



The Flightline



Volume 46, Issue 4 Newsletter of the Propstoppers RC Club AMA 1042 April 2016

President's Message



Both fields are in good shape. When you go to CA field stay to the left side due to the mud. Elwyn field is good, no parking problems.

Try and get your AMA or name and phone number in your plane; IT IS THE LAW. Just in case your plane should fly away.

Hopefully we can get the Picnic dates picked at the meeting.

The night indoor flying is over and will start up again in the fall.

Please bring in show & tell or if you want to sell something bring it in.

Dick Seiwel, President

*Agenda for April 12th Meeting At
At the Church Room, CA Field
Meeting 7:00pm till 8:30?*

1. Membership Report
2. Finance Report
3. Club Calendar Review
4. Club Picnic Plans
5. Show and Tell

Minutes of the Propstoppers Model Airplane Club March 8, 2016 at the Christian academy meeting room

Call to order took place at 7:15 PM by President Dick Seiwel following member registration
Roll call by membership chair Ray Wopatek showed 20 members and one guest present
Minutes of the January meeting as published were approved

Treasurer's report by Pete Oetinger was presented

Old Business:

President Seiwel reminded the membership to register with the FAA and place that number along with name and address somewhere on the model.

New Business:

Dwayne Myers spoke about batteries. He explained C ratings, battery degradation and the measurement of internal resistance. He pointed out that aged batteries lose power as the discharge and this process worsens with time.

Show and Tell:

Larry Woodward showed a high wing foam trainer that he built from plans. He showed how it can be configured in many ways to be three or four channel and pusher or tractor.

He also showed a new first person view camera and screen that he has acquired.

Ken Merlino showed a rubber powered stick and tissue model the One Night 28. He picked it up at a model show and is anxious to see it fly.

Al Tamburo showed several G scale train cars all scratch built. They all run and are planned to run under his shore house.

Adjournment took place at 8:55 PM

Dick Bartkowski Secretary

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Calendar of Events

Club Meetings

Monthly Meetings

Second Tuesday of the month.

Gateway Community Church at the Christian Academy. Doors open at 7:00

Next Meeting; 12th April at Church Meeting Room

Tuesday Breakfast Meeting

Tom Jones Restaurant on Edgemont Avenue in Brookhaven. 9 till 10 am. Just show up.

Flying after in the summer at CA or Elwyn Field 10 am. Weather permitting.

Indoors at the Brookhaven Gym in bad weather 10:30-11:30 See dates allowable.

Regular Club Flying

At Old Christian Academy; **Electric Only**

Monday through Friday after school till dusk

Saturday 10 am till dusk

Sunday, after Church; 12 pm till dusk

At Elwyn Field; Gas or Electric

Monday through Saturday 8 am till dusk

Sunday 12 pm till dusk

INDOOR Flying, see attached dates.

Special Club Flying

Saturday mornings 10 am

Wednesday Helicopter evening in summer

Thursday evenings in the summer

Tuesday mornings 10 am weather permitting after breakfast.

Check our Yahoo Group for announcements;

<http://groups.yahoo.com/group/propstoppers/>

Beginners

Beginners using due caution and respecting club rules may fly Apprentice or similar models without instructors at Christian Academy Field.

The club also provides the AMA Introductory Pilot Program for beginners without AMA insurance.

University Support Redux

For a number of years Dave Bevan, Chuck Kime and I have been supporting the various university engineering student programs associated with model aircraft. Most of this has been reported on these pages.

Currently Chuck and I have been supporting Drexel University teams engaged in the SAE Aero Design competitions.

This year a team is planning to compete in the Micro Class in California. This class is for a hand launched electric powered model that fits in a 6 inch tube, can be assembled in less than 2 ½ minutes and carries the maximum payload.

The team is really late in their work. As I write this they have just left my workshop with a pair of wings. Nothing much else exists and there is only a week left for them to finish the model and test fly it, pack it and fly to California.

Meanwhile I have thrown together an aerodynamic surrogate to evaluate the possible flying qualities ahead of the real thing. Trouble is the weather is not cooperating so I wait to test too.

Dave



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Larry Woodward Reports

Flitest Explorer



The Explorer is a recent design from flitest.com that is intended as an all purpose platform for multiple applications. The shoulder mounted pusher motor and robust size (56") makes it useful as an FPV platform and the gentle flying characteristics make it a great trainer. The plans include both a polyhedral wing for three channel and a dihedral wing with ailerons for four channel and flaperons. Another key aspect of the design is its modular construction. The main fuselage "core" has provision for alternative positioning of the removable tail section and nose as well as a swappable motor pod. The stated intent is to encourage experimentation and design exploration beyond the basic design.



Download plans and the build video here <http://flitetest.com/articles/ft-explorer-build>

Wireless Buddy Box

I have been using my new FT Explorer as a trainer with my friend Pedro. You will be welcoming him to the club this month.



The buddy system I have is an interesting alternative to the usual cable based system. This is essentially an A-B switch that allows you to alternate between two entirely independent receiver/transmitter systems via a spare auxiliary switch on the master transmitter. There is no need for the the two systems to share any common protocol or other compatibility. In my case, the master is a DSM2 Orange RC digital system from Hobbyking and the slave is an FSSS (Futaba) analog system that came with a cheap RTF model. It is a little fussy to set up with so many connectors, but once installed it works flawlessly.

The newer 8 channel system, \$16 plus shipping, is available from Hobbyking at http://www.hobbyking.com/hobbyking/store/_70604_Wireless_Buddy_Box_System_8CH_Dual_RX_Controller_AR_Warehouse_.html?strSearch=wireless.

Don't forget to order a ten pack, or more for the 8 channel system, of short male-to-male servo leads for the connectors: http://www.hobbyking.com/hobbyking/store/_61681_10CM_Male_to_Male_Servo_Lead_JR_26AWG_10pcs_set_.html

FPV on a Budget

Since my new FT Explorer is designed for FPV, I have been looking for a simple turnkey system at an affordable price to get my foot in the door. On Amazon I found a complete setup ready to fly for just \$65.99. The Syma X5C 5.8G Real-time FPV Image Transmission Kit with Memory Card + Card Reader is essentially an add on kit for a Syma quadcopter. The kit includes a variety of mounting brackets that allow it to be fitted to any type aircraft. The monitor is quite bright and clear and mounts to your transmitter. Both the camera/transmitter and receiver/monitor units have built in lipo batteries and the camera/reciever includes a SD card slot for recording flight video or still photos.



The remote control of this video/photo recording feature is a function of the Syma quadcopter. So in order to activate these features remotely in another system it is necessary to make some modifications to the control wiring. Explanations for this are available on RC Groups.



http://www.amazon.com/Real-time-Image-Transmission-Memory-Reader/dp/B0157YZQL6/ref=pd_sim_sbs_21_2?ie=UTF8&dpID=41cAW3cWT4L&dpSrc=sims&preST=_AC_UL160_SR160%2C160_&refRID=02B9J2S5D55DJ832DG8W

Back to Harding's Beach, Cape Cod

By the time you read this, Like the herring, I will have made my annual migration back to the shores of Cape Cod for the summer. While the herring are busy breeding and completing the cycle of life, I will be engaged in the more profane transition from indoor rubber band free flight to seaside slope soaring and fun flying over the "Great Marshes" surrounding Cape Cod Bay.

I will miss the Tuesday morning breakfasts, the amicable competition to fly longer/better than the next guy, and the opportunity to enjoy our great flying venues in their prime season. But, I look forward to the gradual return of our little band of migrant aviators that congregate each morning throughout the summer at Harding's Beach in Brewster MA.



So, goodbye for now. I hope you all have a great season of flying and camaraderie. Keep an eye out in this newsletter for my occasional Report from Harding's Beach.

I look forward to seeing you all again in the fall.

Larry Woodward

'Nano Bee' 0,006 cc Diesel Engine

Last November, during the Cartigliano Show dedicated to Ninetto Ridenti, I had the opportunity to see a small interesting motor in the hands of Mr Guido House. This is the 'Nano Bee' the incredible capacity of 6 thousandths of a cubic centimeter. (0,006 cc 0.00035 cu in). This means a diameter of the piston of less of 2 mm with a stroke of about 2.5 mm. (0.1 in)

Of course we do not know the exact measurements and we only made a hypothesis. It is in all likelihood the smallest diesel engine operating at the world. It's the last one from Ronald Valentine, known for its elegant minimum size of motors and for the beautiful and expensive small Cox processing. Its size can be appreciated in comparison with those of the 1 Euro coin, which has the diameter of 23 mm. (0.9 in).

The engine is of the diesel type. The knurled tool that is seen inserted in the Wood mount is the key to be inserted on the microscopic compression adjusting screw.

In his certificate presentation, Ronald gives no indication for the starting of the engine: it is clear that it has never been run, but, if it were in our hands, surely we would try to make it work. An engine 'Should' work, at least a bit ', otherwise it is just an ornament.

To get it going, it should naturally use a small propeller, with diameter of 5 or 6 cm, with 2 mm pitch in a rather heavy wood.

The stand on which It is now mounted is wrong; well, it does not give propeller clearance.

Given the small elements it will be necessary to carefully balance the propeller. Of course it will take delicacy of hand in all operation, treating the micromotor like a jewel and forgetting the usual regular roughness taken even with small 1 cc engines.

We do not know if the Mr House will follow our suggestion, but we are sure that in the case he does, he will keep us informed. We are curious.

Daniele Vescovi

Translated from SAM 2001, Italy, Newsletter



Born to Race

Just how close a pair of custom-built racers came to unseating the kings of Reno.



Tsunami (with Super Corsair) was named for the rogue waves that can reach a speed of nearly 600 mph. (Frank Mormillo)

During the golden age of aviation, following World War I, air racing became a global obsession, bringing a feverish succession of new world records as aviators, contended for the titles of world's fastest man and machine. The raceplanes they flew were purpose-built: The Schneider Trophy Macchis and Supermarines, the Gee Bees, Howard Hughes' magnificent H-1—all were unique designs capitalizing on rapid advances in aeronautic and engine technology.

After World War II, jets took over as the world's fastest airplanes, and the next fastest were cast aside. Surplus warbirds that had been fast fighters became widely available. When the National Championship Air Races started up again—in Reno, Nevada, in 1964—the only airplanes circling the pylons were Mustangs, Bearcats, and the occasional Sea Fury. Speed was now simply a matter of pumped engines, clipped wings, and a fitted canopy. By 1989, a 1946 F8F-2 Bearcat, Lyle Shelton's *Rare Bear*, was uncatchable; it set the propeller-driven three-kilometer speed record, 528 mph, and began a decade of dominance at Reno.

To break the absolute speed record and overcome the aluminum grip of ex-World War II fighters on Unlimited races (where, unlike in other classes, anything piston-powered and propeller-driven were then allowed), challengers would have to build an airplane from scratch and just for speed. Proposals and prototypes popped up,

with names like **Shockwave** and **MachBuster**, but there were only two serious contenders: John Sandberg's **Tsunami** and Bob Pond's **Pond Racer**. Rarely have two aircraft designed for the same mission looked so different, and the truth is that both teams came much closer to their ultimate goal than is generally acknowledged. That no one in the last two decades has dared to follow in their footsteps is evidence that the three-kilometer absolute speed record is going to be one helluva tough nut to crack.

Tsunami first flew in 1986, but the idea had been hatched seven years earlier under blue Nevada skies, as Bruce Boland and John Sandberg watched 27-year-old Steve Hinton set a new absolute speed record in a highly modified P-51, **Red Baron** at Tonopah. **Red Baron** owner Ed Browning had hired Boland and Pete Law, Lockheed Skunk Works engineers who had worked together on air racers since 1965, to modify the airplane for the Reno races; as one reporter later noted, practically every Unlimited racer at Reno had been graced, in one way or another, by the magic touch of Boland and Law (see "Secret Pete," Sept. 2012). Sandberg ran a company that rebuilt the Rolls-Royce V-12 Merlin engines that powered many of the Unlimited class racers. While Boland and Sandberg saw Hinton set a new record of 499 mph, they saw something else: the possibility to go even faster with a clean-sheet, purpose-built design. It was a hugely ambitious undertaking that nobody had yet attempted. So when Sandberg invited Boland and Law to join the project that became **Tsunami**, they jumped.

Though it shared the same goals as **Tsunami** (victory at Reno; the 3-km absolute speed record), **Pond Racer** was born under a different star. Bob Pond had trained as a naval aviator in World War II (though he never saw combat), and after the war he turned his family's machine shop into a multimillion-dollar concern. A devoted collector of airplanes, he created a warbird museum, and in 1988 commissioned Burt Rutan's Scaled Composites to design an airplane that would so dominate the Unlimited class that warbirds would no longer be competitive—and thereby saved from the sacrilege of heavy modifications for the Reno air races, not to mention the crashes that destroyed them. Any airplane that could beat the Bearcat at the races would have no problem snatching the 3-km record.

There are only two ways to make a raceplane faster: more horsepower or less drag. With the Unlimited warbirds already grenading engines on a regular basis, wringing significantly more power out of a Merlin or a Wright radial than one's competitors was unlikely. So while both the **Tsunami** and **Pond Racer** teams focused on drag reduction, Sandberg's decision to stick with a Merlin—and hide the smallest possible airframe behind it—seemed a brilliant tactic: The engine was race-proven, and well understood. With 3,600 ponies on tap, **Tsunami** got the "more horsepower" side of the equation right. It was the airframe that was to prove troublesome.



In contrast, the Scaled Composites team had relatively few problems with Burt's airframe. Rutan considered a number of configurations, but the twin-boom-and-pod design, though more draggy than other layouts, kept the pilot out of the line of fire in the event of engine failure and provided excellent visibility. Chief test pilot Dick Rutan (pilot, with Jeana Yeager, of *Voyager's* round-the-world flight in 1986) praised it for "exceptionally good flying qualities—the directional stability was like it was on rails," and Mike Melvill, who was to later pilot *SpaceShipOne* to win the Ansari X-Prize, called it "Rutan's best flying airplane straight out of the box." *Pond Racer's* problems were almost entirely due to the difficulty of adapting a pair of 1,000-hp, methanol-fueled racecar engines to airplane use (in keeping with program goals, Pond prohibited the use of warbird engines like the Merlin). *Pond Racer* had less drag than even *Tsunami*, but was unable to pull more than 640 hp from the engines in flight. It never turned a lap at Reno faster than 400 mph.

In the world of aircraft prototypes, it is generally agreed that you should not put an untested engine in an untested airframe: New engines should go in proven airframes, and vice versa. Andy Chiavetta, renowned builder of Reno Sport Class racers, has a corollary for raceplanes: "Choose your engine, then build the racer around it."

John Knepp didn't have either of those options when Dick Rutan phoned in the summer of 1988. Knepp, an industrial physicist, owns the race-engine developer Electramotive, and in the late 1980s, the company's Nissan VG30 V-6 dominated sports car racing. "Dick called and said, 'I need an engine that fits inside a two-foot circle and makes 850 horsepower. Can you do that?'" recalls Knepp. "I answered 'You bet!'" But *Pond Racer* was Electramotive's first venture into aviation, and from the start the engine was beset with challenges. The two biggest problems were the propeller drive gearbox and the packaging: "In trying to squeeze everything into that two-foot-diameter cowling, we had planned on utilizing the space behind the firewall to place engine controls and cooling systems," says Knepp. "But that space was soon filled with airplane systems, so we kept having to move engine-related components ahead of the firewall." Space became so confined that the electronic engine controls had to be mounted above the 1,500-degree turbos in an insulated, air-cooled box. "Integrating everything required to get 1,000 hp [upped from the original 850 hp in order to beat *Rare Bear's* new record] out of a 3.2-liter, 320-pound engine proved a far greater challenge than Scaled ever imagined," he says.

Knepp designed and fabricated several thousand parts for the engines, and the team slowly overcame myriad technical problems, from overcooling to engine stuttering caused by severe electromagnetic interference. Packaging remained the ever-present dilemma. "The real Achilles' heel was that we only had space for a four-quart oil sump where we'd typically have 12," says Knepp (the sump collects oil after it passes through the engine). Engine problems were exacerbated by the methanol fuel, which indirectly caused the engine to blow oil, further decreasing its already precariously low volume. "The remedy was to increase engine temps slowly, run gasoline, other stuff—patches on patches. Probably several engine failures were caused by running low on oil," says Knepp, although he also points out that the failures were always due to external systems integration issues, rather than a failure of the core engine itself.

Knepp points out that in the design phase, oil tank size was a relatively minor detail compared to a potentially much more harrowing problem: rotational vibration between the engines, gearbox, and propeller. Such vibrations can destroy an engine, a propeller, or even a whole airplane in the blink of an eye, and yet here the team nailed it. All pilots reported the airplane was so smooth it felt as though it were running on turbines, not reciprocating engines. "I worked quite closely with Electramotive," says Bruce Evans, Pond's point man during the build and *Pond Racer's* crew chief. "The development of that gearbox from scratch is an amazing untold story."

In addition to being chief test pilot, putting his life at considerable risk every time he flew the untested design, Dick Rutan worked as project manager of *Pond Racer* while it was a Scaled contract. He took no pay, but had a gentleman's agreement with Pond that when the racer was ready for the 3-km, he would be the pilot to attempt the record. Rutan agrees with Knepp that from a technical standpoint *Pond Racer's* weak point was engine integration. But in Rutan's eyes, the biggest problem with *Pond Racer* was Bob Pond himself.

Though he spent an estimated \$6 million-plus, according to two people who worked on the airplane, while developing one of the world's most sophisticated experimental aircraft, Pond could be inexplicably tight with money, exploding at what he perceived to be unnecessary expenses. He resisted funding the development of a

proper thermostat for the engines, doing a full ground vibration test that would tell engineers if the airframe was safe from high-speed flutter, and even paying for tickets to get crew through the gates at Reno. “For him to be involved [in engineering decisions] with that little knowledge was dangerous,” says Rutan, still bitter that he risked his life, only to have Pond transfer the project away from Scaled after the 1991 Reno races. The great irony is that, once Scaled’s construction contract was officially fulfilled, Pond handed **Pond Racer** over to a rival, responsible for the very warbirds the **Pond Racer** team was supposed to be defeating on the racecourse: Steve Hinton and his Fighter Rebuilders, down the road in Chino, California.

Pond died in 2007, so we don’t know why he transferred **Pond Racer** to Chino (the airplane spent a year in Pond’s Palm Springs hangar before the transfer), but it’s not hard to guess: Fighter Rebuilders restored more than 20 warbirds for Pond’s museum, and owner Steve Hinton was a seasoned Reno air race veteran who had been down the 3-km road before—in **Tsunami**. If Pond was discouraged with **Pond Racer’s** progress, he may have looked to folks at the top of the racing game to set things right.

Working with engineer and fabricator Ray Poe, Boland and Law spent six years designing **Tsunami’s** airframe, and drew on extensive experience at both Reno and Lockheed (Boland was an aerodynamicist and Law a thermodynamicist). Sandberg cherry-picked components to assemble the finest race engine he could, and in fact during **Tsunami’s** construction used a P-51 named **Tipsy Too** as a testbed for the engine modifications. While many people’s names were painted on **Tsunami’s** gear doors as construction crew, it is these four—Sandberg, Boland, Law, and Poe—who created it, and it was Steve Hinton who made the first flight in Chino after final assembly.

Compared to **Pond Racer’s** engine, **Tsunami’s** was relatively conservative. By the 1980s the design was already 40-odd years old, but the Merlin was the state-of-the-art engine before being eclipsed by jets. Its high horsepower and inline, liquid-cooled design offered advantages over radial engines. “The Merlin’s pretty damned reliable,” says Hinton. “It’s an awesome, awesome engine.” **Tsunami’s** problems were predominantly due to aerodynamics and mechanical complexity. The airplane used military- and race-proven structures and where possible adapted existing components (such as landing gear). Nevertheless, modifications to the **Tsunami** airframe were made so quickly that despite extensive flight testing, the team was never really able to get out from behind the eight ball.

After **Tsunami’s** first flight on August 17, 1986, the team aimed to make it to the Reno races less than a month later. “We made 50 or 60 flights in a very short period of time, along the lines of World War II flight testing,” says Hinton. “The rudder was extremely light: up to 250 knots, it was light; above 250 knots, it was uncomfortable; and at 280 knots—well, it wasn’t fluttering, but it would have if you’d gone faster. We could only increase flight speeds 10 knots at a time, which is why it took so many flights. But you really only get one chance with this flutter stuff.” In the end **Tsunami’s** rudder was redesigned with a wider chord, and the airplane made it to Reno. But a cooling systems failure kept **Tsunami** from flying in the championship race.

In the subsequent five years, victory at the races—and an absolute world speed record—always seemed just beyond reach. Sandberg was an inveterate tinkerer, and while his ideas were often brilliant, they were also often untested, and the endless changes drove team members, including even Boland himself, from the project. “At one time I think I counted well over 20 major changes we made to **Tsunami** over the years,” says Jim Dale, one of the lead crew and currently crew chief for Unlimited racer 232. “We went from a fixed horizontal to a trimmable horizontal, changed the size of the horizontal, changed the size of the elevators, changed the size of the rudder, changed every single flight control system—it might have been pushrods one year and cables the next...” Heating problems associated with the small radiator, oil cooler, and scoop took several years to sort out. (Dale points out that **Tsunami** ended up with possibly the smallest scoop of any Merlin-powered racer: “I don’t think a cereal box would have fit into the opening when we were done.”) Finally, structural changes to the landing gear and flaps led to crashes. “The airplane should’ve won Reno many times—it should have, and it could have,” says Hinton with a note of matter-of-fact disappointment. “The airplane was really a heartbreak airplane.”

In 1986 and '87, Hinton was poised to finish strong in the Gold class at Reno only to DNF (Did Not Finish) with cooling system problems. But starting in 1988, *Tsunami* made it all the way—to the Sunday Unlimited Gold heat—four years in a row. “The third year [1988], it should have won, and it should have won every year after that,” says Hinton. “The only reason it didn’t win that third year was that we had some miscommunication among the crew. An adjustment was made with the water injection system before the main race without a test flight. I didn’t even know they did it until I was coming down the chute. I pushed the throttle up and the induction temperature was over the redline. I radioed in and the reply back was ‘Oh, we should’ve tested that.’ That was a big disappointment.”

Pond Racer, meanwhile, changed teams. After the raceplane was transferred in early 1992 to Hinton’s Chino shop, Dale took over as crew chief from Bruce Evans, and agrees with Knepp that while Burt Rutan’s engineering genius was awe-inspiring, the complexity of *Pond Racer’s* engines held it back. “*Pond Racer* had systems,” says Dale. “It had ECUs [electronic engine controls], turbochargers, radiators—it was systems-heavy, but that’s what was required to produce that kind of horsepower.”

In the hands of Rick Brickert, a seasoned race pilot Pond had hired, *Pond Racer*, despite lacking nearly half its potential horsepower, managed a respectable second place in the 1992 Reno Bronze class: 365 mph. It seemed as though the raceplane had finally found its footing, but the inability to make full power continued to vex the team, and the engine modifications continued. During a flight to test turbo modifications, Brickert experienced total engine failure. North of Chino in the high desert of Mojave, Brickert calmly feathered the prop and threaded the Cajon Pass back to the airport on a single engine.



The outcome of a similar failure later that year in Reno could not have been more different. During a qualification heat at Reno in 1993, the right engine failed, and for reasons not entirely clear, Brickert chose to belly-in on a dry lakebed adjacent to the course, rather than land at the airport. When the aircraft slammed into the lakebed and burst into flames, Brickert was killed; some evidence suggests he may already have been incapacitated by smoke from an electrical fire. This might explain why he made no radio communications on the way down, and why he made no flare or throttle adjustments at touchdown. An investigation revealed the cause of the crash to be the gremlin that had nagged at **Pond Racer** from the beginning: insufficient oil, leading to connecting rod failure and subsequent seizing of the engine.

Though **Pond Racer** had never surpassed 400 mph at Reno, the pieces were set up for a potentially brilliant end game. The team had a definitive list of fixes—including a larger oil sump. The next year at Reno could have been **Pond Racer's** moment in the sun. Likewise, **Tsunami** seemed to have worked out the most difficult challenges, only to be undone by the failure of a \$10 part.

By 1989, the **Tsunami** team felt it was time to attempt the absolute speed record; in straight-and-level flight tests, Hinton had seen the racer's airspeed indicator read 550 mph. The team arrived in Wendover, Utah, in August, just weeks before the Reno races. But on August 21, Lyle Shelton broke Hinton's old record of 499 mph, with a 528 mph run in **Rare Bear** in Las Vegas, New Mexico. The ante was upped considerably: Rules require a new record to exceed the current one by at least 1 percent; in this case the target was now more than 533 mph. In test runs **Tsunami** ran in excess of 500 mph, but the ground crew radioed to abort the attempt due to possible oil breathing problems. In fact two pistons had cracked. The team worked throughout the night, and the next morning Sandberg taxied out to try again—only to taxi back, having smelled gas in the cockpit. A heroic team effort to fix the leak got Sandberg back on the line later that afternoon. The test flight was a success, but a hard landing caused **Tsunami's** landing gear to fail, and the racer swerved off the runway. The radiator was packed full of sand, and a wing spar, an aileron, and a flap were bent. The landing gear were splayed, one in, one out. The amount of damage would ordinarily have taken weeks, perhaps months, to repair, but if **Tsunami** was to race at Reno, it had to be present at registration—just four days away. The team and an army of volunteers worked nonstop. They installed a new engine, and Sandberg flew to Minnesota to fetch four new propeller blades. Bruce Evans—the future **Pond Racer** crew chief—had come to Wendover simply to watch but was soon enlisted to fabricate a new radiator scoop. By Sunday night **Tsunami** was ready to fly. Dale and a couple of volunteers from Chino sneaked back into the hangar after dinner and spent the night painting the airplane, much to Sandberg's delight the following morning.

As **Tsunami** taxied out to depart, the tailwheel collapsed. More hurried repairs, And **Tsunami** arrived in Reno minutes before the close of registration. In 1991 (**Pond Racer's** debut year; the two never raced against each other) **Tsunami** flew in what was described by observers as one of the best Unlimited finals ever. It lost Sunday's Gold race by the narrowest of margins.



On September 25, 1991, *Tsunami* was on approach to landing in Pierre, South Dakota, when one of its many untested modifications, a flap pushrod, failed. The airplane flipped over and crashed, killing Sandberg. The flaps had been a later addition Sandberg had been warned not to install; they were intended to enable him to more easily land at his home base in Minnesota.

Since 2013 the Unlimited category at Reno has been restricted to modified warbirds, so we may never see such purebred propeller-driven racers again. Dale points out that the biggest barrier may not be the speed of sound but the cost of speed. At Reno 1991, Evans, *Pond Racer's* pre-Chino crew chief—and crew chief of Voyager's round-the-world flight—commented to Dale: "I now realize it's a hell of a lot harder to go fast than it is to go far." Evans' comment appears to be accurate: Steve Fossett followed in Voyager's footsteps. But *Rare Bear's* absolute speed record remains unbroken, and unchallenged.

By [Eric Stewart](#) AIR & SPACE MAGAZINE | [SUBSCRIBE](#) APRIL 2016

Editor's Note; I had the pleasure of visiting Burt Rutan's Scaled Composites often during the period of the Pond Racer development. Indeed, I made the mistake of walking through the datum thread on the shop floor. '

Burt usually tooled his airplanes by cementing key elements to the hanger floor. In this case the fuselage datum and engine pods were fixed by bulkhead supports and aligned by taught threads. I just didn't see the thread. Hope it didn't make the airplane "wonky" or out of line.

Anyway I saw it through construction and into the initial flight test before that was taken from them.

Dave

Timeless Contributions of Glenn H. Curtiss

The aviation career of Glenn H. Curtiss is noteworthy. Here was a driven individual who went from being a Western Union delivery boy and speed-obsessed bicycle racer to one of the more accomplished aircraft designers and the head of a lucrative plane manufacturer.

Curtiss developed numerous aircraft and systems in the early 1900s, some of which are still in use. He is credited with creating ailerons, the flight control surfaces on the trailing edge of wings. The discovery prompted a lawsuit by the Wright Brothers, who claimed his invention infringed on their wing warping design, according to various reports. The suit was settled eventually and the two companies merged in 1929.

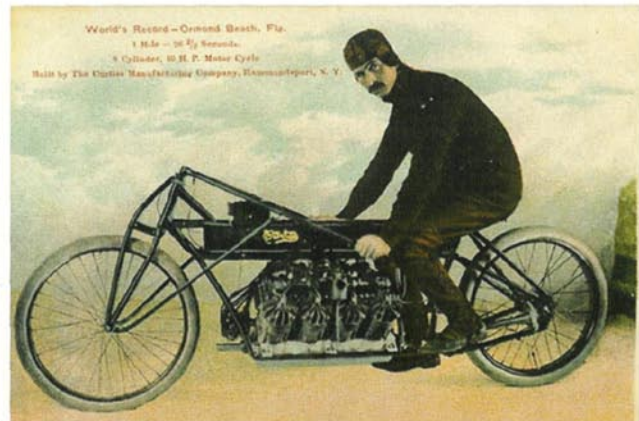
Curtiss' other aircraft and systems developments included: design and construction of the first successful seaplane in America, dual pilot control, and the design of retractable landing gear. Curtiss also produced and sold the first private airplane, according to the Glenn H. Curtiss Museum in Hammondsport, New York.

In 1907, Curtiss joined the Aerial Experiment Association (AEA) — headed by Alexander Graham Bell — and built four flying machines, each one better than the last, reportedly. They included: the "Red Wing," which had no lateral control and crashed on its inaugural flight after flying 300 feet. Then came the "White Wing," which had triangular-shaped ailerons and wingtips. The "June Bug" came next, which along with the "White Wing" were the first aircraft to have aileron control. The fourth aircraft, the "Silver Dart" was the most successful with over 200 flights.

Curtiss is known today as "The Father of Naval Aviation," in part, because one of his aircraft was the first to be successfully launched from a makeshift wooden deck on the USS Birmingham on Nov. 14, 2010. His company built numerous seaplanes for the US Navy.

His company built the open-cockpit JN-4 Jenny biplane, which was the principal trainer for the US Army Air Service during World War I. Curtiss built over 7,000 JN-4s and 2,000 seaplanes, along with over 15,000 aircraft engines. The V8 Curtiss OX-5 engine powered the Jenny.

Curtiss died at the relatively young age of 51 during surgery after an attack from appendicitis, but his inventions live on today.



Glenn Hammond Curtiss on his V-8 motorcycle in Ormond Beach, Florida, in 1907. He set the unofficial world record of 136.36 mph (219.45 km/h), a record that was not broken until 1930.

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