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# Exxon Flyin' Tiger News Flash

## ***The Exxon Flyin' Tiger hits a World Record Grand Slam in Palm Springs Desert!***

*Behind the scenes report breaks Bohannon's silence on the real rigors and risks of aviation record flights.*

**Palm Springs, California:** *Exxon Flyin' Tiger* pilot Bruce Bohannon has pulled off something no other piston engine pilot has ever done. Pending NAA certification, Bruce set a Time to Climb record to 12,000 meters (40,000 feet)! In the same flight, he also broke his own records for Altitude in Horizontal Flight and Absolute Altitude at **41,300 feet!!!**

***No, it wasn't easy and for the first time you're going to know why!***

### **First, the hard facts:**

**Date:** October 22, 2002

**Time:** High Noon

**Place:** Desert Resorts Regional Airport- Palm Springs, California

**Records Set: Class C-1.b (piston engine aircraft weighing 1102-2205 lbs)**

**\*Time to Climb to 12,000 meters: 32 minutes, 2 seconds**

**◆ Absolute Altitude: 41,300 feet**

**◆ Altitude in Horizontal Flight: 41,300 feet**

**Class C-1 Unlimited (piston engine aircraft of any weight)**

**\*Time to Climb to 12,000 meters: 32 minutes, 2 seconds**

***\*The Exxon Flyin' Tiger is establishing these as new World Records.***

***No other piston engine aircraft, since Time to Climb records were first recorded in the 1950s, has successfully raced the clock to 12,000 meters!***

**For Immediate Release**

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For years, Bruce and I have collaborated to write *Exxon Flyin' Tiger* press releases, reporting our successes and failures. He has always downplayed the difficulty and danger of these record quests; partially for fear of frightening our sponsors away and partially out of simple modesty. With each successful mission, our failure to tell the *whole* story is prompting more and more comments like:

“You make this record stuff look easy.”

“Bruce Bohannon set another World Record, so what?”

“He’s been doing the *same thing* for years, how hard can it be?”

Some people just don’t get it and it’s partly our fault. Today I sent Bruce to the hangar so that I can tell you what it’s *really* like to fly in the face of fear, frustration and physical pain to come out alive and sometimes...a winner.

#### **A Date with the Desert-**

After our failure to set these records at Oshkosh, Bruce was hell-bent on solving our problems and capturing those records before year’s end. He is truly a man possessed when success eludes him. So we set our sites on Palm Springs and began climbing the hurdles standing between us and our goal of 40,000 feet.

#### ***Major Myth: “All Time to Climb records are the same.”***

Spoken like someone who’s never tried it! From the day we begin flight instruction, all pilots learn that you can’t have everything. Want to climb faster? Get a bigger engine! Of course, it weighs more so you’ll need more fuel. (more weight). The heavier you are the slower you climb. The slower you climb, the more horsepower you need. The more horsepower you make, the more fuel you need. The more fuel you carry, the heavier you are....*everything* is a trade-off. The challenge is finding new ways to get the most performance possible. There are no instruction books on doing things that haven’t been done before. You write your own manual with lessons learned from each new record attempt....*and they’re all different!*

The difference between racing a piston engine aircraft to 30,000 feet and to 40,000 feet is like the difference between the Indy 500 and a race around the world!

Bruce Bohannon just flew higher, faster than anyone has ever flown in a piston engine aircraft... 12,000 meters (39,370 feet) in just 32 minutes and 2 seconds! That's an average rate of climb of 1,230 feet per minute...to an altitude that most piston planes never even reach! *Think it was easy? Take a walk in Bruce's shoes and then decide.*

In *The Exxon Flyin' Tiger* there are 25,000ths of an inch of aluminum between the pilot and 60 degrees below zero temperatures at 40,000 feet. Bundle up all you want, the "brass monkey" factor is still there! You can wear one glove, but must forego the other in order to wear a Pulse Oximeter on your finger. This gives critical feedback on your blood oxygen levels. At 40,000 feet you have just *15 seconds* of useful consciousness if your oxygen system fails, so frostbite doesn't seem such a bad trade. I haven't found a pair of socks in the world to keep Bruce's feet warm at altitude. In his words they "become two stones" at the ends of his legs. Imagine landing a tail dragger at 100 mph without being able to feel your feet! So why don't we add a heater and some insulation? More weight = slower rate of climb = need for more horsepower = need for more fuel = more weight = slower climb...(oh yeah, that.)

You'll need to pre-breathe pure oxygen for an hour and a half before the flight to purge the nitrogen from your body. This (hopefully, but not always) prevents a painful and potentially deadly condition known to scuba divers as "the bends". As you climb and air pressure drops, nitrogen bubbles form and expand, usually in your joints. Imagine someone trying to pry your knees & elbows apart with a crow bar...that's what it feels like! If you're really unlucky, the bubbles can break loose and travel to your brain. Then world records and everything else in your life becomes irrelevant. Bruce has been forced to terminate test flights due to the bends and excruciating gastrointestinal pain caused by the same expansion process. FAA doctors have assured us that a

pressure suit isn't needed at 40,000 feet. But Bruce's high-flying buddy Scott Crossfield is jumping all over him for doing it. (A fact that is never far from my mind.) You'll also want to make sure to Velcro a bottle of emergency nasal spray in the cockpit. Extreme pressure changes can burst clogged nasal passages and actually break the bones in your face...not only horribly painful, but "bloody embarrassing" on landing!

Now imagine launching from the California desert on your world record quest. You're in *The Exxon Flyin' Tiger*, a light, sleek, modified Van's RV-4 powered by a highly modified Mattituck/Lycoming IO 555 engine, blown by a massive, custom Kelly Aerospace turbo charger and turning a super efficient Hartzell three bladed propeller. You're the "baddest of the bad"! Who *couldn't* set a record in a monster machine like that?

Hang on "Maverick", you've got work to do. As you blast off the runway, pay attention to that noise in your ears...you're now at the mercy of ATC. *You* want to go *up*...as *quickly* as possible. But you're taking a 120-knot airplane into a 450-knot environment (airliners and military operations), so controllers may choose to hold you at particular altitudes (don't they understand this is a *timed* record?) or vector you around the sky (you have only so much time and so much fuel). But this time you get lucky. On the Palm Springs flight, ATC is going out of their way to help. (There is a God!) All you have to do is answer their calls, squawk the correct codes & change frequencies when directed. Most of your brain can concentrate on the mission. Your mind is consumed with monitoring exhaust gas, cylinder head, oil and turbo intake temperatures, climb speed, RPM adjustments to avoid prop tip over-speed, the leaning process, monitoring GPS to stay on course and slowly closing the manual wastegate to engage the turbo. As the CHTs climb you'll need to carefully use the water system. We use spray bars on two very large PosiTech oil coolers to cool the oil, which in turn helps prevent the CHTs from melting your pistons. You'll turn the water on and off to manage cylinder head temperatures, keeping in mind that if you run out of water damage or failure is lurking.

As the altimeter climbs and outside air temperature drops, your canopy ices over from the inside. Your only view out is directly ahead, that thanks to the design of the *Tiger's* intercooler that dumps warm air onto the windshield. Your instrument panel fogs up, making it difficult to read critical instruments. At some point the water system freezes. When that happens, you MUST remember to turn off the pump to keep it from burning up. The colder your hands get, the harder it is to work the stick, turn knobs and push buttons. When ATC calls, you struggle to speak clearly due to reverse breathing. (Your diluter demand O-2 system forces oxygen into your lungs at high altitude and you must push air out to exhale) Suddenly, at about 34,000 feet there's an abrupt engine over-speed. The prop is running away at *3500-RPM*...keep it up and you may lose a propeller blade which can yank the engine off the mounts and then you'll be skydiving. But if you pull the power, instantly reduced exhaust gas flow will cause the turbo to spool down and you'll be making a Time to Climb record attempt in a glider (a repeat of the failure at Oshkosh). **QUICK, DO SOMETHING!!!!**

As much as I have fantasized about making a record attempt myself, it's times like this (which are too numerous to mention) when I "get a grip". You can have the machine, you can have the support, you can have the desire; but there's *nothing* like experience to improve your chances of survival.

OK, relax...Bruce has the plane. With just 6,000 feet to go for the record all hell breaks loose. There's a sudden over-speed and impending disaster. As competitive and driven as Bruce is, *experience* prompted him to do the right thing. It took him less than one second to instinctively pull the power, saving the engine and propeller!

The price of survival was starving the turbo. Now piloting "*The Exxon Glidin' Tiger*", Bruce starts working on his consolation speech. But then his "never say die attitude" kicked in. Experience saved the plane and possibly his life, now; experience was about to save the record.

I won't tell you *what* he did to breathe life into a dead engine. There are rumors that we may have competition on the horizon, so there's no sense in telling all of our secrets. Suffice it to say that every failure is an opportunity to learn and Bruce never fails to learn something. Our attempts at Oshkosh this summer taught some valuable lessons that Bruce put to good use in Palm Springs. He revived the engine and indicated 41,601 feet on the GPS (allowing for a possible 300' GPS error) at the top of his climb. Mission accomplished! *Now you can relax....right?*

OK, you've got the plane again. Wonder what the view is like from over 41,000 feet? No time for sightseeing, you've got to get down from here alive and *hopefully* with a healthy airplane. How much fuel do you have left? If you miscalculated cool-down time or were vectored by ATC you might not make it back to the field. If you have to land elsewhere you can kiss those hard-earned world records good-bye. (The rules say you must land at the same field you departed.) Have you checked your oxygen tank lately? Did you remember to recharge it after pre-breathing to give you enough for the entire flight? If you're in danger of running out you may have to put the nose down and sacrifice your engine to save your skin. Fuel's good...oxygen's good...but your guts hurt, your eyes are bloodshot & bone dry and you're afraid you may break a frozen finger off before you can land. Can't hurry, though...cool the engine too quickly and it's toast (cold, cracked toast). Fortunately, *The Exxon Flyin' Tiger* has a VM-1000 display (Vision Microsystems) that warns you when you're about to shock cool one or more cylinders. (This has saved us *many* engines!) It's your job now to slowly descend, level off for cooling, then descend again while slowly opening the waste gate on the turbo charger to avoid over-boosting the engine. (With a compression ratio of 12:1, that's a real danger.) Remember to keep enough power on the engine in decent to prevent your oil from getting too cold. The *Tiger* has an extremely efficient oil cooling system. While you're doing that, manage the fuel mixture, the prop and the throttle while keeping all temperatures within their perimeters as you reverse the climb process. ATC is still in your ear and you'll need to respond accordingly. Navigate precisely; you don't

have enough fuel or oxygen for time-consuming mistakes. You're down to 20,000 feet and starting to breathe easier...almost home! Then your heart stops....*is the video camera running?!?!*

The NAA oversees installation of a camera to record your altimeter, airspeed indicator and clock. If the camera isn't running, you could make it to the *moon* and it wouldn't matter...*there's no proof!* You really should have checked the camera a couple of times in flight. Bitter cold is rough on equipment and batteries. But you had a couple dozen other things on your mind and forgot. Now you hold your breath and take a peek... IT'S RECORDING!!! You just avoided a bitter disappointment....trust me, we know.

Now you have the field in sight...*don't relax!* You can't feel your feet, you can't see over the nose with that huge air scoop in the way *and* you'll touch down at 100 mph. Vile thoughts creep in...was the airframe damaged in the flight? Just how much can an airplane shrink in bitter cold without breaking? Will these stones that were my feet work the rudder pedals? Will I accidentally jump on the brakes and end up on my back? You remember that old geezer constantly preaching, "the flight's not over until the wheels are in the chocks". That old geezer was right. You *are* careful and you *do* make a victorious landing.

How many times would you like to experience this fun-filled flight? Any idea how many test flights, malfunctions and "May-Days" it took before Bruce made that easy, no-big-deal desert flight to set *FOUR WORLD RECORDS?* Did I mention we almost had to cancel the whole thing *one day* before record day? Let's back up a bit.

Bruce and Crew Chief Gary Hunter worked non-stop to solve the various problems that plagued us at Oshkosh. We learned from turbo-guru Bob Minnis that our accessory pressurization lines were undersized and poorly placed, causing fuel mixture problems and a horrible vibration. Bruce and Gary corrected that problem and learned how to

avoid the turbo stall that shut us down at Oshkosh. Cooling is always a major issue and some things were changed to help in that department. Weeks before the Palm Springs attempt, we were tested, proven and “race-ready”. But on the flight from Texas to California, something went wrong.

We travel as a flight of three; Bruce in “*The Exxon Flyin' Tiger*”, Gary in his Very EZ and I in the Mattituck RV-4. Everything was great until we took off from an El Paso fuel stop. Bruce suddenly picked up some strange vibrations and instrument indications of some type of engine problem. We continued on to Phoenix and before departing there, Bruce told Gary and I to stay on the ground while he took off and made a few checks. He determined it was OK to continue and we made it into Palm Springs right at dark.

The next day, Bruce and Gary worked the problem from daylight to dark. They finally found the culprit...a partially clogged fuel injector that was flowing just enough fuel to read a correct EGT, but was running lean of peak. That caused the engine roughness and overheating of one cylinder. We cleared the injector, made a test flight, did the official weigh-in and were ready for the record attempt the next day. Although the issue was resolved, Bruce had another worry in the back of his mind...*would the overheated cylinder manifest another problem that would force him down on the record attempt?* Last minute scrambles before record runs are not unusual and always unsettling.

That's pretty much the nitty-gritty of our Palm Springs world record flight. And if you think any of the other records Bruce has set were any easier...re-read this story and multiply it by hundreds. Every record quest had it's own set of challenges, risks and close calls. The research and development behind all of Bruce's world records go back to 1989 when he began racing “Pushy Galore”. He's flown hundreds of test flights, surviving everything from blown engines to airframe failures and too many “May-Days” and deadstick landings to count! In “Pushy”, Bruce learned how to run nitrous oxide on an O-200 engine to get 250 horsepower. But that knowledge didn't entirely apply to



running nitrous on the *Tiger's* IO-555 and we blew up an engine trying. So we're learning an entirely new industry...turbo charging. The perimeters used on stock engines and certified aircraft just don't apply to a hopped-up engine on a highly-modified experimental plane. As always, we've got a lot to learn.

If Bruce Bohannon makes record setting look easy, maybe it's because he has over 9,000 hours of mostly "high-risk" flying. From crop dusting to aerobatic competition, air racing and even skydiving, that's a lot of test pilot experience. Or maybe it's because he's smart enough to start with the very best aviation products and services before he pushes the envelope beyond known limits. Or maybe it's that charming grin and self-effacing manner that make Bruce's incredible accomplishments seem almost routine. If you didn't get anything else from this release, understand this.....

**Each time Bruce flies a little higher, a little faster than the guy before him,  
*it wasn't luck and it damn sure wasn't easy!***