1985 CAFE 400
OVERVIEW

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The 1985 CAFE 400, the fifth annual Competition for Aircraft Flight Efficiency, was held at the Santa Rosa Air Center over the weekend of June 21-22. While the past four CAFE races had been successful in their own particular ways, this fifth anniversary event was a true milestone, successful in many ways both obvious and subtle. First and foremost, it was a real race for the record books.

Three new CAFE speed records were set during the race. Tom Hamilton flew the factory Gisair RG to a new high mark for the Experimental Two Seat category of 199.3 mph. Marty Jacobson established the record for the new Production Showroom Stock category at 194.5 mph in his sleek Sial Marchetti SF-260. And Tom Hamnett set a new absolute CAFE speed record of 269.2 mph in his Superstar, a Machen-modified Aerator, flying in the Exhibition Category.

Vic Turner, Jr. won the Experimental Single Seat category and the Chevron Award for the Advancement of Aircraft Fuel Efficiency in his 32 hp Quickie, exceeding the historical average score in his category by the highest margin yet recorded.

Gary Hertzel was also among the record setters, winning an unprecedented fourth consecutive victory in the Experimental Two Seat class, posting the highest CAFE score overall, and taking both the Tom Hewett Memorial Award and the Best Var'Eze prize.

The 1985 CAFE 400 could also be called a success from another standpoint — growth. The field of contestants was 30% larger than in 1984. Although several well-known CAFE competitors were absent this year, there were many new faces among the entrants and a remarkably diversified collection of outstanding aircraft in the lineup. These forty-two contestants vied for a prize purse totaling more than $11,000, double the prize money offered in 1984. This directly reflected the increased financial, material and logistical support provided by a group of generous sponsors, without whom there could not be a CAFE 400.

Planning for this year’s competition started in August of 1984. The Board of Directors elected the CAFE Foundation’s Vice President, Larry Ford, to be the Race Chairman for 1985. Larry’s skills as an organizer and consummate promoter (if you need a CAFE T-shirt or cap, just see Larry) as well as his sense of humor and ability to work with people were just what was needed to meet the challenge.

The first order of business was to find a way to encourage greater participation in CAFE racing. After much discussion, the Board decided to rearrange the aircraft categories. The old Production Single and Twin classes were replaced by Production Modified and Production Showroom Stock, the latter category providing the vast majority of light aircraft in the active fleet, which are unmodified, with an opportunity to compete on an equal basis. We also hoped that this new alignment would encourage the major manufacturers to participate with factory or factory-sponsored teams. Dwayne Green, the Foundation Treasurer, observed that in four years of CAFE racing no Thorp T-18s had ever participated and we had no data on the type. He also noted that we had relatively little data on the T-18’s principal rival in the all-metal two-seat experimental market, the Bushby Mustang II. Dwayne proposed a separate competition within the CAFE’s Experimental Two Seat category exclusively for these two types, which have outstanding reputations as fast, efficient, cross-country transportation. The Board promptly elected Dwayne to chair this part of the event, to be called the “T-18/Mustang II Shootout”. The Board also decided to create another new category for Air Recreation Vehicles, or ARVs.

Next on the agenda was the race course itself. The 1984 course had been safe and easy to navigate but was not particularly challenging. The required climbs were shallow and the race was flown below typical cross-country cruising altitudes. A better course was needed. Several meetings followed which were spent literally going over the San Francisco sectional chart with a magnifying glass looking for the best potential checkpoints and routes. We found ourselves coming back to the mountain peak around Redding as the best potential pylons sites, but they all presented serious logistical problems due to their distance from Santa Rosa. To the rescue came the Redding EAA Chapter 157, whose members enthusiastically agreed not only to help scout the two most promising sites, but also to staff them on race day. Thanks to this support from the Redding EAAs, particularly Al Johanson and Roger Luftus, the 1985 CAFE 400 course was able to include 7000-foot pylons atop Bully Chop Mountain to the west and Latour Lookout to the east. With these two peaks, plus the pylons on St. John Mountain staffed by a Santa Rosa-based crew, the new course would feature two strenuous climbs from sea level to 7000 feet and more than 200 miles that could be cruised at that altitude or better. The distance worked out to an ideal 399.625 statute miles.

Two other courses were laid out at the same time. A 270 mile course with one arduous climb was created for the Experimental Single Seat category. These aircraft were usually fuel limited on the long course in the past, and we wanted to encourage more single-seat planes to enter the race. An even
shorter 220 mile course with appropriate climb gradients was laid out for the ARV's.

Since the first CAFE race in 1981, many contestants had suggested that the rules be changed to allow fuel to be credited as part of the aircraft's payload. The Board had stood firm on regulation of events, people, personal effects and ballast, with the requirement that all seats be occupied. The logistics of weighing aircraft empty, which was the only practical way to do the fuel credit computations, seemed impossible. Since the advent of the gas STC’s pioneered by EAA, however, several new products have come on the market to simplify the fuel handling problem. When Brian Seeley saw the ad in SPORT AVIATION for the Aero Fuel Track, he knew he had found the answer. Two pumps would be needed, along with 55 gallon drums, buckets, hoses, batteries and other support equipment, and all that cost money. Things seem to have an uncanny way of working out for this group, and the fuel handling problem was no exception. An angel appeared in the form of veteran racer Mike Smith of Mike Smith Aero in Johnson City, KS. Mike had been a long time advocate of fuel-as-payload, as well as a founding sponsor of the event. This year, Mike Smith Aero donated $1200 to the Foundation, with the additional money earmarked specifically for the acquisition of the pumps. Great Plains Industries helped further by offering to sell the pumps to the CAFE Foundation at their cost. Another obstacle had been overcome.

The final item needing the Board’s attention to make 1985 a landmark year was the CAFE scoring formula, Speed x Miles per Gallon x Payload. This basic formula has been through several evolutionary changes since 1981 and had served its purpose well. But examination of the race results and feedback from contestants indicated that a further change was needed to close gaps in the scoring between aircraft of different types, and between aircraft of differing sizes and weights. With the aid of the Hewlett Packard computer, Brian Seeley and Jim Horn performed a comprehensive analysis of the past four years of CAFE racing, trying various combinations of factors and exponents, looking for the mathematical “equalizer”. As Brian recounts in his Discussion of Results, raising the Speed factor to the 1.25 power and Payload to the .75 power did the trick. In the actual race, the new formula worked so well that the Board decided to use it without modification for the 1986 race.

It would be impossible to recount all of the support provided by the marvelous group of sponsors, but there is an appropriate point at which to recognize contributions which were particularly significant to the success of this year's race because of their size, significance, and timeliness. Chevrom USA once again funded the $2500 Chevrom Award for the Advancement of Aircraft Fuel Efficiency accompanied by a $2000 donation to the general fund, double the amount contributed in 1984. Our special thanks go to Cul Ingram and Grid Toland of Chevrom USA for their efforts to secure this funding.

Once again, the EAA Aviation Foundation provided significant and increased support for the CAFE 400 through a donation of $2000, up from the $1500 contributed last year. Also warranting special mention is the $500 contribution of Mooney Aircraft Corp.
The weather up to race weekend had been good, with only three marginal days in the past month. There was an overcast on Friday that didn’t burn off completely until almost 11:00 a.m., but all the forecasts called for improving conditions on Saturday. Friday’s registration, fueling and weighing activities proceeded without incident. Event the lengthy fuel draining process was expedited by means of 5 gallon plastic buckets and the ingenuity of the station crew led by Ron Ford and Greg Poczek at EAA Chapter 124.

When Tom Harrett arrived in the 70 hp Superstar he asked a race official if there was any twin-engine competition. “Just one,” the official replied, and proceeded to take Tom down the line for a look at Harold Josephson’s twin-engined entry — a Zenair Cricket with its two 15 hp two-cycle engines perched on stands on either side of the nose like the antennae of its insect namesake. It was going to be that kind of a race.

By 5:30, the last airplane had been processed and snugly tied down in the overnight impound area, its empty and fueled weights and other vital data recorded by the computer.

An informal get-together on Friday evening for pilots, crews, officials and volunteers has been a tradition at the CAFE 400 since 1981. This year, the affair was hosted by Anne and Brien Seeley at their home in Santa Rosa. Instead of the usual hors d’oeuvres, there was a catered spaghetti dinner with all the trimmings including Sonoma County wine, crisp bread and dessert, just the ticket if you weren’t up to gross weight yet. Almost two hundred people attended, a sizeable group out on the deck trading flying stories, another group in the living room taking one more look at the pilot briefing videotape (“Where did he say those mountains were?” — “You can’t miss ‘em!”), and a third group, by far the largest, packed into the family room to view the videotape of last year’s race produced by Borelant Video. A chartered bus was available to shuttle crews back to the hotel, and by 10:00 p.m. the guests had gone home to bed, anticipating the scheduled 7:00 a.m. start of activities at the Air Center the next day. The locals, who had been anxiously watching the sky throughout the evening, couldn’t help noticing that by dark a particularly thick fog had rolled in, bringing the ceiling down to about 800 feet, and covering the entire Santa Rosa plain. It looked like the low stratus went all the way east past Mt. St. Helen, an ominous sign reminiscent of the 1982 race.

Race day dawned, but just barely. Most race officials, volunteers and a few crews had arrived at the Air Center at 6:30 a.m. to be greeted by solid IFR conditions and PIREPs reporting the stratus layer to be 2500 feet thick. The Race Chairman, Larry Ford, invoking Plan B, advised everyone to check back in at 9:00 in expectation of improved conditions. Fortunately, the 95’s had plenty of doughnuts and hot coffee on hand. By 9:00 the ceiling had lifted somewhat, and the reports coming from the Calistoga Soaring Center, the airport nearest to the first mountain pass along the route, indicated that conditions were improving to the east. It was decided to proceed with the weighing of crews and prefight preparation of aircraft, since conditions were thought likely to be improving rapidly. By 10:00 the weighing was completed and the crews were at their planes. The Air Center was now above VFR minimums, but the pass south of Mt. St. Helen was still reported in the fog. So we waited. And waited. And waited. A shuttle service was organized between the impound area and the port-a-potties for crews who overpassed on the 95’s coffee and had to declare an emergency. Some crews who hadn’t eaten since a very early breakfast, and who faced a four hour flight on an empty stomach, managed to sneak a snack.

Finally, about 12:30, with no real improvement in the weather apparent from the ground, Tom Harrett volunteered to take the Superstar up for a look around. The big twin roared off to the south toward Petaluma and Napa, then swung north to check out the route past Mt. St. Helen. It appeared to be socked in solid. Tom was reporting back to Race Control on the race frequency, and every plane on the line had its radio tuned in to get Tom’s observations first hand. By the time the Superstar landed, Brien, Larry and Jim Horn had worked out an alternate course with a southerly departure and a first pylon turn around Mt. Diablo. After conferring with Tom, it was decided to go up again and take one more look around just in case. The Superstar was soon airborne again, now with Frank Braai and Dick Hunt on board. This time, they probed the route around Mt. St. Helen more extensively and found clearing conditions that were indeed improving rapidly. Forty-two radio crackled with the welcome news that the race could start right away and the original course was a “Go!” Shortly after 1:00 p.m. the signals were given to start engines and taxi to the starting line. The race was on.

The racers were flagged off at thirty-second intervals, but by the time the third plane was airborne it was obvious that we were going to have a real race, not just a sedate economy run. At times, the turning point onto the course off the end of Runway 16 suggested a scene at the scatter pylon at Cleveland during the Golden Age. Roy Lopresti in the factory Mooney and later Dick Hansen in Ray Richer’s RV-3 made spectacular departures. But even they were upstaged by Ben Ellison’s red-hot Long-EZ which passed other competitors on the climbout like they were standing still. Ben went on to set a race record for Long-EZs of 191.1 mpn. Twenty minutes after the last racer in the other categories departed, it was the turn of the Experimental Single Seaters. This delay was intentional, since they would be on a short course and turning around one of the pylons in the opposite direction to the rest of the field.

As soon as the first plane cleared the field, an action shifted to the pylons around the course. All of the planes had been on line and ready to go since 7:30 a.m. The weather along the route has clear and hot and there was little shade at the mountain top sites. It’s a real tribute to these volunteer crews that they hung in there until every plane was accounted for. Jim Weir’s radio network worked flawlessly, and soon reports began to filter back from the pylons about the progress of the race.

Once out on the course, the racing became wingtip-to-wingtip in many cases. Pylon judges reported planes roaring in by bunches of four and five. Pilots were using the race frequency plane-to-plane to advise each other of their relative positions. The pylon crews could monitor these transmissions, and were impressed by the professionalism and safety consciousness of the pilots under the strain of competition. One particularly dramatic moment occurred at the St. John Mountain pylon. Tom Hamilton and Marty Jacobson were racing side by side as they neared the pylon. “I’m coming under you,” Hamilton announced and Jacobson acknowledged as they knife-edged by the pylon neck-and-neck.
The St. John pylon also served the short single-seat course. Tim Seeley, the pylone chief, says that they could hear the Cortena pylon car taking to the Cricket, but that it was nearly an hour before he arrived at the St. John summit. Pilot Harold Josephson had to circle three times to climb to pylon passage altitude. Going from 700 to 1000 on a hot afternoon in 26 miles is just about the limit for the little 30 hp twin. When the Cricket finally reached the pylon, Tim said it was the first time he had actually seen how a plane flies at its service ceiling, bobbing up and down in the turbulent air, on its tail in the air. As soon as he cleared the pylon, Josephson throttled back for the glide down into the valley and the run to Mt. Diablo, and it was almost as if the plane itself let out a sigh of relief.

Three aircraft had to drop out of the race with mechanical problems. George Pereira, whose sleek GP-4 had been a prime candidate to take the Outstanding New Design award, made a precautionary landing at Sonoma County Airport when a fitting came loose from his fuel quantity sight gauge and leaked gasoline into the cockpit. Another candidate for the same award was Chris Beachner’s V8 Special, but Chris’ race was spoiled by an exhaust manifold that came apart just after passing the Cortena pylon. Chris was able to return directly to the Air Center without further incident. Because neither plane completed the race, they will be eligible for the Outstanding New Design award again next year. The third contestant to retire from the race was Irwin Abrahms, whose Q-2 experienced overheating on the climb from Cortena to St. John. He was also able to return to the Air Center.

The first plane to finish the long course was the last plane to take off, Tom Harnett in the Superstar. Tom’s airplane wasn’t weighed after the race so no CAFE score could be determined. There was no way to refuel and reweigh his plane after his characteristically unselfish weather scouting flights. Nevertheless, Tom had the satisfaction of passing every airplane on the course and setting a new all-time CAFE speed record that is likely to stand for some time.

All the racers seemed to arrive back at the Air Center in remarkably short order, and the weighing-out process went smoothly and quickly. The awards banquet was moved back to 9:00 to allow adequate time for data processing, printing of results and photo processing. The last two planes down were the Cricket and Jim Lewis’ Moni. When the Cricket finally taxied up to the hangar, shut down the little two-stroke and opened the canopy, Vic Turner ran up to Harold Josephson, shook his hand, and said, “Man, have you got guts!”, a feeling shared by all present. If there were awards for courage, perseverance and achievement in airmanship, they would surely go to Harold and Jim. Both pilots looked as though they had put in a long day. We hope to see both of them competitors back next year in the ARV category. It’s ironic that after all his hard work, Harold was disqualified. The long climb to St. John Mountain took too much fuel and the little Cricket landed with just slightly less than the required fuel reserve.

The awards banquet was held at the Los Robles Lodge, which has become the official CAFE 400 hotel. Despite the compressed time frame caused by the delay at the start of the race, we still had the traditional slide show with pictures of all the competitors in their best pylon-polishing form zooming around St. John Mountain. We were also fortunate to have about 20 minutes of spectacular videotape shot at the same location. The evening’s featured speaker was Dr. Leo Windoeder, designer of the Wingard Eagle and Avtek, and a pioneer in the field of composite construction techniques for aircraft. There was a long list of awards to present, capped by the presentation of the Outstanding New Design Award by Edward Tripp of AOPA.

All too soon the festivities were over. The Board members and a few volunteers spent Sunday out at the Air Center cleaning up the site, putting away the equipment for another year, and saying farewells to the contestants heading for home. There would be a few days of rest ahead, then a meeting to evaluate the race and start planning next year’s event. All of us in the CAFE organization would like to express our sincere thanks to the contestants, sponsors and volunteers who made the fifth anniversary CAFE 400 so special.

To those readers who haven’t yet tried efficiency racing, and to those who have and would like to take a shot at beating your previous score, we’d like to invite you out to Santa Rosa, CA over the weekend of June 27-28, 1986 for the sixth annual CAFE 400. The course and the formula will be identical to 1985, so start now making plans and doing your flight testing. Don’t believe anyone who says that CAFE racing is dull. Until next year, Happy Landings!
Steve Alderman and his turbocharged KR-2 finished 9th in the 2-seat experimental category.

Discussion of Results
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The CAFE Formula of Speed times MPG times Payload was refined again for the 1985 CAFE 400 to give more importance to speed and less to payload. This was accomplished by analyzing the previous 4 years of CAFE scores while substituting different exponents for speed and payload. The result was a formula that worked beautifully for comparing widely different aircraft. For example, the 8 seat Piper Malibu scored within .3% of the 2 seat Glasair RG and the Turbo Mooney 231 and Turbo KR-2 likewise differed by only .35%

The new formula reads:

\[
\text{Speed} \times 1.25 \times \text{MPG} \times \text{Payload} = \text{CAFE Score}
\]

or, in other words, “Speed to the 1.25 power times MPG times Payload to the .75 power equals CAFE Score.” Taking a number to the 1.25 power requires a scientific calculator with an x to the y power function key and is not the same as 1.25 times the number. 10 to the 1.25 power equals 17.782794, not 12.5. For those of you without scientific calculators, the 1985 CAFE Score can be calculated by using the old formula of Speed times MPG times Payload and then multiply that number by the square root of the square root of the quantity obtained from dividing speed by payload.

The old CAFE Formula optimized at an average of about 59 to 50% power while the new one demands anywhere from 65% to 75% depending on the aircraft. Thus, the formula now not only evens out size differences, but also encourages flight at real world power settings. Now, appropriately, the barrier to achieving a maximum fuel efficiency score tends to be the physical limit of the internal combustion engine, the detonation threshold. That threshold, along with the factors or drag coefficient, the viscosity of air, propeller efficiency and optimized pilot skill are the sum of the fundamental challenges that face anyone attempting to win the CAFE 400.

1985 Winners...
Experimental Categories

The $2500 Chevron Award for the Advancement of Aircraft Fuel Efficiency was won by Victor Turner, Jr. in his modified Quicksie single seat homebuilt. This award goes to the aircraft whose score most significantly increases the average scores of its category from all CAFE events past and present. Vic’s score exceeded that average by 2.28 standard deviations.

Vic’s Quicksie is remarkable in that he installed a 100 cubic inch, 4 cylinder opposed, air cooled Wisconsin engine that he found in a military salvage yard near San Diego. It delivers about 32 hp and directly drives the special prop made for it. This is the only Quicksie around that has seen 170 mph true straight and level. Vic feels he could have scored even higher except for a tactical error he made when he elected to dive underneath a broken stratus layer on the final 60 mile leg of the 270 mile race course for single seat category. There he encountered bad turbulence and lost 15 mph off his expected airspeed (he had been trueing out at 155 up at 4000 feet). In spite of this, Vic’s score is a new all time high CAFE score for single seat experimental aircraft, as shown on List A.

Dick Hansen flew a blistering pace in Ray Richter’s RV-3 to place second in this year’s single seat category and should get the award for tightest pylon turns. Jim Lewis posted 59.65 mpg and placed third in his Monnett Moni.

Unfortunately, the Cricket finished with less than the required half hour fuel reserve and was disqualified.

The amazing team of Gary Hertzler and Dick Townsend again won the 2 seat Experimental category with an outstanding score. These guys spent nearly 20 flight hours testing Gary’s superb A-80 powered VanEze to develop their optimized flight plan. This included using a digital fuel flow indicator to determine that his VanEze requires 1 gallon per hour over level flight fuel flow for 335 fpm climb at 137 mph at gross weight. The changes for 1985 in Gary’s airplane were the use of Aero Shell 15W-50 oil instead of Phillips 20-50W which Shell claims affords a 2% improvement in fuel consumption, fabricating and installing a spinner, and installing oil vents.

Gary also won the $400 Tom Jewett Memorial Award sponsored by the Aircraft Spruce and Specialty Company of Fullerton, CA. This award goes to the aircraft that achieves the highest product of MPG times Payload regardless of speed, which is a number proportional to the aircraft’s Lift to Drag Ratio. Gene Sheehan of Quickie Aircraft Corporation presents the award annually, having been Tom Jewett’s co-worker in their “Free Enterprise” around the world flight efforts prior to Tom’s death.

Speaking of Gene Sheehan, he again placed second in Hertzler’s VanEze in the prototype Q-200 with a speed exactly 26 mph faster than the VanEze. Since he missed first place by less than one percentage point, Gene is undoubtedly wondering what would have happened if he had not suffered a stuck valve during the final descent from 15 miles out, which produced rough running and very poor mileage.

Klaus Savi, in Larry Godsey’s VanEze, placed third in an airplane with the same engine and same MPG as Sheehan’s Q-200 but 7 mph slower. This is a remarkable score especially for a first time CAFE racer.

Dick Wallrath’s freshly completed Q-200 had just barely flown off the initial flight hours since hatching and still managed a 4th place. Look out for this guy next year.

Dick VanGrunsven, a real veteran CAFE racer, won the Best All Metal Two Place Experimental award with another excellent performance in the prototype RV-4. VanGrunsven, like Hertzler and Sheehan, is an old pro at flying this race in an airplane with which he is very familiar. Their 1984 and 1985 scores listed below show that, clearly, the new 1985 CAFE 400 race course is more demanding than the previous year’s course (see List B).

<table>
<thead>
<tr>
<th>Year</th>
<th>Aircraft</th>
<th>Pilot</th>
<th>Score</th>
<th>Speed</th>
<th>MPG</th>
<th>Payload</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>Quicksie</td>
<td>Vic Turner, Jr.</td>
<td>132,930</td>
<td>129.4</td>
<td>56.51</td>
<td>200</td>
</tr>
<tr>
<td>1981</td>
<td>Quicksie</td>
<td>Martin Fisher</td>
<td>112,338</td>
<td>116.8</td>
<td>53.55</td>
<td>158</td>
</tr>
<tr>
<td>1982</td>
<td>Quicksie</td>
<td>Bill Hartman</td>
<td>102,569</td>
<td>110</td>
<td>55.40</td>
<td>156</td>
</tr>
<tr>
<td>1981</td>
<td>Mini-Mustang</td>
<td>Charles Linn</td>
<td>96,175</td>
<td>185.7</td>
<td>26.38</td>
<td>200</td>
</tr>
<tr>
<td>1981</td>
<td>Quicksie</td>
<td>Vic Turner</td>
<td>93,450</td>
<td>97.9</td>
<td>57.06</td>
<td>200</td>
</tr>
<tr>
<td>1984</td>
<td>Van’s RV-3</td>
<td>Ray Richter</td>
<td>92,555</td>
<td>178.3</td>
<td>26.74</td>
<td>200</td>
</tr>
<tr>
<td>1985</td>
<td>Van’s RV-3</td>
<td>Dick Hansen</td>
<td>90,802</td>
<td>180.0</td>
<td>24.55</td>
<td>200</td>
</tr>
<tr>
<td>1983</td>
<td>Van’s RV-3</td>
<td>Ray Richter</td>
<td>86,307</td>
<td>172.4</td>
<td>26.58</td>
<td>200</td>
</tr>
<tr>
<td>1982</td>
<td>Quicksie</td>
<td>Vic Turner, Jr.</td>
<td>81,132</td>
<td>106</td>
<td>51.17</td>
<td>178</td>
</tr>
<tr>
<td>1983</td>
<td>Owl Racer</td>
<td>Dennis Vest</td>
<td>86,525</td>
<td>200.3</td>
<td>23.59</td>
<td>178</td>
</tr>
</tbody>
</table>
The score decrement would be even greater in 1985 if these old pros had been flight planning for the new "high speed" CAFE formula in their prep efforts. This makes the 5th place score of Steve Scaroni's VariEZs especially significant because he bettered his 1984 score by 5.5% this year.

Ben Ellis, developer of the Ellison Throttle Body, won the Rutan Aircraft Company's Best Long-EZ award with his superbly built 160 hp version. Comparing historical Long-EZ scores shows that Mike Melvill's N26MS still holds first place among the competing Long-EZ's (see List C).

In the first annual Thorp T-18 vs. Mustang II "Shootout", Ken Brock's "Sweet Marie" took first place with Dick Rutan serving as co-pilot. The two Thorps this year had the same engine but apparently flew different strategies since Ken's showed 164.9 mph vs. 172.8 for Peter Leffler's entry.

Steve Alderman's Turbo KR-1 scored better than any other KR-2 in any efficiency race on record despite the absence of favorable high altitude winds in this year's race, and set a mark for other KR-2 owners to strive for.

**Production Category Results**

This year the production aircraft were divided into two classes: Showroom Stock and Modified. To qualify for Showroom Stock, an aircraft must not have any aerodynamically or thermodynamically significant changes in the airframe and no taping of seams, openings or gaps is permitted.

Roy Lopresti, President of Mooney Aircraft Corporation, won first place in the Showroom Stock class with a shiny brand new Mooney 201 fresh off the assembly line at the Kerrville, TX factory. Roy and computer expert Rich Specter spent a good deal of time figuring out an optimized flight profile for the 201 from the airplane's Flight Manual data.

Roy took off with full throttle, 2700 rpm and 100 degrees rich of peak EGT and immediately leaned to 50 degrees lean of peak EGT and 75% power after retracting gear and flaps, which he then maintained throughout the race. He made the steep climb to St. John Mountain at 115 mph burning 10.2 gph and leveling off about 5 miles out from the finish at 2800 feet. Then he stayed at 7000 feet until Ira's computer called for a 750 fpm constant slope descent at 65% power and 188 mph indicated.

After the Labor Day Butte pylon at 7000 feet, Roy tried everything he could to pass Bob Beard's 201 which was racing wingtip to wingtip all the way. He finally shut off all the radials, closed all the cabin vents and had a passenger climb over into the baggage compartment and gained 1 mph. By this time Bob who, unlike Roy, had no RN9, had drifted about 10 miles east of the true course. Bob flew a very similar flight plan, but feels that enriching the mixture during the hot climb to Bully Choppy pylon, which he did because he thought the engine sounded like it was detonating, probably cost him the race. Bob also utilized 26.5° and 2350 rpm at the lower altitudes for 75% power rather than a constant 2650 to 2700 like Roy. Bob is very serious about CAFE racing; he is building a 4 place VanEze with 180 hp.

Third place in the Showroom Stock class was won by Clark Gates II in his Piper Malibu, a design making its first appearance in a CAFE race. Clark won the Outstanding New Design Award sponsored by AOPA. He
1985 CAFE 400
Discussion of Results

planned carefully for the race and flew the longest leg (161 miles) at 10,500 feet. He maintained 65% power for climb, cruise and descent and experienced no overtemp problems at 50 degrees lean of peak EGT. The Malibu was going 235 mph downhill to Black Butte Reservoir pylon. It was a fully equipped aircraft including, probably to the detriment of its CAFE score, full de-ice boots.

Roger Lovato’s S models Bonanza narrowly edged out Phil Perrin’s Comanche 250C for 4th place and “Best Sonoma County Pilot” which was sponsored by the Sonoma County Aviation Association.

Lyle Powell, Jr., who was unable to race his slick Glasair this year due to a runway accident one week before the race, turned in a remarkable score in Keith Martz’s Comanche 250, getting nearly 16.5 mph.

Bruce Drang, who came all the way from Wisconsin to race his G-35 Bonanza, would have won first place if the fuel cost was figured into the formula, since his Bonanza runs on auto gas.

In the Production Modified class, Paul Loewen was the clear winner in his extremely fast Mooney M20E which has all of the speed mods from Paul’s Lake Styling and Repair shop in Lakeport, CA. Paul’s arch rival, Coy Jacob, the self-proclaimed owner of the “fastest non-turbo Mooney in the world”, withdrew from the race at the last minute after learning that Paul’s Mooney was in the running and thus one of the best grudge matches around failed to materialize.

Paul’s score is truly remarkable, surpassing even Roy Lopresti’s despite the older Mooney’s limited payload capability. Paul used Loran C to navigate the course and ran 2550 to 2700 rpm all the way, summing 11.5 gph in climb and 9.0 gph in cruise, 50 degrees lean of peak EGT and maintaining 7000 feet as the Loran showed light and variable winds aloft.

Mike Terhune of Mike’s Aero Turbo Plus in Angwin, CA, flying Tom Harnett’s Mooney 231 with the Turbo Plus innercooler installed, fought a close duel with Jan Morgan’s 231 which has all flush antennas and a smooth fiberglass belly panel.

Paul Davids in his modified Superplane, a Cessna Turbo 206 that is a good 20 mph faster than stock, again won the Best Fixed Gear Production award with a very good score. As with the others, the new course this year gave a score 2.5% less than his score last year.

Also of note was the Exhibition score achieved by Rich Powell and Rob Cook in an experimental Mooney which flew most of the race at 2500 rpm leaned 100 degrees on the lean side of peak EGT. They feel they could have achieved 23.5 mpg if they had not gone an extra 25 miles in the valley haze in search of the first pylon. Their score is listed along with the Mach 2 Superstar’s in the Exhibition category.

The CAFE scales again produced very accurate weighings of the aircraft demonstrating excellent reproducibility in weighings and comparisons made with pilot estimates of their fuel burn. The new CAFE formula produced a more tightly condensed set of scores for markedly differenced sized aircraft than we ever expected. The new race course, all agreed, was a spectacular scenic challenge yet easy to navigate.

It was most gratifying to find that the average percent power used in the 1985 CAFE 400 was 70.1% compared to the 60% used in the previous races. Hail to the new formula!

SUMMARY OF 1985 CAFE 400 AWARDS

- Chevron Award for the Advance of Aircraft Fuel Efficiency sponsored by: Chevron USA, Inc.
  - won by: Victor Turner Jr., Quickie N800QK
  - $2500

- Outstanding New Design Award sponsored by: Aircraft Owners and Pilots Association
  - won by: Clark Gates II, Piper Malibu N4372F
  - $2500

- Best Fixed-Gear Production Aircraft sponsored by: Paul Davids Aviation
  - won by: Paul Davids, Cessna Turbo 206 N1280DA
  - $500

- Tom Jewett Memorial Award sponsored by: Aircraft Spruce & Specialty Company
  - won by: Gary Hertzler, Varieze N99VE
  - $400

- Best All-Metal Construction Two-Place Experimental sponsored by: CAFE Foundation
  - won by: Rich VanGrunsven, RV-4 N114RV
  - $300

- Best Performance By A Sonoma County Pilots sponsored by: Sonoma County Aviation Association
  - won by: Roger Lovato Beechcraft Bonanza S N5876S
  - $200

- Best Thorp T-18 vs Mustang II sponsored by: CAFE Foundation
  - won by: Ken Brock, Thorp T-18 N42KB
  - $150

- Best Varieze sponsored by: Rutan Aircraft Factory
  - won by: Gary Hertzler Varieze N99VE
  - $150

- Best Long-EZ sponsored by: Rutan Aircraft Factory
  - won by: Ben Ellison Long-EZ ETB N17BE
  - $150

- Best Rand KR-2 sponsored by: Rand-Robinson Engineering
  - won by: Steve Alderman Rand KR-2 N5276J
  - $150

Category Awards: 1st Place $500
                2nd Place $400
                3rd Place $200

$1200 in each of 4 Categories

$4800

Ken Brock’s 180 hp T-18 “Sweet Marie” more than defended the honor of this older type of homebuilt design.
CAFE VOLUNTEERS

Bill Atwell  
Aviation Explorer Squadron 79  
Steve Barnes  
Bonnie Braal  
Bob Curtis  
Ron Davison  
Bill DeProsse  
Bill DeProsse, Jr  
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Brian DeProsse  
Crandon Elmer  
Ron Elmer  
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Richard Shone  
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Betty Stephens  
Joe Stender  
Pete Tudebbush  
Dale Vawter  
Candy Vawter  
Alex Taylor  
Bob Vargas  
George Vodder  
Pete Webers  
Cimmin Vongehr  
Bob Gutteridge  
Ray Andrews  
Ted Smith  
Dick Hunt  
Damon Seeley  
Cris Hawkins  
Al Foster  
Ron Ford  
Del McDaniel and Jean McDaniel  
Mark Shone

Race Chairman Larry Ford practicing for single seat category with daughter Meaghan Key.

CLASS

PRODUCTION 1985 Marty Jacobson 194.5  
SHOWROOM STOCK Stai Marchetti SP260C  
PRODUCTION 1982 Lee Larson 206.7  
MODIFIED Smith Bonanza V-55  
EXPERIMENTAL 1983 Dennis Vest 200.3  
SINGLE SEAT Owl Racer  
EXPERIMENTAL 1985 Tom Hamiton 199.3  
TWO SEATS Glasair 180 RG  
EXPERIMENTAL 1981 Burt Rutan 184.0  
THREE + SEATS Rutan Defiant  
EXHIBITION 1985 Tom Hatenn 269.2  

Speed  
MPG

1983 Harold Anderson 28.44  
1984 Paul Loewen 21.26  
1981 Martin Fisher 71.69  
1984 Gary Hertzler 46.03  
1984 Shirl Dickey 29.27  
1984 Dick Rutan 28.31  

The CAFE Foundation Board of Directors

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SUMMARY OF MOONEY PERFORMANCES IN 5 CAFE RACES

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<tr>
<th>Year</th>
<th>Aircraft</th>
<th>Pilot</th>
<th>Score</th>
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*1983 Mooney Factory Team member, now employed by Beechcraft.

(Continued on Page 64)