



# Captivating Cadet

Carl Schuppel

## **A** CULVER CHRONICLE

If you had been a person of perhaps just a little better than average means in 1940 you might have made about \$2,000 that year . . . yes, \$2,000 for the **entire** year. If you were a pilot, your flying would necessarily have consisted of an occasional hour in a 40 or 50 horse Cub, Chief or Taylorcraft, or, maybe, in a ratty old OX-5 Travel Air or Waco 10. If you could have squeezed an extra couple of bucks out of the family cookie jar, you might have even logged a half hour in one of those shiny new 65 hp Luscombes that would actually do an honest hundred miles per hour. Sure, that was small potatoes to

those big shots who made ten or fifteen thou a year and could afford to thunder off to another city in their Waco Cabins or Stinson Gullwings . . . or those oil company executives who lorded it over everyone with their Staggerwings and Spartan Executives . . . but what th' hey, you were just happy that you had done well enough to be able to learn to fly

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**BY: JACK COX**

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and could hang in there and log fifteen or eighteen hours a year.

Given the economics of the time and the level of expectations of the average person in 1940, imagine the sensation that was created when the word leaked out that a small Columbus, Ohio firm

named Culver Aircraft had developed a 2-place sportplane that would **cruise** at 120 mph on just 75 hp, and that it planned to sell them for around \$2,200 apiece!

That wonderplane was the Dart L . . . a name that was quickly changed to "Cadet" to differentiate it from the larger, radial engine "Dart" the company was already producing and, perhaps, to apply a little power of suggestion to those who were buying airplanes for the Civilian Pilot Training Programs that were springing up at colleges and universities all over the nation. Apparently, the sole owner of the firm, Knight K. Culver, Jr., liked the name "Dart" . . . because his family also owned an outfit called the Dart Boat Company. The designer of the Culver Cadet was one Al Mooney, a self-taught aeronauti-



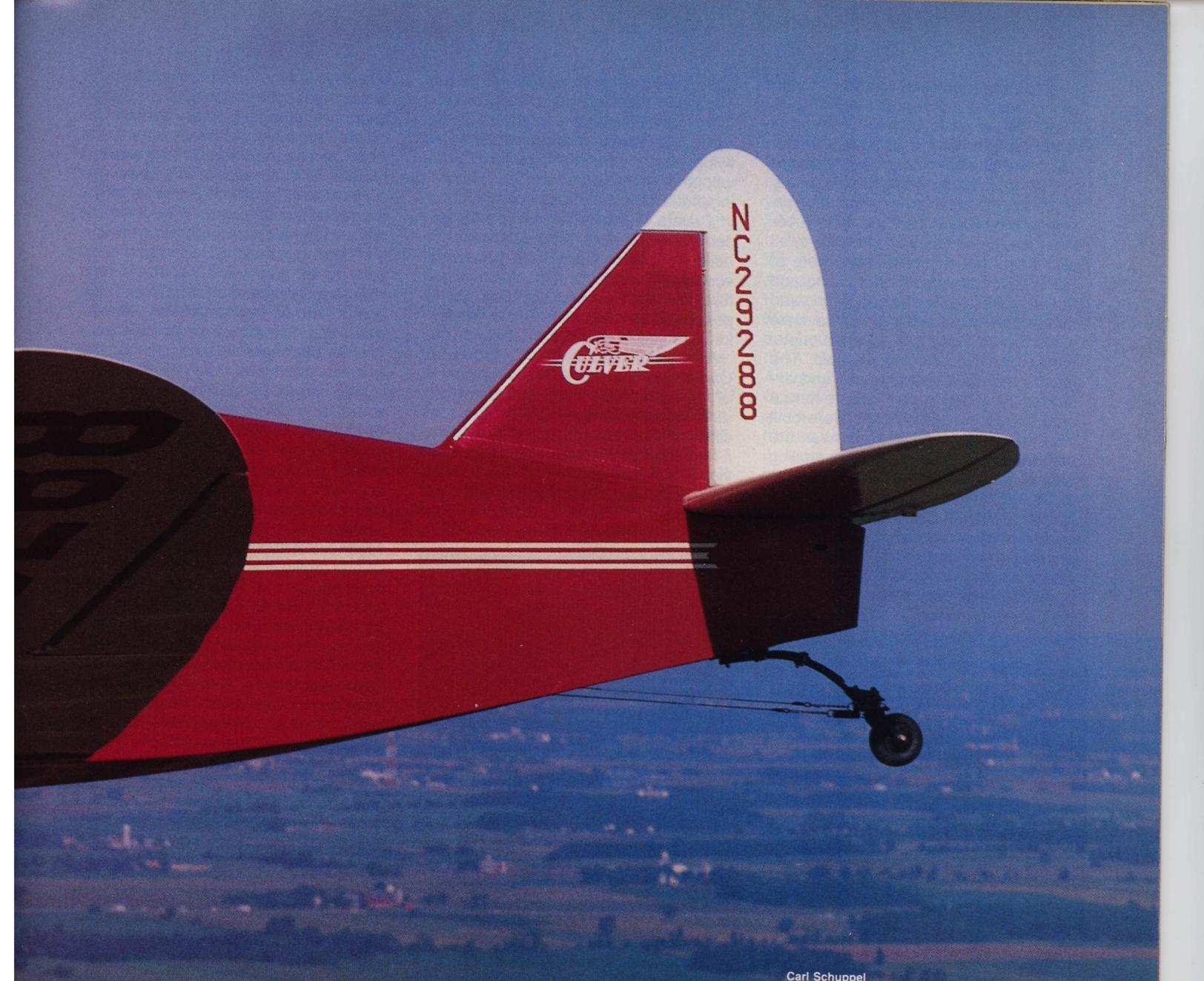
cal engineer who had designed his first airplane, the long wing version of the Alexander Eaglerock, at the tender age of 19. In an age of biplanes, he had earlier become enamored with the Ver-ville-Sperry R-3 racer of the early '20s, a low winged, retractable geared machine, the shape of which foretold the configuration of the fighter planes that would battle each other 20 years later in World War II. Al designed his first low wing, retractable geared airplane much sooner, however — the ill-fated Alexander Bullet that was initially flown on January 11, 1929. Though unable to meet government spin test requirements in its original configuration . . . and a victim of the onset of the Great Depression by the time it was fixed . . . the Bullet was a milestone in aeronautical design. It was

the precursor of all our 4-place, low wing, retractable geared lightplanes of today.

Al . . . and his brother, Art . . . would struggle through the 1930s, sacrificing all else to stay in aviation and to pursue his dream of sleek low winged airplanes. He would work for a number of firms, including Bellanca and Monocoupe, before ending up at Dart Aircraft (later Culver) in 1938. Along the way, he formed his own company, designed and built his own more advanced version of the Bullet, the Mooney A-1 or M-5 (Al's personal numbering system of airplanes he designed for himself and others), but the deepening depression shot the venture down before it ever got off the ground. Hoping to capitalize on the "back to basics" movement that generated the Aeronca

C-2/3 series, the Taylor Cub, Curtiss Junior and others, Al then designed a tiny Continental A-40 (37 hp) powered low winged, open cockpit 2-placer he called the M-6. It was flown in April of 1932 . . . but also became a victim of hard times.

In 1935, Al and Art went to work for Clare Bunch at the Monocoupe plant in St. Louis. In short order a Lambert powered light twin based on Al's M-5 and a Lambert powered version of his M-6 were designed and built. These were his 10th and 11th designs and were named, respectively, the Monocoach and the Monosport, Monocoupe, itself, was in financial trouble, however, and in 1938 its Columbus, Ohio dealer, Knight K. Culver, Jr., bought the design rights to the Monosport for \$25,000 and incorporated Dart Aircraft Company.



Carl Schuppel

With the deal came the Mooney brothers.

Culver had the Mooneys set up shop in the back half of a hangar on the Port Columbus airport he shared with a local fixed based operator, Foster Lane . . . their two operations separated by a canvas curtain. Somewhere between 40 and 50 Monosports, now called Darts, would ultimately be built at Columbus, but in the meantime, Al Mooney was hard at work on a new design.

The late 1930s saw the lightplane engine brought to such a stage of perfection . . . in the form of the horizontally opposed 4-cylinder Continental A-65 and the Lycoming O-290 . . . that we are still using them to this day. Displacement has been increased and cylinders have been added but, essentially, all of our current flat 4s, 6s and

8s are little more than variations on a theme first played in 1938 and 1939. The small Continentals, in particular, quickly put Lambert, Ken Royce and Warner out of the business of supplying engines of 90 horsepower or less for the lightplane market. They were cheaper, more economical to operate and were more reliable than the small radials they replaced and, again, nothing has supplanted them to this day.

Al Mooney was, of course, aware of this development, and quickly surmised that Dart needed a completely new airframe, designed specifically for the little flat fours. To him, speed was the ultimate justification for any airplane, and he wanted to create the fastest practical aircraft in existence using the engines available to him. The Continental A-75 was just being introduced when he

began work at his drawing board, so he literally designed his airframe around it . . . the smallest, lightest and fastest airframe he could conceive of utilizing features he had empirically selected over the years. All his low wing designs had featured side-by-side seating, all had wings with the elliptical shape that was supposed to be the aerodynamic ideal and, of course, had retractable gears when he could talk the people financing his efforts into allowing him the luxury of that additional complication and expense. Largely because he understood it, had a lot of experience with it and because it was cheap and quick to tool up to use, Al also frequently used wood in the construction of his designs.

The result of his effort, his twelfth aircraft design, was the Culver Cadet.

Foster Lane made the first flight of the prototype, NX 20946, on December 3, 1939.

With a span of just 27 feet, a length of 17 feet 8 inches and an empty weight of 750 pounds, the Cadet was, in many respects, the smallest airplane the government had ever certified. The fuselage and fixed tail surfaces were all wood; the rudder and elevator were of fabric covered welded steel tubing and the wing was a mix of wood, fabric and metal. The main and rear spars were wood but a hefty "W" shaped metal tubular truss connected the two. The leading edge was of plywood and extended back to the main spar to form a rigid "D" section. Fixed slots were built into the leading edges out near the pointed tips to keep them from stalling before the wide root section. A NACA 3414 airfoil used at the wing root transitioned to a 3408 at the tip. The landing gear retracted manually, with the pilot palming it up and down with a small metal wheel mounted ahead of and parallel to the main spar. A third hand was needed to work a selector/locking pin, so Culver pilots quickly became adept at flying with their knees during parts of the retraction/extension cycles. The gear legs themselves were controversial from the start. Sized and heat treated to handle the Cadet's 1,305 pound gross, they appeared to be too spindly to pilots used to seeing much beefier struts on larger aircraft equipped with oleo-type gears. The struts also mounted little half circle leaf springs . . . which pilots were unaccustomed to seeing. The result was that the Cadet acquired a totally unjustified reputation for having a "weak" landing gear. Its only real weak link was the pilot who forgot to lower it for landing.

The Cadet had little 5:00 x 5 wheels, toe actuated brakes and a non-steerable tailwheel in its original form. Differential braking was used for ground steering, but owners quickly installed steerable tailwheels, which made crosswind landings and, especially, crosswind taxiing much easier.

It was, however, the performance of the Cadet that impressed the flying public, rather than its technical features. Leighton Collins, the editor of **Air Facts** magazine, was one of the first to write an article on the airplane and in his July 1, 1940 issue he put the airplane into the perspective of that time . . . 47 years ago. (Note that the Cadet was still called the Dart when Collins wrote his piece.)

"The new Dart is an important development from several standpoints. First of all, it represents the first offering of apparently a bona fide cruising speed of 120 mph at less than \$5,000. That means not only a further step into economical transportation, but into a

speed range that comes much nearer making Private Flying and utility rhyme. Our first real expansion in Private Flying came with the light airplane: low cost flying even if slow. The next broad development will be found in low cost flying that is fast, and cross-country hours in Private Flying will pass and far exceed the present preponderance of hours in airport flying. We have had economical enough ships for this before, but not at a first cost that would permit the development of a wide market. The ice is now being broken."

The Continental A-75 powered Cadet, the Model LCA, had a top speed of 140 mph at sea level, a cruise of 120 at 75% power and an 800 fpm rate of climb. With a fuel capacity of 20 gallons, it had a range of about 500 miles. Service ceiling was 17,000 feet. Subsequently, the Cadet would also be available with the 80 hp Continental A-



Carl Schuppel

80-8 (LCA-80), the 80 hp Franklin 4AC-176-F3 (LFA-80) and the 90 hp Franklin 4AC-199-E3 (LFA-90). The 90 hp engine upped the max speed to 142 and cruise to 130 mph at 7,000 feet. The advertised speeds were with the Freedman-Burnham ground adjustable propeller and those who chose cheaper fixed propellers instead had to live with either less top speed or less rate of climb. In any case, this was performance the likes of which Cub pilots never dreamed they could afford. The initial price in 1940 was \$2,395 and it rose to \$2,475 early the following year. (To put those figures in perspective, they would equal about \$28,000 to \$29,000 in today's currency.)

The Cadet was an absolute sensation and the orders flooded in . . . to the extent, in fact, that it was quickly obvi-

ous that the tiny Port Columbus, OH factory was not capable of producing enough airplanes to keep up with demand. To make matters worse, the Army had approached Culver, wanting the firm to build special tri-gear versions of the Cadet to be used as target drones. This unexpected largess set some rather bizarre corporate wheeling and dealing in motion, causing the company to be sold twice within the next year. According to Gordon Baxter in his book, **The Al Mooney Story**, Culver was approached by a delegation from Wichita offering a large building if the firm would move to their city. Knight K. Culver bought the plant and moved his operation to Kansas in September of 1940. Just as production was starting up at the new site, however, the Army dropped a bombshell in management's lap — they wanted Culver to produce drones at the rate of five per day. This would have required a tremendous investment in tooling, far more than the Culver family was willing to sink into the endeavor. As a result, Culver Aircraft was sold out to a Detroit investment firm, Van Grant and Associates, which, in turn, later sold out to Walter Beech and Wichita attorney Charles G. Yankey. Cadets and Army PQ-8 drones were produced simultaneously until October 17, 1942, after which civilian production ceased. The company would go on to make thousands of PQ-8s and 14s during the war years . . . and despite pleas from their pre-war customers to produce an improved Cadet after World War II, the company chose instead to develop an entirely new design, the Culver V (for "Victory"). Highly innovative, but underpowered and too expensive to build, the V did not sell . . . and Culver Aircraft soon became an early casualty of the lightplane industry's postwar boom and bust cycle. Al Mooney had left the firm as soon as the V had been certified and went on to form Mooney Aircraft and design the Mooney Mite. He later designed the 4-place Mooney M-20, which is still in production today in a highly refined form, but left the firm in 1955 to join Lockheed as a design engineer. He died a couple of years ago . . . and is remembered today as a genius and one of the legends of aeronautical design.

The Culver Cadet had been certified (ATC 730) on September 7, 1940 and 359 were built before civilian production ceased. Demand always exceeded supply and it's a shame a war had to come along to prematurely end its development.

Unfortunately, the Cadet would get off to a rocky start once deliveries began. Pilots who were experienced in airplanes with fairly high wing loadings had no problems with them and thought they were fantastic little airplanes. How-

ever, those who were moving up to the Cadet from Cubs, C-3s, Taylorcrafts and the like . . . and did not get proper checkouts . . . promptly began finding highly imaginative ways to prang the little jewels . The Cadet had a propensity to head for the boonies if the tail was lifted too early in the take-off run, so a lot of groundloops occurred before pilots learned to fly the airplane off in a 3-point attitude. And being very clean, the Cadet forced Cub pilots to exercise far more precise speed control on approach to avoid overshooting the airport. Unfortunately, some pilots overdid it, slowing down too much and spinning in from their turn to final. The Cadet dropped a wing rather abruptly in the stall; again , something unfamiliar to Cub pilots.

The biggest problem with the Cadet, however, was its speed. Looking like a little fighter to pilots of the early 1940s, there was an irresistible impulse for some to do screaming buzz jobs of their girl friend's homes and to do high speed aerobatics. According to Leighton Collins in a December 1, 1942 **Air Facts** article on the Cadet, at least four pilots had pulled wings off their Culvers by that date — all as a result of being 'way out of the top end of the envelope. Culver initially provided owners with placards indicating the proper entry speeds for approved aerobatic maneuvers, then, because the problem persisted, placarded the airplane against aerobatics altogether. It was also placarded against instrument flight because it was considered too "jumpy" in turbulence for the average person to fly "blind" (as instrument flying was termed in those days).

Inevitably, the Cadet acquired a reputation as a "hot" airplane . . . and as the years went by, successive re-tellings of tall tales upped the ante to "killer". I distinctly recall the first time I saw a Cadet . . . and the remarks of the pilots watching it land at our airport. There was a fellow whose chances weren't worth a plugged nickel, they said. If the airplane didn't bite him, the termites in the main spar were sure to stop holding hands sometime — and that would be the last of him. Of course, not one of them had ever so much as sat in a Cadet, let alone fly one.

By today's standards all this is pretty laughable, of course. Almost any factory aircraft out of the 150 category has a higher wing loading and approach speed than a "hot" Cadet, and our big engined homebuilts like the T-18s, Glasairs and such make the Cadet look like a demure little pussy cat by comparison. Only its taildragger configuration would be daunting to many of today's pilots.

Despite all the dire predictions, the Culver flew on, quite successfully, in

fact, in the hands of competent pilots. Leighton Collins, for example, would become perhaps the most highly visible of Cadet owners. As soon as World War II regulations allowed private flying to resume on a more or less normal basis, he began zipping all over the country in his "Plain Vanilla", visiting the aircraft plants to obtain information for publication in **Air Facts**. Even our own Molt Taylor had a connection — he was a Cadet dealer at Long Beach, CA just before the war and recalls his Southern California distributor flying one from Columbus, Ohio to Los Angeles in the daylight hours of a single day — an impressive dawn-to-dusk feat of reliability and endurance. Recently retired FAA Administrator Don Engen once proved the Cadet was not necessarily a "killer" by surviving an incident that could well have proven otherwise. He has admitted . . . in print . . . to having been one of those for whom the Cadet's sporting nature was too compelling to resist. Years ago he did a low level slow roll right by the tower at the Mojave, CA

airport . . . and just about paid the price for his indiscretion when the engine cut out on him while he was inverted.

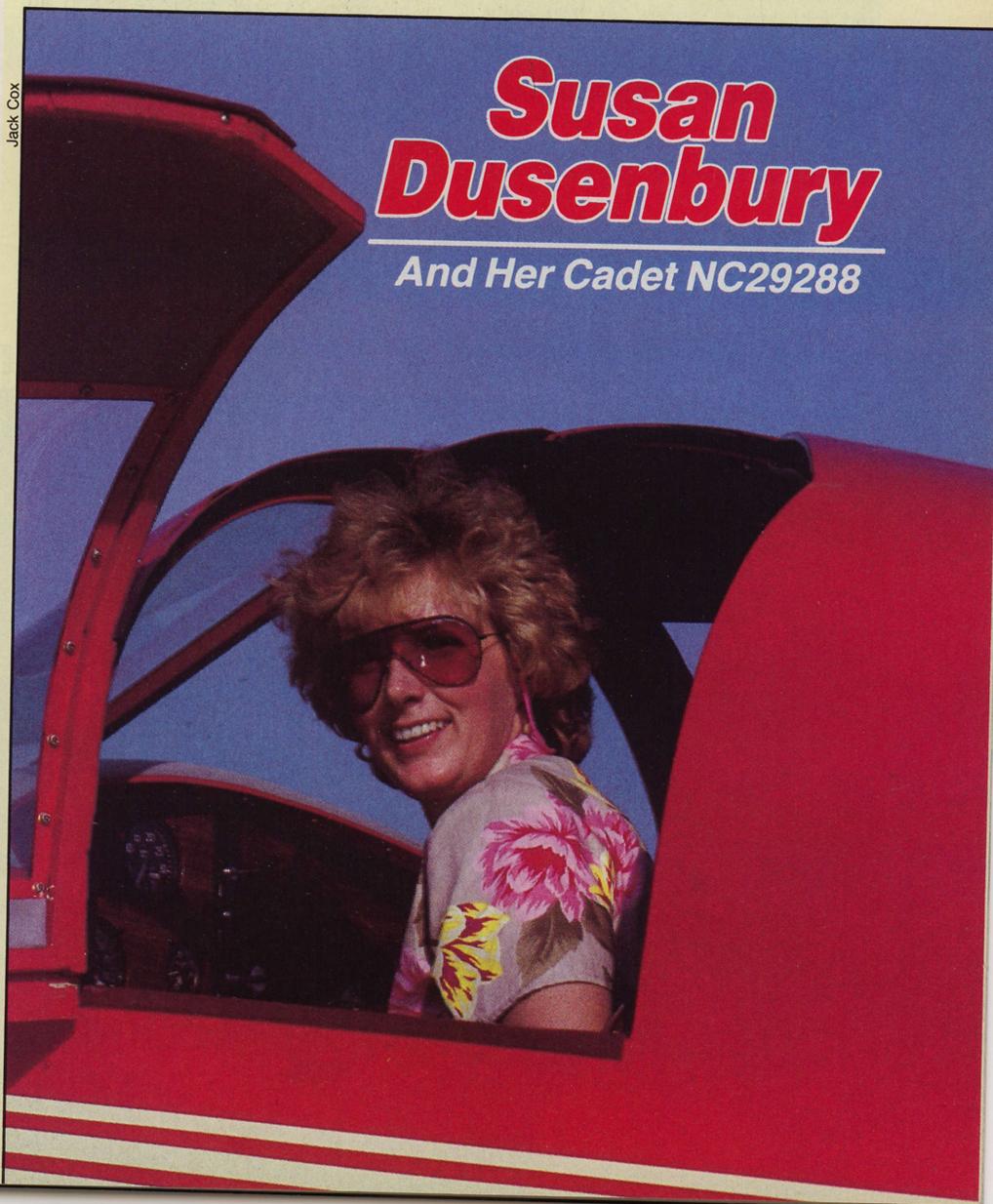
The Cadet has always had its loyal following and as the numbers of aircraft have slowly dwindled over the past 46 years . . . there are 112 of them left on FAA's books today . . . they have more or less filtered down into the hands of the hardest of the hard core antique airplane collectors — people like EAA Foundation Director Morton Lester of Martinsville, VA who recently located and bought back his father's old Cadet. (EAA Director Bob Puryear and EAA Antique/Classic Division Director Stan Gomol also have Culver restoration projects.) As is the case with most old airplanes, there is a virtual Culver underground in operation today — where parts and information are exchanged by the true believers in order to keep the remaining airplanes flying. Having achieved cult status among collectors, the prospect is for even more Cadets flying a few years from now than are active today — which brings us to . . .

Jack Cox

# Susan Dusenbury

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## And Her Cadet NC29288



So, what's the attractive blonde you see pictured here doing with a "killer" Cadet? Not to worry, troops . . . because that young lady has a string of FAA mechanic and pilot licenses as long as your arm and over 10,000 hours of flying time in everything from homebuilt aerobatic specials to the DC-9 she currently flies to back them up. She totally rebuilt the Cadet's airframe, overhauled its engine and did the test flight when it was completed . . . so she obviously has the situation well under control.

Susan Dusenbury grew up in Pawleys Island, South Carolina, began flying lessons in a Piper Colt at 15, soloed at 16 and earned her Private license at 17. After high school, she enrolled at Winthrop College in Rock Hill, SC to get a degree in accounting. Not wanting to give up flying, she took an after hours and weekend job at a nearby airport, working initially as a grease monkey in H. A. Springer's maintenance shop. By the time she had completed her sophomore year at Winthrop, she had paid her own way to her commercial license and had added instrument, multi-engine and instrument ratings. At that point, she also began instructing on weekends and soon had her instrument and multi-engine instructor's ratings.

Before completing her studies at Winthrop, Susan took two years off to complete a mechanics course at Florence/Darlington Tech in Florence, SC, graduating with an A&P license. She then returned to Winthrop and earned her accounting degree. Moving back to Florence, she went to work teaching math and accounting at Florence/Darlington Tech, instructing and flying char-

ter. Then, after earning her Air Transport Pilot license, she began her professional career flying Navajos for Air Carolina (now Atlantis). A year later she went to work for Air Virginia flying Metroliners . . . and after five years with that outfit, became a pilot for the governor of Virginia, Chuck Robb, flying a King Air 200 and a C-90. After the governor's term was up, she hired on with Airborne Express, an overnight air freight carrier that has its hub in Wilmington, Ohio. She initially flew the YS-11, but later transitioned to the DC-9 she flies today. By choice, Susan lives in Greensboro, NC because that puts her in close proximity to friends, her job and her family in South Carolina.

Concurrent with her busy college life and working career, Susan somehow found time for a little recreational flying. While still in college, she took aerobatic instruction from air show pilot Dwight Cross of Huntersville, NC . . . and had access where she worked to a Clip Wing Cub in which to go practice flip-flop flying. She also became an aircraft owner during this period, first buying a Luscombe 8A and, later, restoring an Aeronca Champion. Next came the rebuild of a 7EC Champ, but before that airplane was completed, she sold it in order to buy a one-off aerobatic homebuilt, the Rogers/Gibson Acrocraft, from Mandeville "Buddy" Rogers. Susan also owned a Cherokee Arrow for a time, but eventually sold it.

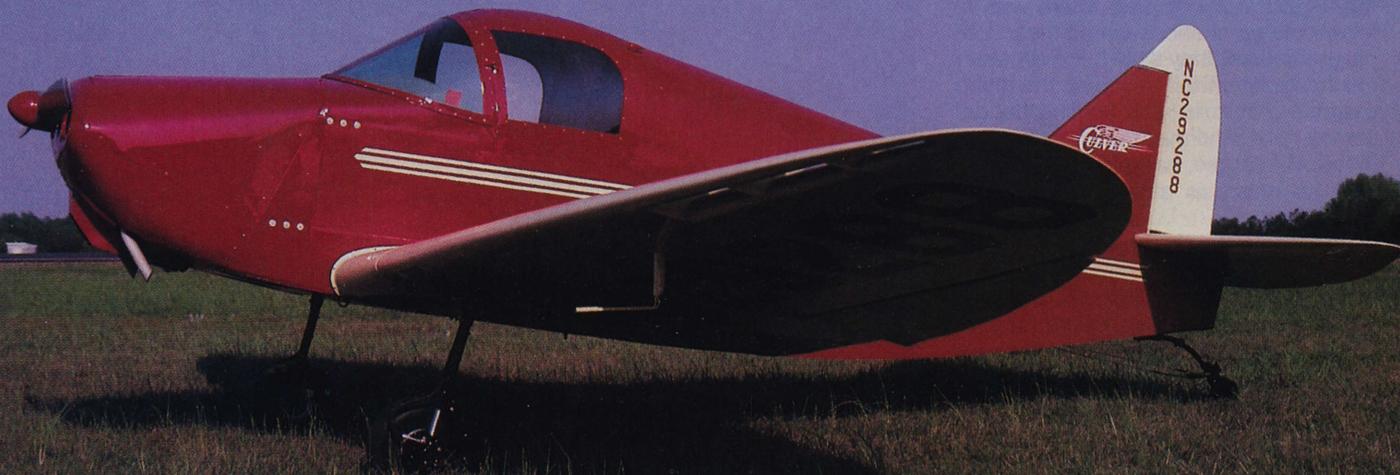
In 1980 while still flying for Air Virginia, Susan decided she would restore another sportplane — a little pre-war BC-65 Taylorcraft, if she could find one. She began looking, but found her

quarry to be so elusive that eventually she switched to hunting for a good Luscombe. A lot of friends had been enlisted to aid in the search and one day one of them called to ask if she would be interested in a Culver Cadet . . . a very unusual Culver Cadet? It was a basket case and was stored in Pennsylvania, but could be made into a nice airplane.

The Cadet, NC29288, Serial Number 157, was owned by EAA member Bill Kilburn of Staunton, VA who had bought it in the late 1960s as a result of an ad he read in **Trade-A-Plane**. Purchased as a future project . . . he was building a Cougar at the time . . . Bill had stored it in his mother's old carriage house in West Chester, PA. The previous owner had experienced an engine failure and a rather unsuccessful forced landing. There was a lot of damage, but the basic airframe was intact. For a variety of reasons, Bill never got around to restoring the Cadet, so in 1980, he put it up for sale . . . and it was Susan who ultimately bought it.

Arriving on the scene with her trailer, She was pleased to find the wooden airframe high and dry, but, of course, covered with a thick layer of dust. Little animal tracks all over told her there might be some surprises in store, but it was only after arriving home in Roanoke, VA on January 1, 1981 . . . in a blinding snow storm . . . that she came to realize the full extent of the role her new airplane had been playing in the animal world. As the parts and pieces . . . particularly the wings . . . were being unloaded, all manner of animal and vegetable debris began tum-

Jack Cox



bling out on the ground. It was obvious that the airframe had long served as the home of squirrels and possibly other rodents, with scores of generations having gone through their complete life cycles inside. Fortunately, they did not have or acquire a taste for the brand of glue used by Culver Aircraft so the vulnerable interior woodwork had been spared the mischief of gnawing teeth.

After thawing out from her retrieval mission, Susan began to inventory her "treasure" and quickly learned why the airplane had been described to her as a "very unusual Cadet." It had a non-standard main landing gear with gear doors and a hydraulic retraction system, the tailwheel retracted, the rudder was significantly enlarged and the tail end of the fuselage was extended by means of a long stinger fairing. A stock Cadet has 2 doors, but the left one had been closed off, and almost everything about the windshield and its attachment hardware was obviously from somewhere other than the old Culver plant's parts bin. The same was true of the entire nose of the airplane. Not a piece of the metal work was standard. The panel was so full of instruments that obviously someone had ignored the Cadet's placard against "blind" flying. Almost all the non-standard stuff turned out to be Bellanca parts. Susan would eventually learn that they had been installed by a fellow named E. M. Smith who had reputedly once worked for Al Mooney and obviously had a lot of ideas on improving the basic Cadet.

He also obviously had ready access to Bellanca parts. In a way, it was all rather appropriate. Al Mooney had worked for Bellanca for a time and many see the Cruisair as a reincarnation of his old Alexander Bullet. It was a sort of closing of the loop, then, to later have someone adapt Bellanca parts to Al's Culver Cadet.

At any rate, Susan's initial task was to sort out all this aeronautical incest, discarding the Bellanca parts and instituting a nationwide scavenger hunt to locate the missing Culver stuff. A lot of time, energy and money for phone calls and travel to look at other Cadets would be expended . . . but that was part of the fun of the project.

Launching into the basic airframe, Susan soon felt more like a cabinet maker than an aircraft restorer. The chips and sawdust flew as she replaced the entire plywood D-section, the trailing edges and wingwalks on her wings, plus some rib repair . . . and virtually had to remanufacture the fuselage. In addition to the crash damage, she found the entire bottom of the fuselage box to be oil soaked to the extent that the wood was no longer useable. All she was able to save were the upper longerons and the rounded top skin —



Carl Schuppel

the side frames and lower longerons and the side and bottom skins were completely replaced. It was fairly easy to restore the enlarged rudder to its original shape, but the horizontal tail, which was junk, appeared to be a real project. Just when Susan had resigned herself to building a new one from scratch, she learned that Univair had a good one for sale. That lucky break ultimately put the airplane in the sky at least a couple of months earlier than otherwise would have been the case.

Cadets left the factory with full swivel tailwheels . . . which meant differential steering on the ground was solely by means of the little expander tube brakes. That was probably adequate in the early 1940s when most airports were grass or dirt, but can be a terrible threat to years of meticulous restoration work on today's paved runways. For

that reason, Susan wisely chose to rig up a steerable tailwheel on NC29288 . . . using measurements taken off Morton Lester's Cadet.

Susan's Cadet was one of the early LCAs built at Port Columbus. Somewhere along the line, however, it had been converted to a LFA-90 . . . its 75 hp Continental being yanked in favor of a 90 hp Franklin. A metal prop had also been intalled, the harmonics of which eventually broke the crankshaft and resulted in the crash landing previously noted. Susan's intention from the beginning of the restoration was to return her Cadet to its original configuration — with one exception. The A-75 Continental did not have a starter . . . and knowing the sort of problems that could cause flying cross country these days, she opted for an O-200 with starter and alternator. The latter was strictly for



Carl Schuppel

keeping the battery charged for starting, because she installed no lights or radios. NC29288 was built in 1940 and a good part of the appeal of the airplane for Susan would be the challenge of flying it as pilots did over 40 years ago. She had all the modern electronic gizmos she wanted on the air carrier aircraft she flew.

The landing gear that came with NC29288 probably would have been chunked in the nearest trash barrel had Susan had ready access to a better one. Landing gears for Cadets are in extremely short supply these days, however, so she was forced to work with what she had. Metal tabs for mounting gear doors had been welded on the upper barrel of the oleos, so they had to be cut off. With so many unsightly welding lumps on them, she had the barrels chucked in a lathe and turned down to round again. The lower, telescoping parts of the oleos were badly pitted and had to be rechromed and turned back to the proper diameter. One was bent and had to be straightened. After the restoration work was completed, the gears were re-heat treated and magnafluxed for cracks. The little C-springs were missing, but the owners of a Helton Lark gave her theirs.

The original Culver Cadet retraction system is a rather complex weldment that attaches to the main spar in the floor of the cockpit. This was missing entirely, having been replaced by the hydraulic actuation system when the airplane was modified to a "Bellan-cadet". Not normally a replacement item, Culver likely made few other than one each for the planes it built, so they

are **really** scarce today. In fact, Susan was never able to find a complete unit. She managed to find a piece here and another there . . . and by making the rest, was finally able to come up with a like-new system. It was the pure devil to adjust, she says, but was made to raise and lower the mains in unison after a lot of figuring and fiddling.

Using the O-200 would require a different engine mount and Susan welded up her own, using the C-90 mount from a Helton Lark, a latter day sport plane version of the Culver PQ-8 drone, as a guide. The O-200 used rubber pucks shaped differently than those in the C-90 mount, however, so special bushings had to be machined, using a drawing Susan remembered seeing in a Luscombe newsletter. She also had drawings for the Culver exhaust system and expected to have to have a set of stacks made from them . . . but the more she studied them, the more familiar they looked. Paging through a parts catalogs one day, she suddenly came upon the answer — the Cadet stacks were dead ringers for those of an Aeronca Champ. Ultimately, the Champ exhaust system was used, which, in turn, solved the problems of carb and cabin heat as well as ready replacement in the future.

A 68 inch McCauley metal propeller from a Cessna 150 was used, repitched to 58 inches in deference to the faster speed of the Cadet.

When all the big pieces had been completed, Susan found herself . . . although she didn't know it at the time . . . in a spot all too familiar to homebuilders: "When it appears you have 90% of the airplane done, you still have 90% of it left to do . . . timewise." All that

"little" stuff — the cowling, the fairings, the instrument panel, upholstery, etc., etc. — was just as much a pain in the posterior in the restoration of the Cadet as it is for those building an airplane from scratch. More so in some cases, because of the need to stick to whatever was original. Homebuilders have almost unlimited options.

A surplus 1940 LCA nose bowl simply doesn't exist . . . or if it does, Susan couldn't find it. Her only recourse, it turned out, was to have John Neal of Griffin, GA make her one. John is a young artisan who has learned the old tinsmithing trade and is in great demand today by those who need aluminum bumped and hammered out the way it was in the '20s and '30s. Even with his skill, the nosebowl was quite a job, however. It had to be made in two pieces and welded into one. The heat of the welding process caused the thing to warp all over the place, but John finally got it whipped into the desired shape. Fortunately, the rest of the Culver cowl consisted of hinged and screwed-on flat wraps, and Susan made all those, herself.

John Neal had to be pressed into service again when the time came to fit the cabin doors. The Cadet is really not a cabin airplane in the sense most airplanes of that type are. With the doors off, it looks like an open cockpit airplane with just a support member running across the top center of the cockpit from the top of the fuselage to the windshield frame. The "doors", then, are really just fore and aft swinging canopy frames that extend up to and close against the top support member. They are very light in construction . . . and as Susan was to learn, no two of them are alike. She knows . . . she collected 8 of them and **still** had to have John make a set, plus the channeling for the windshield. Even the door knobs were different, requiring the partial fabrication of one to match the only original knob/latching mechanism she had in her collection.

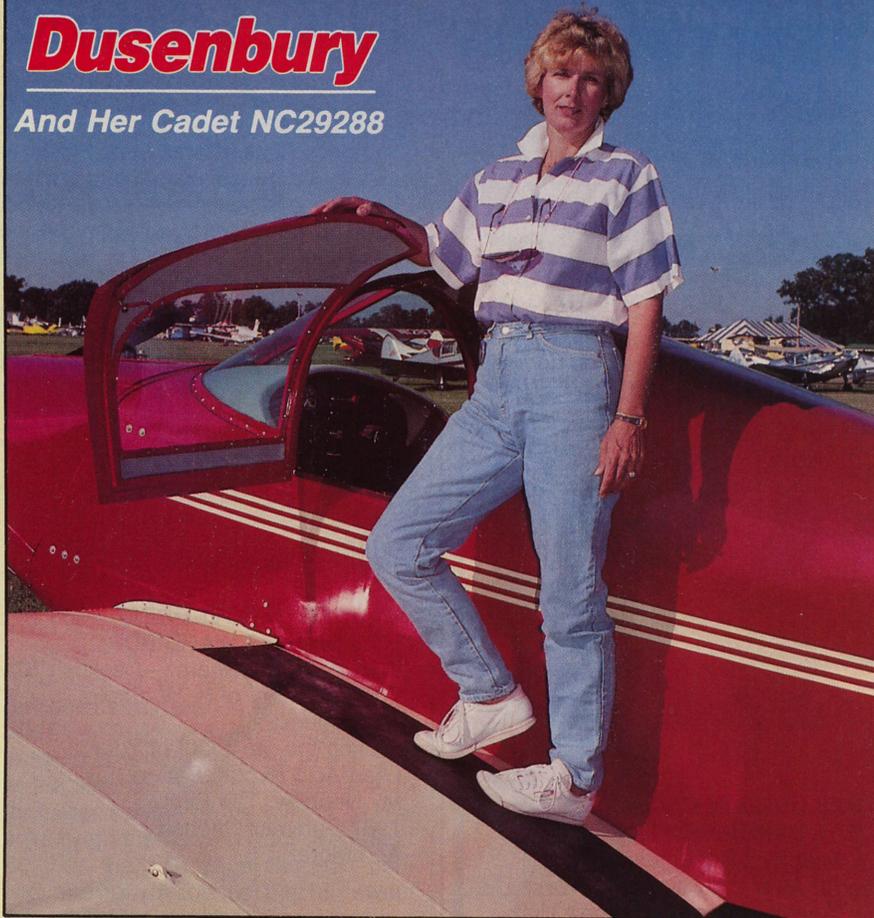
Fitting the doors and windshield was a challenge all its own. The story from Culver Aircraft employees still around today is that these and, in fact, all the bolt-on/screw on parts like fairings were hand fitted to each Cadet. Only those subassemblies built in tooling, like the landing gear and its retraction system, the tubular wing trusses, etc., were interchangeable. Culver Cadets were, in some respects, like homebuilts being built in quantity in a factory setting.

Shifting her attention into the cockpit/cabin, Susan knew she would have to replace the instrument panel and come up with original style and color upholstery materials. The Cadet panel was cut out of plywood, which would be

(Continued on Page 88)

# Susan Dusenbury

And Her Cadet NC29288



Carl Schuppel

(Continued from Page 20)

easy, but getting it done with every instrument and knob in its proper position was the trick. No drawing was available to her, so she used illustrations from the Culver Cadet owners' handbook she had acquired to make one. With the help of a friend who owned an engineering firm, a beautiful drawing was made from which the authentically 1940 panel you see pictured here was made. Susan offers to copy the drawing for other Culver owners.

Amazingly . . . considering all the other changes that had been made . . . the original interior was still in the airplane. It was faded and soiled beyond further use in a brand new spotless restoration, of course, but served well as both a pattern and a color key . . . the latter possible because of turned-under laps that had never been exposed to the sun. NC29288 had left the factory with maroon naugahyde seat covers and a gray headliner . . . and Susan was able to match them almost perfectly in weave, color and texture by rummaging through a stack of modern General Motors auto upholstery material. Black paint had originally been used in some of the unupholstered areas of the cabin, so that was easy to

duplicate, using Imron.

When the airframe was finally ready for cover . . . including the fabric layup over the areas of plywood skin . . . the Stits process was used, start to finish. The airplane was painted in Pontiac Red and Tucson Cream Stits Aerothane . . . based on a paint scheme Susan found on one of those now treasured little collector's items, a Wings cigarette airplane picture card. The very artistic Culver decals for the vertical fin and instrument panel were obtained from fellow Cadet restorer, Jack West of Costa Mesa, CA, who had had a batch of them made up.

By this time in late 1986, the project was in its third location since the restoration had begun. Work had started in Roanoke, VA in a building owned by Piedmont Airlines and was later moved to the Ashland Airport north of Richmond, VA when Susan became Governor Robb's pilot. After she moved to Greensboro, NC, the Cadet was moved to nearby May's Airport where it was completed and test flown.

Because of the substitution of the O-200 engine and the use of a metal prop, Susan had a concern for the effect it might have on the Cadet's CG. Afraid it would be nose heavy, she made provision for bolting on a metal plate where

the tailwheel spring attached.

As it turned out, the 90 hp Franklin for which the Culver had been designed to accommodate was similar in weight with the O-200 . . . so that the CG came out within a 16th of an inch of its most desired location. NC29288 weighed 812 pounds when it was completed, 62 pounds over the factory's advertised empty weight of 750 pounds. The increase was largely in the O-200's electrical and exhaust systems and the airframe's slick finish . . . plus the fact that factory specs were averages and usually quiet optimistic. In any case, the extra weight was concentrated within the normal CG envelope and was easily offset by the extra power of the O-200.

When Susan began taxi testing, she was appalled at what she saw from the Cadet's cabin. "This will never fly — these wings are too short!" she told herself . . . not entirely in jest. The tiny airframe and low seating position, compared to the DC-9 to which she had become accustomed, seemed toylike, at best. All her previous lightplane experience came rushing back the moment she pushed in the throttle for the initial take-off, however, and the test flight was uneventful.

With the extra power, the little Cadet really goes. It will easily cruise at 140-145 indicated at 2600 rpm, Susan says, and it can be pushed to 150 in level flight, just short of the 156 mph redline. It begins to shake a little at that speed, however, so she doesn't fly it that fast. "I cruise at 120 because it is a nice, comfortable speed for this airplane." (And, of course, that's about where Al Mooney designed it to fly.) The rate of climb is more than adequate, so Susan has not embarked on any scientific measurement of it, estimating instead that it goes up at around 1000 to 1200 fpm initially with just herself aboard. For landing she says, "I approach at 75 or so and I always 3-point it . . . well, sometimes I one-point it. It's easy to get the tailwheel down first."

Susan flew the Cadet for the first time on Thursday, October 16, 1986 at Greensboro and flew it to Camden, SC the following day to attend EAA Antique/Classic Chapter 3's annual Fall Fly-In. On Saturday night at the awards banquet she was presented the Grand Champion Antique trophy . . . culminating nearly 6 years of part time restoration work. She has flown the Cadet to numerous other fly-ins since, including Oshkosh '87 last August. Both airplane and restorer were deservedly quite an attraction there and have subsequently been the subjects of several nice write-ups in the aviation press.

What's next for Susan? Only she knows . . . but a clue might be the fact that she also owns a very rare Inland Sport that is in need of restoration.

Encore!