary. The *Press and Radio Manual*, furnished by N.A.R. publicity chief Walter Orr to all newsmen, contained brief biographies of all race and aerobatic pilots, but no mention of A.G. Lary.

As qualification trials got underway Wednesday, August 30, high winds discouraged the pilots of the smaller racers, so only Roscoe Turner in his powerful Laird-Turner special and Earl Ortman in the Marcoux-Bromberg registered official speeds. The remaining two qualifying days, newsmen and a handful of spectators were treated to a *tour de force* by Roger Don Rae. He did a masterful job of qualifying the cripple-winged EIGHT BALL at a creditable 230.621 mph average.

As a favor to designer-builder Clayton Folkerts, Rae qualified the SK-4 at 251.748 mph in spite of aileron flutter. The Delgado Flash was taken around the qualifying course by Rae for an average of 220.994 mph. Assigned pilot Clarence McArthur had not yet made his appearance in Cleveland.

Walter Orr called newsmen together and asked for their cooperation to make the 1938 N.A.R. a success. He went on to explain that Roger Don Rae was volunteering to test some of the race planes in the interest of safety, and in the case of pilots who would be late in arriving he would qualify the planes that otherwise might be left out of competition. He hoped that newsmen



The Rider R-6 *Eight Ball* just prior to the start of the 1938 Greve Trophy Race. The number 8 was disallowed and number 38 assigned, but for some unexplained reason the number 18 was painted on.

would soft-pedal the use of Rae's name in their news releases. As a result of the briefing, one Cleveland newspaper credited A.G. Lary with qualifying the *EIGHT BALL* while another named Joe Jacobson as the qualifier. Joe Jacobson had come to Cleveland with the dream of duplicating the 1937 Rudy Kling feat of capturing both the Greve and Thompson races. The new Folkerts SK-4 was unquestionably a more sophisticated racing machine than its predecessor.

The SK-4, however, was being plagued with a case of aileron flutter that defied any quick fix. After conferring with Rae on the idiosyncrasies of the SK-4 and the *EIGHT BALL*, Jacobson chose what seemed to him the lesser of two evils—he agreed to fly the *EIGHT BALL* in the Greve and Thompson events. By limiting his speed to 220 mph, Rae assured Jacobson the *EIGHT BALL* would be relatively docile. After some soul searching, Clayton Folkerts withdrew the SK-4, narrowing the starting lineup for the Greve race to six.

Roger Don Rae got involved with at least one more racing plane before opening day. The Pearson-Williams MR. SMOOTHIE appeared to be the most advanced racing plane of its day. After surviving a near-miss crash in the hands of rookie pilot Lee Williams on its first flight, Rae was enlisted to test and diagnose its problems. Unfortunately, or perhaps fortunately, time ran out on this handsome machine before it could attempt a qualifying try.

On Sunday, September 3, as the contending planes lined up for the 200-mile (20 laps around a 10-mile course) Greve Trophy for planes of less than 550-cubic-inch engine displacement, men of the news corps were on the alert, curious to see what the unpredictable Roger Don Rae might try next. As the engines were started, Joe Jacobson stood by the *EIGHT BALL*. A Ford convertible with Rae aboard rolled up to the starting line, and after an animated conference, it was Jacobson that donned the helmet and goggles and wiggled into the cockpit of the *EIGHT BALL* to await the starting bomb. Prior to the start of the race the *EIGHT BALL* suffered the indignity of having the racing number 8 declared invalid. Timers and judges complained that the numerals were difficult to see because of their small size. The contest committee assigned the number 38, but for some unexplained reason the *EIGHT BALL* now carried a large number 18 applied just behind the existing eight-ball caricature.

The 1938 Greve Trophy race was probably the most exciting air race ever staged. Tony LeVier in the Schoenfeldt FIRE-CRACKER and Art Chester in his brand-new GOON ran away from the rest of the starters and put on a seesaw battle that saw

the lead exchanged at least ten times before LeVier finally crossed the line as the winner. Harry Crosby in the CR-4 pulled up and out of the race on the fourteenth lap, allowing Joe Jacobson in the *EIGHT BALL* to inherit third place. The only other plane still in the air at the finish was Earl Ortman in the Marcoux Bromberg JACKRABBIT, formerly the Elmendorf special—a hopelessly outclassed airplane that had been granted a courtesy start in this event to fill out the meager starting lineup. George Dory, flying the Bushey McGrew special (revamped Rider R-2), crash landed on West 227th Street when his engine threw a rod on the twelfth lap, and was credited with fifth place.

THE GREVE TROPHY RACE, SUNDAY, SEPTEMBER 4, 1938

Place	Pilot	Plane	MPH	Prize Money
1	A. LeVier	Schoenfeldt Spec.	250.88	\$12,000.00*
2	A. Chester	Chester Spec.	250.416	5,000.00
3	J. Jacobson	Keith Rider R-6	218.278	2,000.00
4	E. Ortman	Marcoux Bromberg	192.503	1,000.00
5	H. Crosby	Crosby CR-4	Out lap 14	549.23
6	G. Dory	Bushey McGrew	Out lap 12	470.77

*Included special award of \$2,000.00 for establishing new speed record.

Although observers felt Jacobson's 218 mph disappointingly slow, in reality it would have served no purpose to have gone faster. Jacobson wisely heeded Rae's last-minute advice on the dangerous wing twisting at higher speeds. Even if he could have matched Rae's phenomenal 230 mph qualifying speed, it would not have changed his third-place finish.

The entry list for the traditional Thompson Trophy Labor Day classic had dwindled from 21 planes to a mere 8 by race day, Monday, September 5, partly due to attrition and partly to "no shows." The race, now 30 laps around a 10-mile quadrangular course 100 miles longer than 1937, had forced owners of some of the smaller ships to cram extra fuel tankage into already crowded interiors.

QUALIFYING SPEEDS—1938 THOMPSON TROPHY RACE

Pilot	Plane	Average Speed 2 Laps
R. Turner	L.T.R. Spec.	281.250 mph
S. J. Wittman	"Bonzo"	277.780 mph
E. Ortman	Marcoux Bromberg	270.437 mph
A. Chester	"Goon"	268.456 mph
L. Wade	Military Aircraft H.M.1	264.317 mph
J. Mackey	Wedell Williams	261.488 mph
H. Crosby	CR-4	239.680 mph
J. Jacobson	Rider R-6	230.621 mph

The 50 mph difference between fastest qualifier Turner and Jacobson was, in reality, much larger because, as in the Greve race, the *EIGHT BALL* would be flown at below 220 mph to insure a safe finish, hopefully in the money. Roscoe Turner, usually a slow qualifier, could be expected to better his qualifying speed in the race when pushed by Earl Ortman and Steve Wittman. The *EIGHT BALL* crew was pinning its hopes on a closely fought, high-speed battle resulting in several dropouts to put their crippled plane in the money.

The prestigious Thompson Trophy race got underway after a short delay at 4:07 P.M., Monday, September 5, 1938. Earl Ortman jumped into the lead at the first pylon turn and for five laps gave Roscoe Turner a lesson on flying a pylon race. Entering lap 6, Ortman's oil temperature shot up and pressure went down with an accompanying loss of power. He managed to nurse the Marcoux Bromberg along to finish second. Steve Wittman flew the entire race in a consistent third place. Leigh Wade was cred-

ited with fourth place, after a pylon cutting charge was dismissed. Art Chester pulled out after completing 20 laps with engine overheating. Harry Crosby lost his exhaust manifold and had to leave the race after 10 laps. Joe Mackey, piloting Turner's old Hornet-powered Wedell Williams, managed a close fifth place, less than 4 seconds behind Wade. With all other contestants on the ground, Joe Jacobson was flagged down as he finished lap 27 for an average speed of 214.570 mph.

THOMPSON TROPHY RACE, MONDAY, SEPTEMBER 5, 1938

Place	Pilot	Plane	MPH	Prize Money
1	R. Turner	L.T.R. Spec.	283.419	\$22,000.00*
2	E. Ortman	Marcoux Bromberg	269.718	9,000.00
3	S. J. Wittman	Witman Spec. "Bonzo"	259.187	4,500.00
4	L. Wade	Military Aircraft H.M.-1	249.842	2,500.00
5	J. Mackey	Wedell Williams	249.628	1,800.00
6	J. Jacobson	Keith Rider R-6	214.570	1,400.00
7	A. Chester	Chester Spec. "Goon"	Out lap 20	600.00
8	H. Crosby	Crosby CR-4	Out lap 10	

*\$18,000.00 + \$4,000.00 Allegheny Ludlum award for new record.

The EIGHT BALL had earned \$1,400 for its sixth-place finish in the Thompson event, but, as in the previous Greve race, a goodly portion of the prize money went to pilot Joe Jacobson. Although the completion of the Thompson Trophy Race signaled the end of the National Air Races until the following year, one more opportunity to earn some extra money before leaving Cleveland was offered by the producers of the motion picture, *Tailspin*, a film dealing with a fictitious all-women's pylon race. The camera crews had been on hand in Cleveland since mid-August filming race preparations and then the races, but still needed extra footage to match the script outline. The bad luck that had dogged the EIGHT BALL from its inception persisted to its screen test. The pale blue color that had been one of the outstanding features of the EIGHT BALL's appearance, did not photograph well in the flight scenes. The plane was given a hurried paint job in a nondescript dark blue. The color was described by someone as "dusty blue," which may have been quite accurate—dust appeared to be one of the ingredients of the paint mix. Covered now were the controversial stylized racing numbers replaced by a white number 18 on both sides of the fuselage and top of the left wingtip. The name EIGHT BALL, however, stuck with the ship, even to this day.

Upon his return to Los Angeles, Keith Rider set to work designing a new wing for the EIGHT BALL, this time determined not to duplicate any of the problems encountered in the other two wings. The new wing was laid out on an elliptical planform somewhat similar to the British Supermarine Spitfire fighter. Using the efficient N.A.C.A. 23012 airfoil, with a longer root chord than the previous wing, Rider was able to achieve a greater spar depth that diminished more gradually toward the wingtips because of the elliptical taper. Looking forward to the 1939 racing season with hopes of shedding the unbelievable bad luck of 1938, the new wing was built with mostly volunteer labor. A Hamilton Standard constant speed propeller was acquired and modified in the Story-Gawley shop. The blades were cut off to a 6-foot diameter giving it a paddle blade appearance, common with today's turbine-powered planes, however, in 1939 a rather radical appearance. The bulky hub and counterweights canceled out the use of the spinner giving the plane an unfinished appearance up front. George Byars, a 26-year-old former Navy pilot without any racing experience, agreed to take on the piloting duties of the revamped EIGHT BALL. The new wing proved to



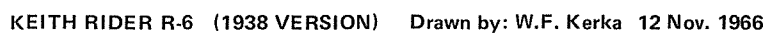
George Byars beside the new winged R-6. Note the starter crank.

be sturdy enough to permit full engine power to be used for the first time, so attention was turned to increasing the power output of the Menasco C6-S4. High-compression pistons were installed prior to the long trek east to Cleveland.

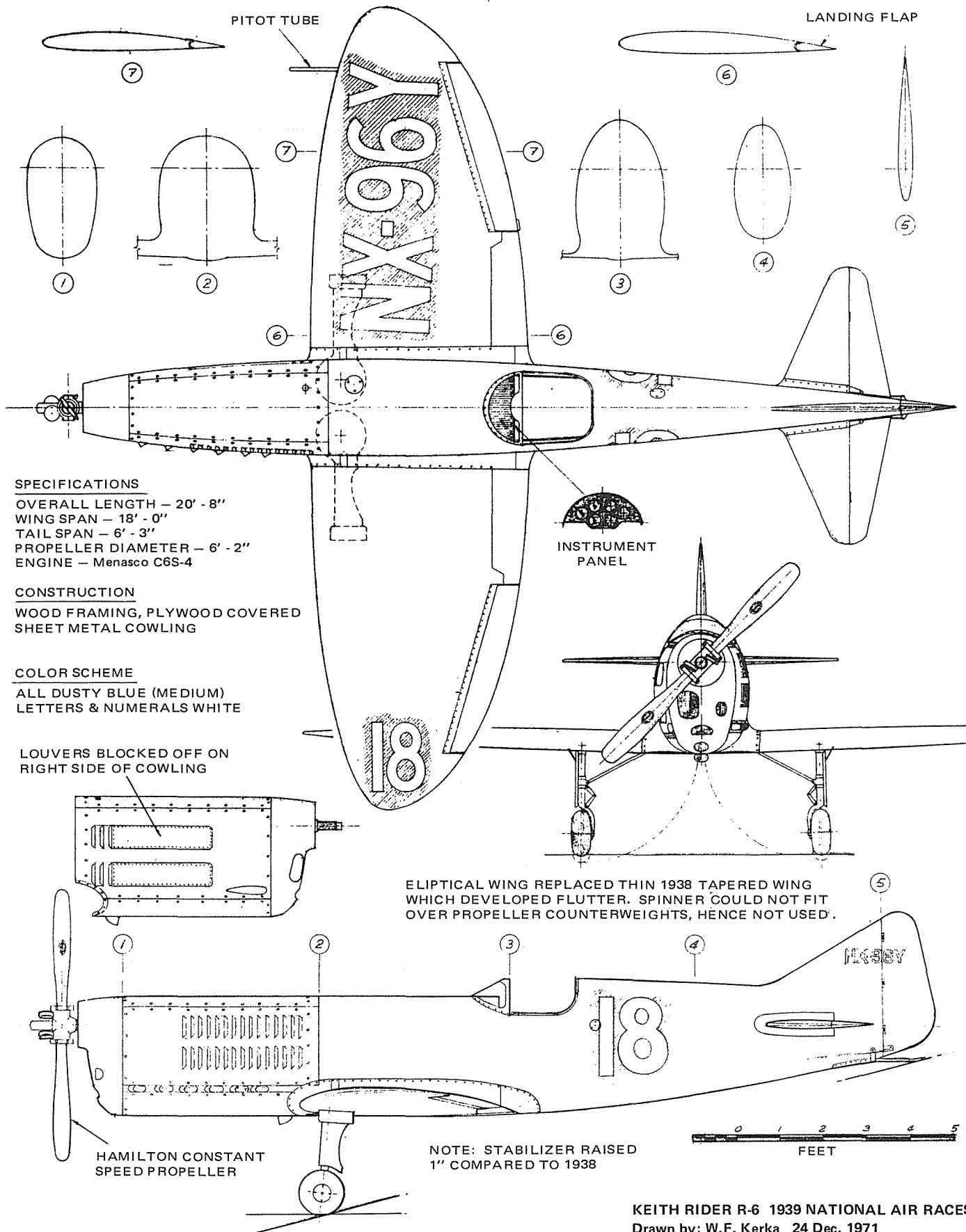
For air racing, the year 1939 was a dismal one. The war clouds gathering in Europe sparked the American aviation industry into an overnight prosperity. Members of the racing fraternity were leaving for the steady pay the industry was offering. It was an open secret this would be the last year of the Cliff and Phil Henderson management of the National Air Races. The brothers had been the first and the only managers of the air spectacle. The entry list for the Thompson Trophy Race totaled 11 planes and the Greve a mere 7 planes. The only new plane, the Floyd-Bean special, a slightly enlarged version of the ill-fated 1938 Chambers special, was damaged on landing after a test flight and never appeared at Cleveland. The Delgado Flash was again without a pilot and had to be scratched.

Shortly after arriving in Cleveland, the EIGHT BALL crew encountered overheating problems with the now-uprated Menasco. A painfully slow educational process ensued while the crew tried to catch up with the engine-cooling technique now employed by Schoenfeldt, Chester and Crosby. The EIGHT BALL engine cowlings, with a multitude of venting louvers on both sides, allowed cooling air to escape almost as quickly as it came in without carrying away heat generated by the closely spaced six cylinders. Mechanics began to progressively blank off louvers in a kind of trial-and-error program without a great deal of success. Photos taken prior to the Greve Race show various louver patterns, evidence of this struggle.

On Sunday, August 27, Del Bush crashed fatally in the Folkerts SK-4 while on a combination test and familiarization flight over Cleveland airport, eliminating another entry from both the Greve and Thompson. Qualifications began officially on Monday, August 28, with only Roscoe Turner, Joe Mackey and Tony LeVier making successful runs. For the next two days, race officials worried as to whether enough planes could be qualified to put on an acceptable Greve Trophy Race. Thursday, August 31, Earl Ortman managed to get to Cleveland from his Canadian Air Lines job to qualify the Marcoux Bromberg. Also qualifying the same day were Lee Williams in Marion McKeen's Brown B-2, and Steve Wittman in his BONZO. Friday, September 1, saw Art Chester as the only successful qualifier as the EIGHT BALL crew still wrestled with the overheating problem. Race officials meanwhile had discarded any thoughts of a deadline for qualifications. Saturday, September 2, opening day, Frank Fuller in his Seversky S-2 ran away with the Bendix Trans-



FRONT PROFILE OF WING



SPECIFICATIONS

OVERALL LENGTH — 20' - 8"
WING SPAN — 18' - 0"
TAIL SPAN — 6' - 3"
PROPELLER DIAMETER — 6' - 2"
ENGINE — Menasco C6S-4

CONSTRUCTION

WOOD FRAMING, PLYWOOD COVERED
SHEET METAL COWLING

COLOR SCHEME

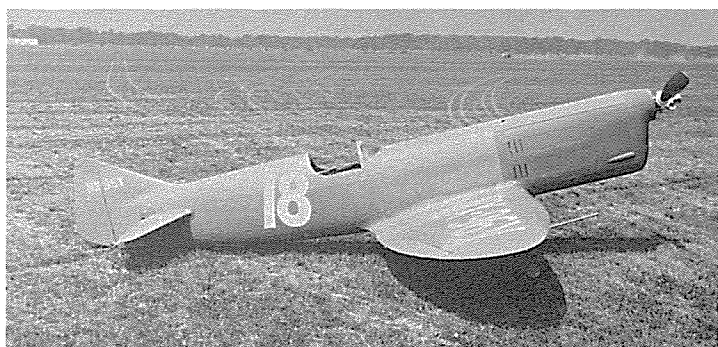
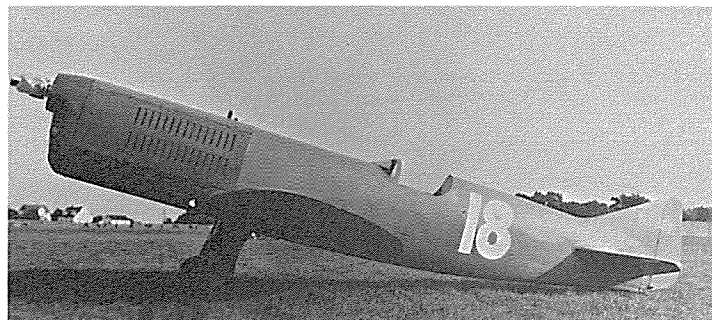
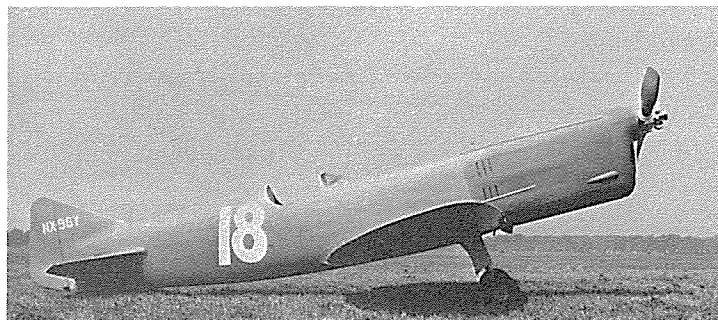
ALL DUSTY BLUE (MEDIUM)
LETTERS & NUMERALS WHITE

LOUVERS BLOCKED OFF ON
RIGHT SIDE OF COWLING

ELLIPTICAL WING REPLACED THIN 1938 TAPERED WING
WHICH DEVELOPED FLUTTER. SPINNER COULD NOT FIT
OVER PROPELLER COUNTERWEIGHTS, HENCE NOT USED.

NOTE: STABILIZER RAISED
1" COMPARED TO 1938

KEITH RIDER R-6 1939 NATIONAL AIR RACES
Drawn by: W.F. Kerka 24 Dec. 1971



The sleek lines of the R-6 remain unchanged for 1939 except for the prop spinner that would no longer fit the controllable pitch prop as reworked by

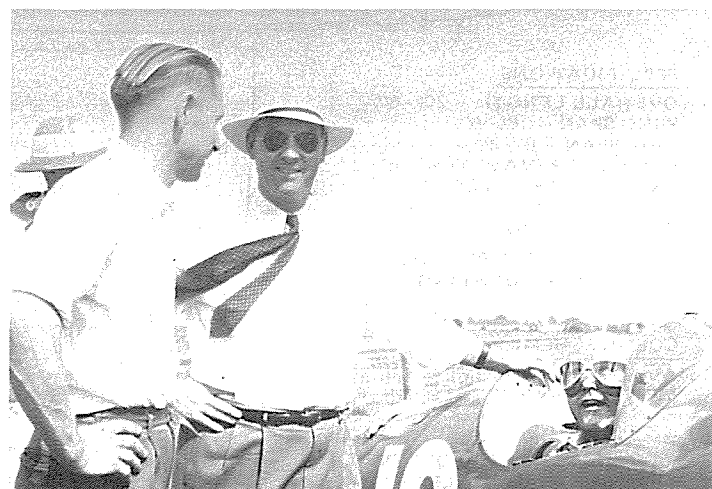
Story-Gawley. Note the louvers on the engine cowl have been nearly removed on the right side of the cowl to improve air cooling of the engine.

continental Derby. With the 200-mile Greve Trophy Race scheduled to start at 4:00 P.M. the following day and only three qualified planes, a maximum effort was extended by all crews and officials to get the EIGHT BALL and Harry Crosby's CR-4 qualified in an unusual morning session Sunday, September 3. For Harry Crosby the extra time paid off—at 9:30 A.M. he turned two laps at a phenomenal 263.158 mph. All hope for the EIGHT BALL had faded when at 2:19 P.M. George Byars got it airborne during a lull between aerobatics of a glider trio and Jesse Bristow's smoke exhibition. Byars turned in a two-lap average 234.834 mph, 5.166 mph short of the new 240 mph minimum for the Thompson Trophy race, but well above the 220 mph Greve Trophy race requirement.

QUALIFYING SPEEDS—1939 GREVE & THOMPSON RACES

Pilot	Plane		Average Speed 2 Laps
R. Turner	L.T.R. Spec.	#29	297.767 mph
A. LeVier	Schoenfeldt Spec.	70	277.154 mph
S. J. Wittman	Wittman Spec.	4	273.764 mph
A. C. Chester	Chester Spec.	5	268.857 mph
H. H. Crosby	Crosby C.R.-4	52	263.158 mph
J. Mackey	Wedell-Williams	25	251.221 mph
E. Ortman	Marcoux-Bromberg	2	244.565 mph
L. Williams	Brown B-2	33	228.137 mph
G. Byars	Rider R-6	18	234.834 mph

At this point, the record is not clear. After the EIGHT BALL was towed back to the hangar, rumors circulated about a burned piston on the last lap of Byars' qualifying run. In less than two hours, the EIGHT BALL was on the starting line for the Greve race. Because of a southerly wind, the scatter pylon had to be employed. As the engines idled in the planes of LeVier, Chester, Crosby and Williams, the start was delayed as the EIGHT BALL crew went through the motions of starting the engine. Just as the starting bomb went off, sending four planes hurtling toward the scatter pylon, the EIGHT BALL was engulfed in a thick cloud of smoke and was left at the starting line. What exactly happened to the EIGHT BALL was overshadowed by Lee Williams' tragic fatal spin at the scatter pylon. Williams, starting his first race in



Art Chester talks to Keith Rider and Byars at 1939 races.

a badly outclassed airplane, stalled when he tried to make a 180-degree turn around the pylon with insufficient flying speed; a replay of the 1937 Kling, Haines tragedy in Miami. While the wreckage of Williams' Brown B-2 was being cleared away, attrition had taken its toll in the Greve Race. By lap 15, Art Chester was all by himself, and went on to win with an average speed of 263.390 mph, netting \$8,000 plus \$1,000 for breaking the previous year's record.

For Keith Rider and the EIGHT BALL, the year 1939 was a monumental disappointment. Ironically, this was the latest and most sophisticated of Rider's seven racing machines and the least successful. A look back at some of the previous Rider racers shows similar historic beginnings. The 1931 R-1 became quite successful after being acquired by mechanic Rudy Kling in 1934. After being purchased by Hal Marcoux and Jack Bromberg in 1936, the 1934 R-3 became a formidable competitor. Bill Schoenfeldt rescued the 1936 R-4, and with Tony LeVier turned it into a virtual giant killer. In each case, it was primarily professional powerplant improvement and maintenance that turned them into winners.



Apparently cooling was still a problem at the races. Note the large opening added to the lower row of louvers.

RIDER R-6 "EIGHT BALL" NX 96 Y 1939

Pilot:	George Byars
Entrant:	Keith Rider
Engine:	Menasco C6-S4
Supercharger:	10.9 to 1
Displacement:	544 cu. in.
Propeller:	Hamilton Standard Controllable Pitch—6 ft. dia.
Fuel Capacity:	80 gals.
Wing Span:	18 ft.
Wing Area:	75 sq. ft.
Weight, empty:	1100 lbs.
Weight, gross:	1810 lbs.
Wing Loading:	24.2 lbs. per sq. ft.
Landing Gear:	Manually retractable
Tire Size:	13.25 streamlined Goodrich
Flaps:	Plain hinged trailing edge 30 degrees

REFERENCES

1937 National Air Race Press Radio Manual
 1938 National Air Race Press Radio Manual
 1939 National Air Race Press Radio Manual
Popular Aviation, September 1934
Popular Mechanics, November 1938

EDITOR'S NOTES

1. It is interesting to note that this proposed racer used a steam-cooling system similar to that used in the Messerschmitt Me209 (P-1059) that Fritz Wendel set the world's speed record of 469.22 mph on April 26, 1939. Of further interest is the maximum horsepower of the Me209. It used a Daimler Benz DB601A that delivered 2300 hp by the use of supercharging and an anti-detonation system. The speed and power range of Rider's proposed racer was not far from the Me209 some five years later.
2. Some questions exist as to the extent of the "design error." Keith Rider was considered to be a good engineer by his peers in the aircraft industry and the fact he increased the thickness of the wing root (in the fuselage) would lead one to suspect that Rider had concluded the wing bending moments might be higher than his original calculations thus necessitating a thicker spar at the center line. The wing flutter was probably due to the very thin section at the tip coupled with the swept-back leading edge that would tend to aggravate the problem due to the center of pressure moving aft to cause an inherent twisting of the wing. Thin wood wings bend and twist even when well designed and some of the current race plane designers have moved the ailerons inboard to solve the wing twist problem. (Cote's Shoestring with the new wing is a good example.)
3. This still happens today with experienced pilots making the same fatal error. Lack of proper speed at the scatter pylon is suspected as the cause of the fatal crash of Fred Wofford at the 1979 Reno Air Races.

ABOUT THE AUTHOR

This is Mike Kusenda's second contribution to the *Journal*, his previous article on the Rider R-4 *Schoenfeldt Firecracker* appeared in the Fall 1978 issue.

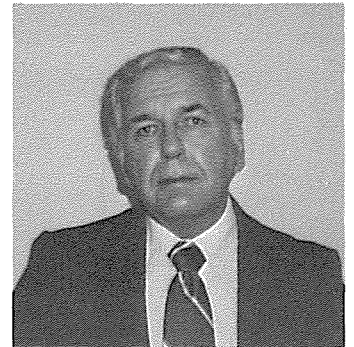
Mike attended all the world-famous Cleveland National Air Races, starting in 1929, as an eight-year-old youngster. He missed the 1930 event held in Chicago and the 1933 and 1936 contests which were hosted by Los Angeles.

In order to find out more about what made these airplanes go, he devised a multitude of dubious schemes to sneak past the "keep-out" ropes of the hangars in which the race planes were being prepared, all of which failed embarrassingly, until he came to the attention of members of local radio station WGAR, an affiliate of CBS, who were looking for help for the broadcast of the racing events. Armed with the necessary credentials, he was now able to snoop around at will.

In WWII he served with the much-decorated Navy Patrol Bombing Squadron 104 in the CBI theatre, flying PB4Y-1 *Liberators* and PB4Y-2 *Privateers*.

Mike has recently retired from NACA-NASA after over thirty years of service, most of it spent at the Lewis Research Center in the Engineering Design Division, which is located on the exact site of the old Cleveland National Air Races.

William F. Kerka, who prepared the R-6 drawings, is a member of the Cleveland Chapter of AAHS. Mr. Kerka is an Associate Professor of Engineering at the Cleveland State University and a lifelong air racing enthusiast. He leaves no stone unturned in his research prior to starting one of his drawings.



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