NEW ALTITUDE RECORD SET

By DAVID W. TIMMS, EAA 160529, 2571 N. Parkdale Ave., Simi Valley, CA 93063

They say that men climb mountains because they are there. I think that in reality a person wants to accomplish greatness within one's lifetime for self-fulfillment, for recognition, or as a contribution to mankind. Perhaps it is for these reasons that when I realized my opportunity to set a world altitude record, I made the commitment to do so.

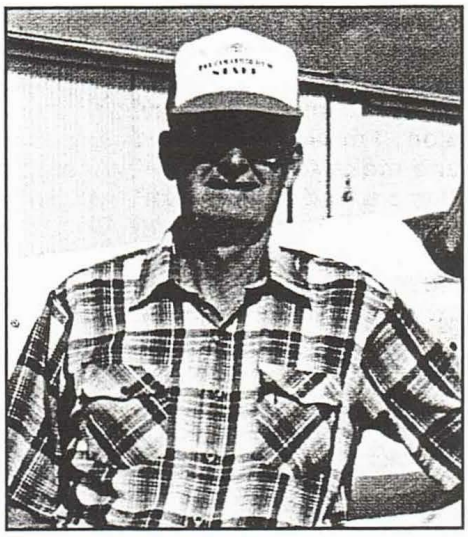
Aero and space world records are sanctioned by the Paris-based Federation Aeronautique Internationale (FAI) which is represented in the U.S. by the National Aeronautic Association (NAA) based in Washington, D.C. The FAI defines Class C.1.a Group I, Altitude in Horizontal Flight, as a light airplane with a piston engine and a takeoff weight between 300 and 500 kgs (661-1102 lbs.). The rules require the airplane to maintain the record altitude in level flight for 15 kilometers or 90 seconds.

The previous record was held by EAAer astronaut and space shuttle commander Robert L. "Hoot" Gibson, flying his modified Cassutt to 27,040 feet on January 31, 1991.

During the record altitude flight in my Long-EZ, N121DT, I attained 30,500 feet indicated, now ratified by the NAA as 30,407 feet, after allowance for instrumentation corrections.

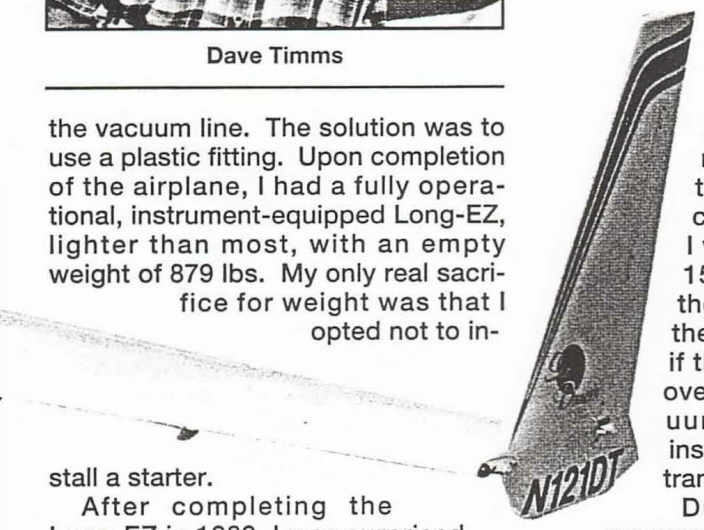
Building my Long-EZ took eight and a half years. I am sure that I must have developed a credibility gap with my friends as to whether I would ever finish this project. During the building process, I was frequently reminded of Rutan's test for adding anything to the airplane: "If you toss it in the air and it comes down, then it's too heavy."

I remember some of my friends laughing at me one day for trying to lighten the weight of a metal fitting in



Dave Timms

the vacuum line. The solution was to use a plastic fitting. Upon completion of the airplane, I had a fully operational, instrument-equipped Long-EZ, lighter than most, with an empty weight of 879 lbs. My only real sacrifice for weight was that I opted not to install a starter.



After completing the Long-EZ in 1989, I was surprised to discover that it performed as well as advertised in terms of rate of climb and speed. I appropriately named it the "Sundancer." Flying light, my initial rate of climb would typically be 1800 fpm. Full power at 8,000 feet would yield 175 kts. TAS while turning my Lycoming O-290 converted ground-power unit at 2750 rpm.

Altitude on cross-country trips was limited only by the lack of oxygen and by cold temperatures. I decided to install an oxygen system and dress warmly. After that, my legal limit became the base of the Continental Control Area (no DME), but my personal limit was still the cold (never could find a suitable heater).

In the spring of 1992, I decided to see just how high the Sundancer would go. With the airplane in its normal configuration, I flew out over the Pacific Ocean to clear the Continental Control Area and was able to climb to 27,000 feet in 55 minutes. The OAT was -32 degrees C; the inside of the canopy was frosting over; my hands and feet were cold.

Surprisingly, I still had three inches of vacuum, and my gyros were operating reasonably well. This was a new environment for me and I was anxious to get back down, landing with two hours of fuel remaining. Had I known at the time that the existing record was 27,040 feet, I probably would have climbed for another couple of minutes to unofficially break the existing record, although I was over weight by 50 lbs.

It was obvious that just as it stood the airplane was capable of braking the existing record. The hitch was that the pilot could weigh no more than 125 lbs. for the aircraft gross to be less than 1102 lbs. At my body weight of 175 lbs., I decided it would be easier for Sundancer than for me to shed some weight.

After getting an accurate weight on the aircraft and after listing the items that could be removed (including back seat, upholstery, fire extinguisher, alternator, ELT, radios, wing leveler autopilot, nav lights, and oil cooler), I concluded that I would have a margin of 15 lbs. grace. So I made the commitment to go for the record. I decided that if the canopy should frost over, I would need my vacuum pump and gyro instruments and maybe my transponder to work ATC.

During the months of preparation that followed, reducing my takeoff weight continued to be the biggest technical problem. That 15 lbs. of grace quickly vanished as changes were made to the aircraft. A flying buddy, Jack McDonough, reminded me that to be legal for VFR I would have to plan for a 30-minute fuel reserve. You must comply with all of the FAR's, or the record doesn't count. But McDonough had a solution for the added fuel weight: simply sand the paint off the airplane. You just can't afford to have many friends like Jack! I opted to go on a diet and save the paint.

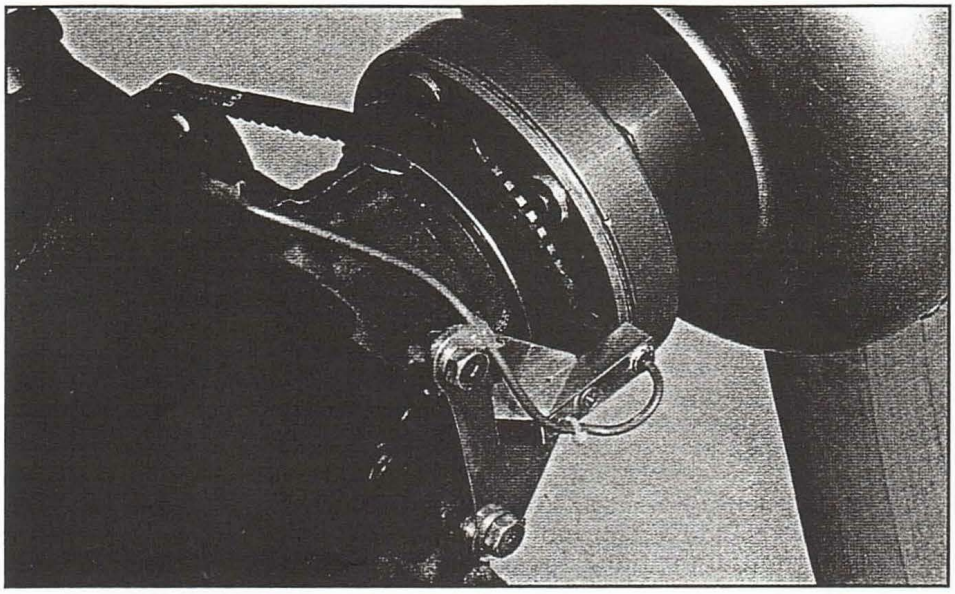
In the months preceding the attempt, numerous test flights were made. On each flight, I tried something different, recording data, solving technical problems and discovering more technical problems.

What happens to a plastic airplane at 30,000 feet with an OAT of -45 degrees C? Does the epoxy resin get brittle and let the wings break off? Will a wooden propeller get brittle and disintegrate? Will a rapid climb with air encapsulated in the wings cause the wings to explode? Will the magnetos arc over and stop firing the spark plugs? Without an oil cooler, will the engine and oil overheat during a sustained climb? Will the oxygen regulator freeze and prevent oxygen flow? Where do you find an inexpensive and lightweight oxygen mask with a built-in microphone? How do you mount a video camera free of vibration to record the resolution of the altimeter? How do you keep warm at -45 degrees C without a heater?

Rutan Aircraft assured me that I did not have to worry about the airplane's structure. They had built jet aircraft using the same process and had flown them over 30,000 feet many times without problems.

To achieve optimum rpm during the climb and especially at altitude, I ordered a longer but much flatter propeller (70d x 36p) from Performance Propellers. The pitch selection was based on estimated true airspeed at 30,000 feet. Luckily, the rpm was right on for the first cut of the propeller, with no additional trimming required. For better ignition and advanced timing, I replaced the right

NAA observer Dick Freeburg seals the canopy prior to flight.



The electronic ignition pickup. Note that there is no starter ring and the timing gear and split pulley are both one piece.

magneto with an electronic ignition made by Electroair.

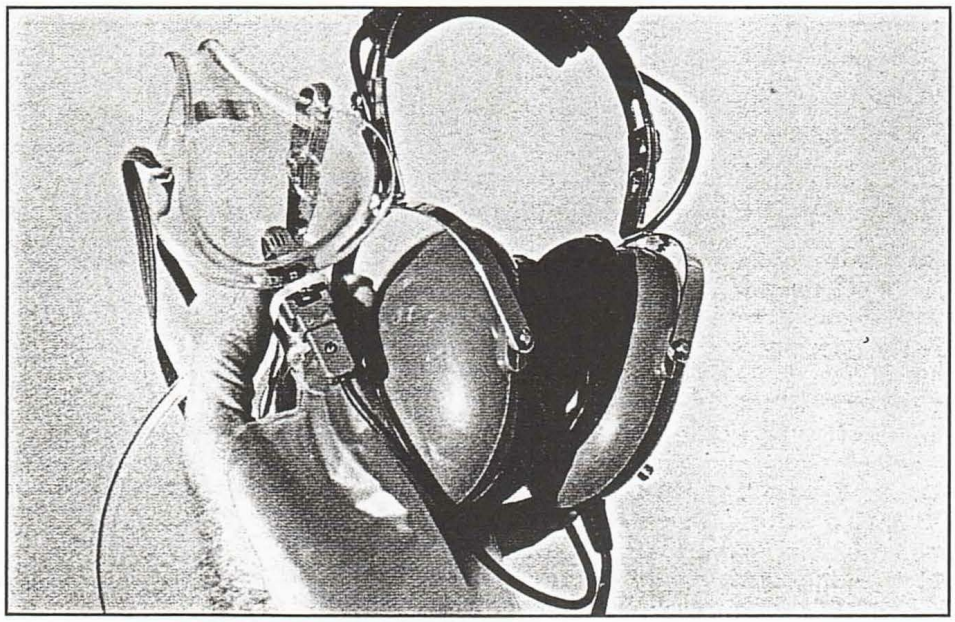
Each test flight was an experience in itself with the oxygen requirement and the cold. Unable to find an inexpensive oxygen mask with built-in microphone that worked well, I improvised my own.

Usually, I would try to work ATC for VFR traffic advisories. Los Angeles Center would sometimes seem puzzled when I would tell them that I was a Long-EZ and that my intentions were to proceed more than 12 miles off the coast to clear the Continental Control Area and climb VFR to 27,000 feet. O.K.?

Then the question arose . . . are the Channel Islands part of the U.S. continent and thereby the Continental Control Area? Yes! Go somewhere else!

Not all test flights were uneventful. On one flight my oxygen system failed, and hypoxia set in at 25,000 feet. I recovered as the aircraft descended through 18,000 feet. Upon landing, I discovered that because of the extreme cold the plastic oxygen hose had slipped off the mask fitting. My final test flight was to 29,000 feet, and it appeared that I could achieve my goal of 30,000 feet.

Finally, the day of the record attempt arrived. Before sunrise on December 5 it all came together at the Camarillo Flight Center, the host of the event and weigh-in. With the video camera and barograph in place, the Sundancer fueled, and with me in the cockpit, we were ready for the moment of truth. What was the gross weight? The ground crew and fellow EAA Chapter 723 members Ken Clunis and Jack Norris lifted one gear at a time onto the precision scales. NAA observer Dick Freeburg called out the weight: 1094 lbs. - 6 lbs. under my target weight of 1100 lbs. Losing that 15 lbs. on my diet had saved the mission. I could keep my transponder and make ATC happy. Clunis and Norris added another quart of oil for a total of six quarts. They added a half gallon of fuel for extra margin, bringing my takeoff weight up to 1099 lbs. I then had eight gallons in the right tank for climb plus two and one-half in the left for descent.



Improvised microphone built into oxygen mask using pilot headset and mic.

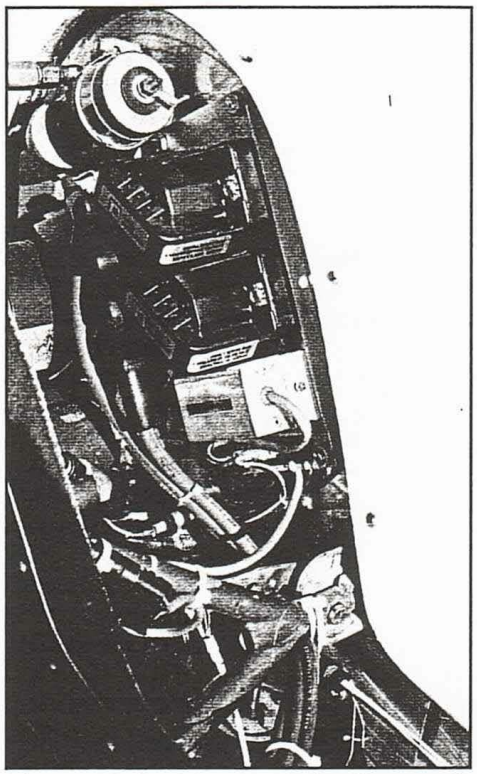
Still in the cockpit, I got pushed back out of the hangar. Cockpit check complete, I switched on the video camera and Freeburg turned on the sealed recording barograph. After closing the canopy, Freeburg sealed it shut with his own sticker. *He did the same to both fuel tanks* just to make sure that I didn't land somewhere and tinker with the airplane or recording instruments.

Clunis hand propped the engine, and in moments I was moving toward the run-up area. Having removed the alternator to save weight, I decided to switch off the electronic ignition during that long taxi to save my battery. But the remaining left magneto didn't carry the engine at idle. The engine quit, leaving me stranded in the middle of the taxiway with my friends and the press looking on. How embarrassing! They must have wondered if this strange-looking machine would even get off the ground. Soon my ground crew caught up with me. Another hand propping, and this time I left the electronic ignition turned on.

Takeoff was at 8:15 a.m. with an initial rate of climb at 2300 fpm, turning 2800 rpm full power and indicating 78 kts. The nose gear crank kept wanting to turn backwards to let the gear down a little. Finally, I held my knee against the crank. The tower handed me off to Point Mugu Approach Control. It was awkward pushing the buttons on my hand-held transceiver with cotton gloves over latex gloves, so each time I changed frequency, I had to remove my outer cotton gloves.

At about 5,000 feet the engine began slowing as though from fuel starvation - a problem I hadn't experienced in the test flights. Was my record attempt already in jeopardy? Could it be carburetor icing? Was the nose-high attitude cutting off fuel flow? Could it be because I removed the air filter after my last flight to give me added manifold pressure? Switching fuel tanks didn't help. Carburetor heat didn't help. But leaning the engine seemed to fix the problem.

Crossing the beach at Malibu, I got handed off to Los Angeles Center. They



Electronic ignition made by Electroair and mounted on the firewall.

were expecting me because I had phoned and faxed them the day before regarding my mission to show them where I would be flying. Center reminded me to stay below 18,000 ft. until 12 miles off the coast, so I leveled off momentarily before resuming my climb.

The engine was running well, but oil and cylinder-head temperatures were well above red line. That $6.25/quart synthetic engine oil should handle the high temperatures.

Center confirmed that my Mode C reply agreed with my indicated altitude. They reminded me to set the altimeter to 29.92 climbing through flight level 180. No, sir! I had to leave the altimeter set to the ATIS setting to read MSL which was being recorded on my video camera.

Climbing through 20,000 feet at 700 fpm was a bench mark that told me I might reach 30,000 feet. Not bad for a Lycoming O-290. (My first airplane was a Piper Tri-Pacer with a Lycoming O-290, and I couldn't get 700 fpm at near sea level.)

I asked Center for vectors to PERCH intersection so as to maintain a 12 mile distance from the coast line. Still feeling alert, I was constantly checking my oxygen system and increasing the flow to compensate for higher altitudes. The oxygen regulator began to frost over. I was glad to be using dry aviation oxygen that wouldn't freeze and plug up the regulator.

Lucky break in the weather - clear and smooth air. But the sight that I wanted to see was the location of the nearest airports, in the event that my engine failed. At that altitude, I could certainly glide to the beach and probably to either Point Mugu Naval Air Station or Santa Monica Airport. At 25,000 feet the moisture from my breath began to frost over the inside of the canopy, except for the areas where I had applied Automotive Rain-X.

My vacuum pump was still pulling almost 3 inches, and the gyro instruments seemed to be working well enough. A check of my battery voltage told me that I had enough battery power remaining to keep the electronic ignition firing for the remainder of the flight. I periodically asked Center for a momentary change of frequency to call Camarillo Flight Center and gave them progress reports. Leaning the engine for maximum rpm was critical at that time. The slightest control movement made a big difference in engine performance.

At 29,300 feet I leveled off momentarily, just to nail down an altitude record of at least 29,000 feet for assurance. I didn't know what technical problems might occur at higher altitude that might jeopardize the record.

Center called to ask, "We just want to verify that you are turbo-charged, aren't you?"

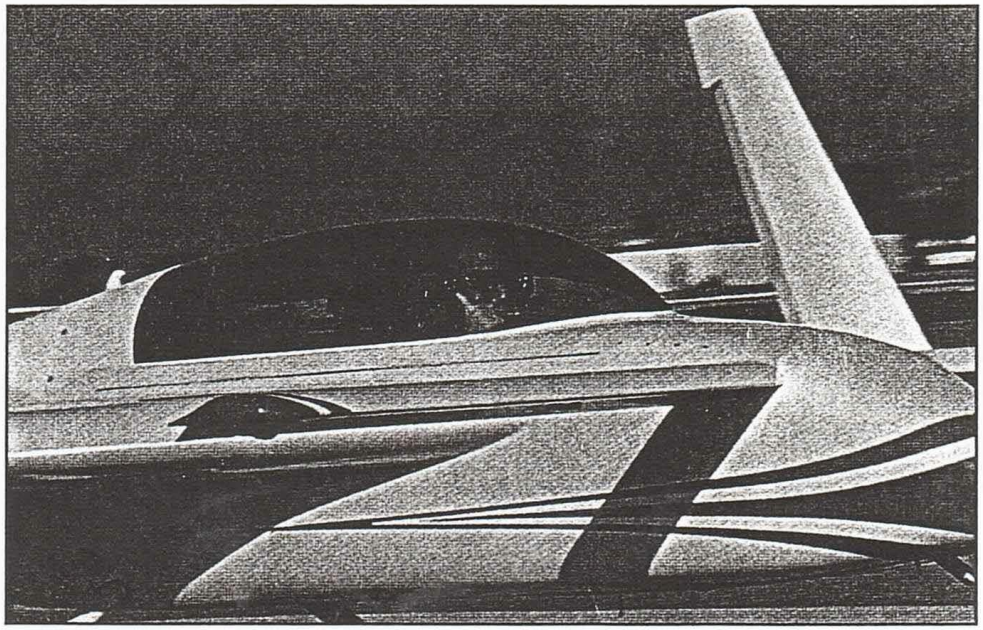
"No sir, just a normally aspirated Lycoming O-290."

After two minutes in level flight, I made a rapid descent of 400 feet to put a notch on the barograph recording. Then I resumed climbing. I momentarily switched off the left magneto, but the electronic ignition timing was far ahead of the magneto at that manifold pressure, and there was no perceptible change in engine performance. However, switching off the electronic ignition caused the engine to lose considerable power with only the magneto firing the engine, yet there was no evidence of magneto arcing or misfiring.

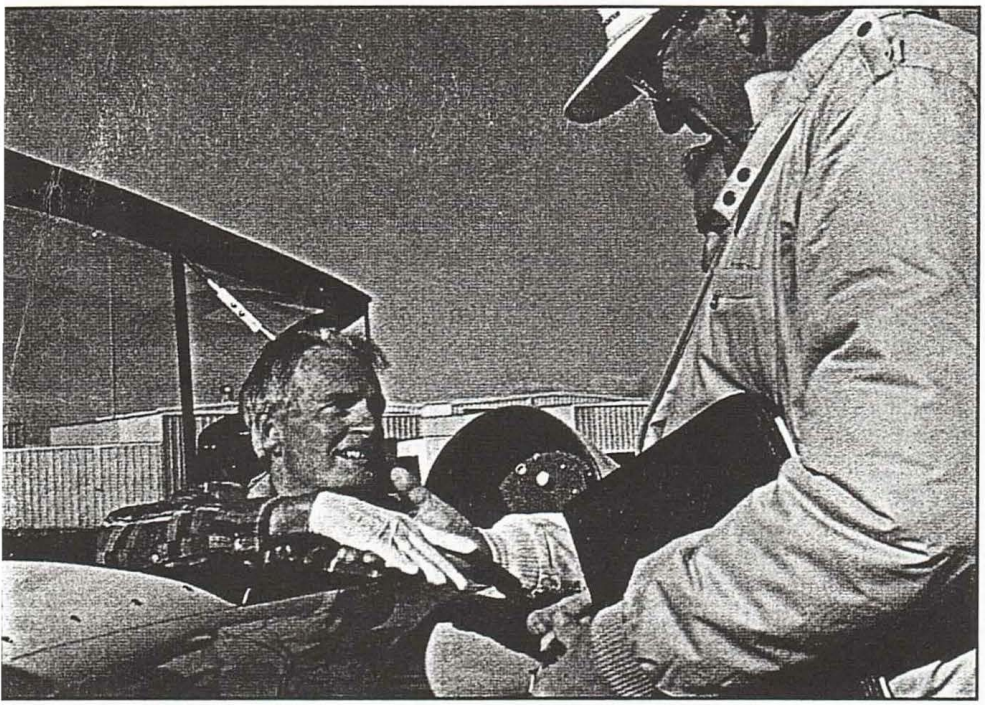
At 30,000 feet my rate of climb was fluctuating between 0 and 100 fpm. Outside air temperature was -40 degrees C. Even with my snow boots, two pair of socks, and my double gloves, my feet and hands were getting very cold. The plastic oxygen hose to my mask was stiff from the cold, so I was careful not to move around too much for fear of breaking the oxygen line. But my plastic wings hadn't exploded or broken off. Guess Rutan was right.

It took three or four minutes to climb the last 100 feet. The airplane was at minimum controllable airspeed indicating 58 kts. and was starting to dutch roll. Interestingly, my true airspeed at that altitude with an OAT of -42 degreees C was 96 kts. The engine was turning a surprising 2600 rpm with the manifold pressure gauge needle pointing below the lowest graduation of 10 inches on the scale; I interpolate 8 inches. I estimate that the engine was only delivering about 30% of rated power, and I suspect that much of that remaining power was used in just turning the engine, leaving little to torque the propeller. Both the CHT and oil temperature were still above redline.

A gentle turn to the west put the sun at my back so as to light the instrument panel for the video camera. I hoped that the camera was still running at that temperature, or it would all be a wasted effort. At 1 hour and 4 minutes into the flight, the Sundancer didn't want to go any higher. Having made my 30,000 foot goal, I leveled off at 30,500 feet indicated. Then I had to concentrate on holding that al-



December 5, 1992 . . . Dave Timms gives a thumbs up after a successful record breaking flight. Note the video camera over the right shoulder and the latex gloves.



NAA observer Dick Freeburg offers his congratulations to Dave Timms after his successful flight. The latex gloves were worn for warmth.

titude within plus or minus 150 feet for 90 seconds to make it official. The airplane didn't accelerate one bit, but the air was smooth, and I maintained plus or minus 50 feet for more than three minutes. Center confirmed that their Mode C readout was showing level flight at FL 305 and that it was being recorded on the computer tapes.

I radioed a status report to ground base and then contacted Los Angeles Center to report starting descent to warmer air. Immediately I lowered the nose gear, pitched the nose down, reduced power, made a steep turn back to the shore line and switched fuel tanks. With less than three inches of vacuum, my attitude indicator tumbled for the first time. I expected to see the airspeed pointer approach the yellow arc. But the airspeed indicator didn't even get up to my typical indicated cruise airspeed.

"Of course not, you dummy," I chided myself. "That big flat prop is holding you back, and at this high density altitude you're not getting much pressure on the pitot tube."

Landing was 1 hour and 34 minutes after takeoff. As I taxied back to Camarillo Air Center, Freeburg reminded me by radio not to open the canopy and break the seal. That was to be his pleasure.

After shut down, Freeburg inspected the seal and sliced it with his fingernail. I opened the canopy for a hand shake with his congratulations and a rousing cheer from the crowd.

Oh, yes, McDonough saw that I landed with 4 gallons of fuel, nearly 40 minutes of flying time.

It just proves that a 54-year old man can compete with the astronauts on a shoestring - if the shoestring isn't too heavy.

(Editor's Note - Dave was recently notified by the NAA that his flight has been approved by the FAI as a world record. Congratulations!) ◆