

How to Get Started in Biplane Racing

Jeffrey Lo
Biplane Air Racing Class
Sun 'n Fun 2026



Photo Credit: Timothy O'Brien

Jeff Lo, President Biplane Air Racing Class (BARC)

- Racing since 1995
- President of BARC since September 2025
- Raced 3 different Pitts Specials
- Retired from Silicon Valley high tech and now an A&P for a flight school at KRRHV (San Jose, CA)
- Also have a PA-22/20 Piper Pacer and C140
- Just got my RV-15 wing kit







A Little Background

- The National Championship Air Races include 7 classes of racing: Unlimited, Jet, Sport, T-6, Formula 1, Biplane and STOL Drag.
- From 1964 through 2023 the races were held in Reno, NV. In 2025 they moved to Roswell, NM.



A Little Biplane History

- Biplane racing was part of the first Reno Air Races in 1964
 - There were EAA Biplanes, Smith Miniplanes, Knight Twisters and a Mong
 - The championship winning speed was 144.57mph
- Allowed engines went from an O-290 to the O-320 to the O-360 and now up to 560 cubic inches is allowed for two seat biplanes



Reno biplane hangar 1987



A Little Biplane History

- There was a brief split between “racing” and “sport biplanes
- In 2015 Phantom set the biplane qualifying record at 284.454mph



Photo Credit: Michael White





What are the Basics to Participate?

- Plane
- Pilot
- Crew



What Do You Need to Get Started?

- Plane
 - You may already have a near race ready plane in your hangar!
 - Many common single seat and two seat biplanes generally fit the rules
- Pilot
 - Private pilot or better with experience in small, high performance biplanes
 - Aerobatic and formation experience helps
- Crew
 - Bring your friends to help!
 - You can do it by yourself, but it is harder and it is a lot more fun if you're sharing the experience with friends.



Aircraft Requirements

- Biplane racing has historically been based on single seat aircraft with 4-cylinder Lycoming engines
 - The Pitts S-1 is the most common now, but Smith Miniplanes, Mong Sports, Stardusters, EAA Biplanes, Knight Twosits and others have raced
- The scope of allowable aircraft has recently been expanded to include many two-seat aircraft with some limitations
 - Pitts S-2A/B/C, Christen Eagle, Skybolt, etc. generally fit the rules



Aircraft Requirements

- Minimum 75 square feet wing area & 500 pounds empty, fixed gear, engine retention cable
- Single Seat Biplanes
 - Naturally aspirated, air cooled, direct drive piston engines up to 364 cubic inches
 - Fixed pitch propeller
- Two Seat Biplanes
 - “Stock configuration” naturally aspirated, air cooled, direct drive piston engines up to 560 cubic inches
 - Fixed pitch or constant speed* propeller

Full details in the technical rules on the BARC website



Many Ways to Meet the Design Requirements



Pilot Requirements

- Private/commercial/ATP pilot certificate
- Class 1 or 2 medical issued within six months of the race dates
- 500 hours total time minimum
- 25 hours & 10 takeoffs and landings in high-performance* tailwheel aircraft in previous 6 months
- 5 hours & 5 takeoffs and landings in the biplane to be raced in previous 90 days
- Aerobatic and/or formation experience preferred

*Not the FAA definition of “high performance”, but rather something with similar characteristics of a race biplane



Pilot Skills

- Take-off – tracking, crosswinds, tailwinds, aborts
- Maneuvers – pylon turns, rolls
- Passing – uncooperative formation



Where Do I Sign Up?

- Registration is by invitation and is completed online. You will be given an URL.
- Involves uploading copies of all of the documents that FAA and RARA need to review
 - Pilot docs
 - Aircraft docs
 - Insurance docs
 - Release of liability
 - Program photos
 - Aircraft safety diagrams and extraction instructions (for CFR)
- DO NOT wait until the last minute. This will take you several days the first time as you collect everything you think you need and start uploading then realize what else you still need and it involved going back to the airport and so on. It is not hard if you're reasonably tech/PC/internet savvy, but it is tedious.



You've Signed Up, Now What?

- Get the plane ready
- Get the pilot & PPE ready
- Get to Roswell
- PRS – Pylon Racing Seminar
- Practice / Qualifying
- RACE



Get the Plane Ready

- Make sure your plane meets the rules
 - Engine safety cable
 - Constant speed prop – RPM settings
 - Race number sizing & placement
 - Radio sufficiently clear at race power
- Annual / Condition Inspection Current
 - Be more than just legally current – go through the plane and be ready for tech inspection to check your work
 - Documents
 - A/C clean, no stray material – all the way down the tail
 - Timing set, plugs clean, fresh oil & filters
 - Nothing chafing / interfering



Get the Plane Ready

- Race modifications
 - Fairings
 - Antennas
 - Weight reduction – affects acceleration and induced drag
 - Engine mods
 - Propeller selection
 - Is your panel layout conducive to racing?
- Testing
 - What speed / max RPM do you see before and after making a change
 - How is your cooling at full throttle for 7-8 minutes straight?
 - Leaning for best power / RPM



Get the Pilot Ready

- FAA Current
 - Flight review
 - Medical
- Practice, practice, practice
 - G tolerance
 - All aspects of flying – takeoff & landing, slow flight/stalls, formation, unusual attitudes
 - Have you ever landed with 50+ psi in your tires?
 - We've all done go arounds, have you ever aborted a takeoff while on the runway?
 - Engine out practice
 - Can you glance at your panel for 5 seconds or less and assess engine health and performance?
 - Have you ever been in a wake 20 feet behind another airplane pulling G's in a turn
- Getting to race weight – acceleration and induced drag...
- Insurance



Moving the Plane from Hangar to Runway

- The distance from the hangar to the runway is quite long. Far too long to push, and not conducive to taxiing with opposite direction traffic
- Last year we ended up towing out to the runway and then back from the fuel truck
- Do you have tow equipment – a tow bar for your plane and a vehicle that can tow it?
- We will have some tow capability, but it is limited and puts you at the mercy of others trying to get their planes to the runway.



PPE – Personal Protective Equipment

- Rules require fire retardant clothing
 - Nomex flight suits and gloves minimum highly recommended
- Helmets recommended
 - Quick release cables
- Parachutes recommended and if used must meet FAR § 91.307(a)



How Is Everything Getting There?

- My first year – flew in with a duffel bag in the turtle deck, a couple wrenches and screwdrivers and some oil
- Nowadays – two stand up tool boxes, a dozen boxes/bins of spares, hardware, consumables, tow bars, golf cart, tables, chairs, coolers, and the airplane is in the trailer with the wings off



1995 vs. 2025



Pylon Racing Seminar (PRS)

- 3 days of training prior to race week
- Classroom and practical training on the race course
- BARC instructors will evaluate your performance and if successful you will receive your racing license to enable you to qualify and race
- Historically PRS happened in May or June, but with much of the volunteer staff being from Reno, it is being combined with NCAR in September to reduce travel requirements which had become a burden
- Veteran racers can also attend to get additional course time



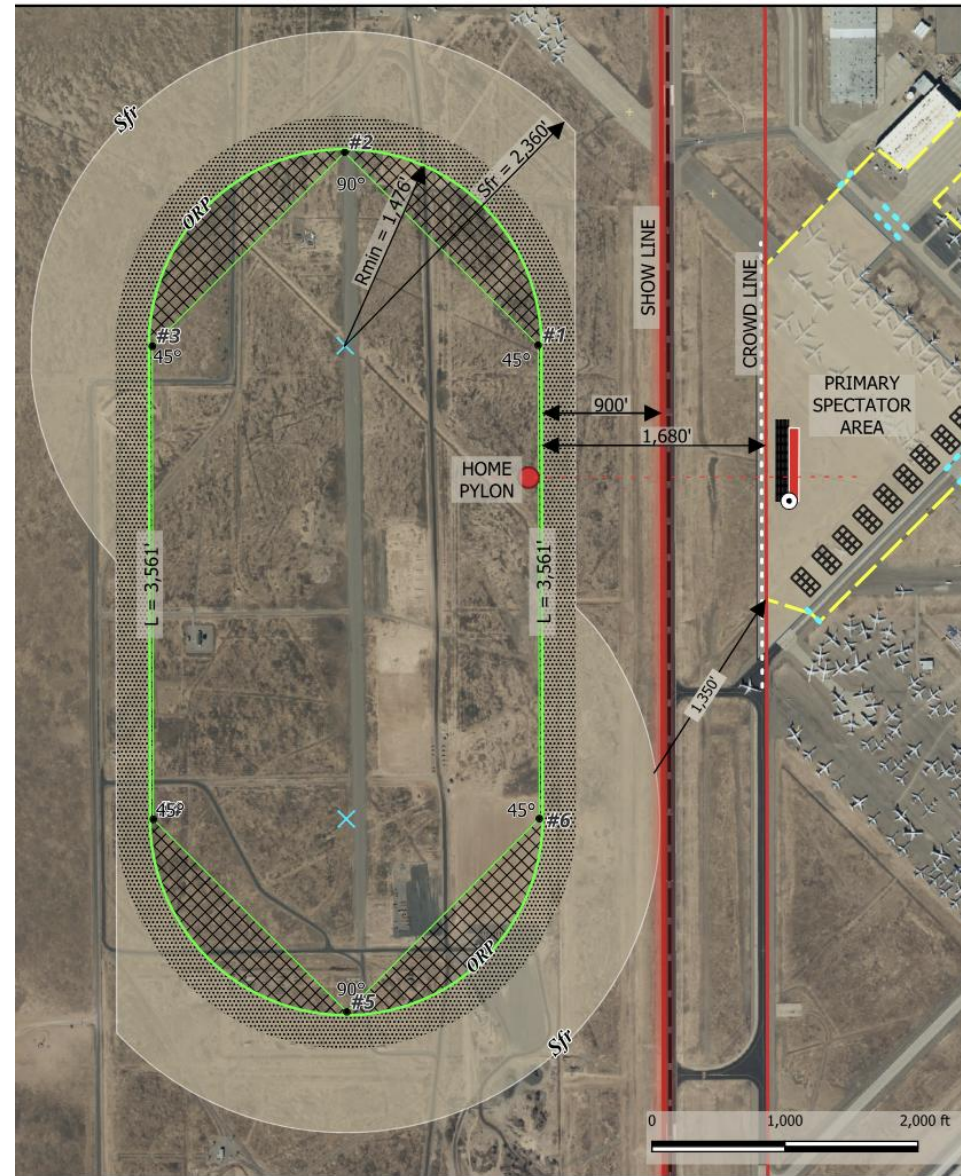
Topics of Instruction

- Fundamentals of Low Altitude Flying
- The Proper Course
- Non-cooperative Formation
- Pylon Air Racing Immersion
- Race Course Familiarization
- Lessons Learned
- Safety & the Racing Mindset
- Biplane and RARA Operational Procedures



Race Course

- 3.11 mile oval
- 6 pylons
- Flown counter-clockwise



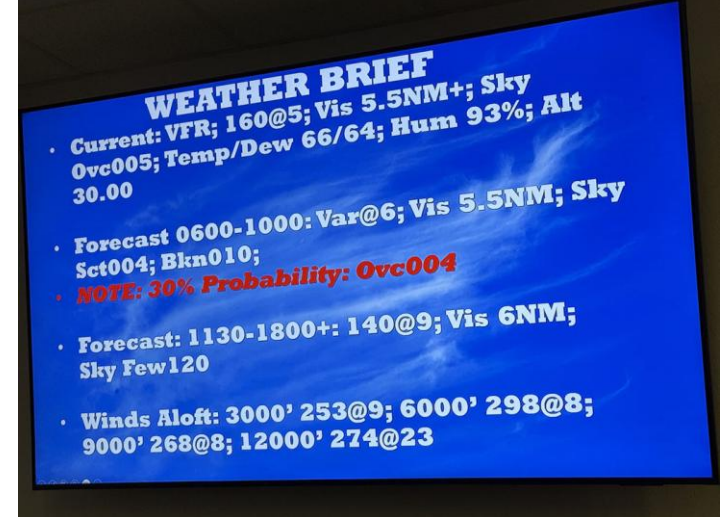


Practical Test

- Take-off
 - Track Straight +/- 10 feet
 - Positive Control During Transition to course or climb
 - Aborts
- Three laps solo
 - Predictable, proper course
 - No significant change in altitude
- Formation Flying and Passing
 - Line selection
 - Wake turbulence awareness
 - Safe execution
- Left and right rolls at ≥ 1500 AGL
 - Less than 50 feet altitude loss
- Re-enter course between pylons 3 & 4
- Normal race finish to biplane pattern procedures and landing
 - Radio calls
 - Positive control at all times

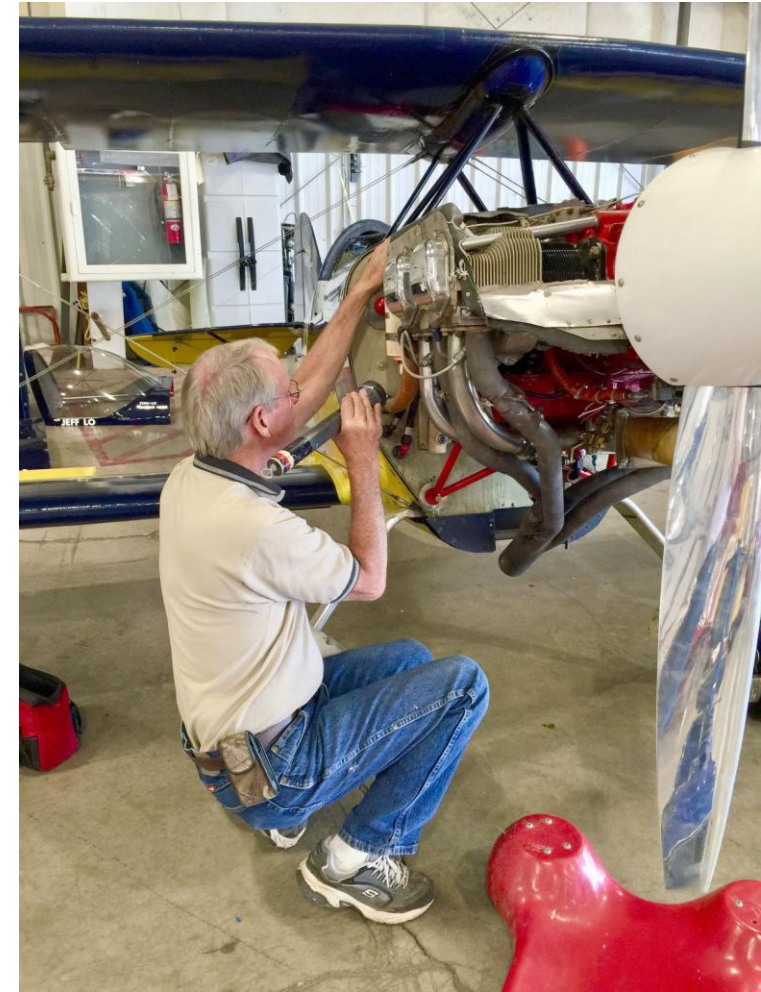
Race Week – NCAR!

- Lots of briefings
 - Mass in-brief (if you attend PRS, the mass in-brief there counts for NCAR)
 - Meet the team, learn their roles, and what their expectations are of you
 - Review the waiver, RARA procedural items and safety rules
- Daily briefings
 - Weather and housekeeping
- Biplane class daily briefings
- Post-race debriefs – pilots and class officials only
 - Frank review of the race and any issues
 - Completed immediately following recovery while crews are getting planes refueled so the situations are fresh in your minds
- Mass debrief – typically just the class president or delegate
- No delegates for the mass in-brief and daily briefings.
 - Sign the sign in sheet – no brief no fly!



Tech Inspection

- Verify compliance with tech rules
- Spot unsafe conditions
- Goes better if you have checked everything yourself before arriving onsite
- Required before flying the race course



Tech Inspection

- Documents – RARA/FAA reviews these, BARC may review as well
- Aircraft Conformance
 - Check conformance to the class technical rules as well as construction quality and materials
 - Check conformance to RARA requirements, e.g. race numbers
- Safety Items – cracking, e.g. engine mount, fuel system/vent, flight controls correct, condition of belts & harnesses, control system slop, critical safety wiring, firewall seals, engine retention cable
- Avionics – operation and safety (don't let a handheld become a projectile)
- Observe flight testing of new or modified aircraft
 - Dive to 110% of max level speed
 - 4G pull up from max level speed



Practice and Qualifying

- 2-3 days of practice and qualifying
- Those who just completed PRS will have a lot of recent laps under their belts, but those who did not will be seeing the race course for the first time in 51 weeks and need to find the pylons and remember their lines
- Those electing to qualify go at the beginning of the session and we limit the course to three planes at a time. This is followed by practice time where we put up to four as well as doing some simulated side by side starts
- Everyone must qualify and get a speed to set up the pairings for the week, so don't wait until the last minute – a bad weather day could prevent you from getting a time!



Racing

- 4 days of racing – 3 heats + final
- Gold, silver and potentially bronze races
- Qualifying speed places you into a medal group where you stay for the week – no bumping between groups
- Up to 8 planes per race, so up to 24 total
 - Some years we have had up to 26 so two didn't make the cut
 - 9 for first year in Roswell, looking to fill both gold and silver races this year



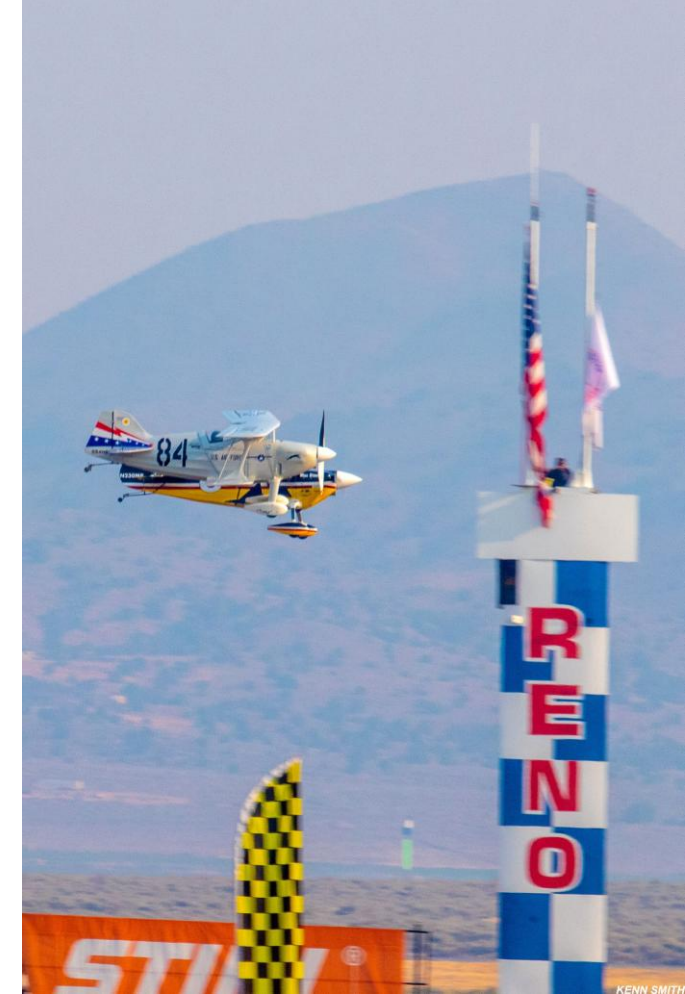
Staging for the Race

- Crews tow airplanes to the taxiway adjacent to our start line on the runway
- 10 minutes warning for race start – push to runway, mount up and warm engines
- Crew holds airplane while warming, must leave at 2 minute mark
- Green flag drop starts the race



RACE!

- Start 4 rows of 2 on the runway with a delay between rows to ensure safe running of aircraft ahead
- One trip around the pylons then the official race clock starts when the first airplane passes home pylon
- Once the first plane completes six timed laps and pulls off the course, the remaining planes will pull off the course once they have passed home pylon



RACE!

- Finishing order is determined by finishing times including handicaps for planes further back starting later



SHOW



Banquet, Trophies, and Yes, Prize Money!

- \$50K in prize money for biplanes in Roswell last year



Key Dates

- Registration opens: TBD, likely May or June
- Registration due: TBD, different materials will have different due dates between ~June to ~August
- Arrival for PRS: aircraft must be on site by noon, Thursday, Sept 10
- PRS In-Brief: Sept 10 afternoon
- PRS: Friday, Sept 11 – Sunday, Sept 13
- Arrival for NCAR: aircraft must be on site by noon, Saturday, Sept 12
- NCAR In-Brief: Likely Sunday, Sept 14 AM
- Practice & Qualifying: Monday – Wednesday
- Heat Races: Thursday – Saturday
- Final Races: Sunday



Join Us In September In Roswell

- There is still time to join us and race in September this year!
- Fill out the form with your information here:
<https://forms.gle/VczzD7L3ggRvubnU8>



More Information

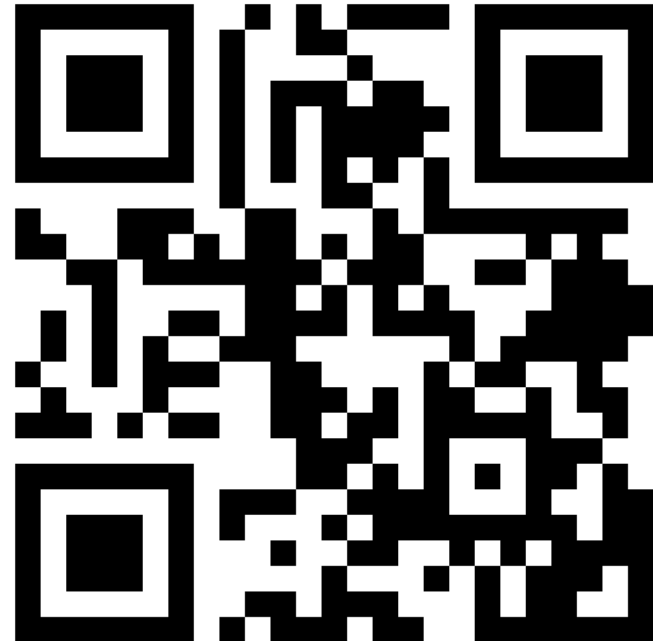
<https://biplaneairracing.com/>

See the “Documents” tab for the
latest class rules



<https://airrace.org/>

Reno Air Racing Association





RIZZO

10710MB

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JEFF LO

DIANNE LO

FLYIN-LO
RACING TEAM



HAYWARD, CA.
800.782.0920

FLYIN-LO.COM

Miss Dianne

INFO.COM

JEFF LO.COM

CHAMPION

WRIGHT BROS.

Ly-Con