CANARD PUSHER

JANUARY 1998 | RUTAN AIRCRAFT FACTORY | VOL.11, ISSUE 1, NO. 83

A different Thanksgiving

by Sally Melvill

Mike and I received an invitation to celebrate Thanksgiving at a Mexico Fiesta Fly In. It was to be held at the small town of Guayabitos which is 24 miles north of Puerto Vallarta. It did not take long to decide to turn in our vacation requests!

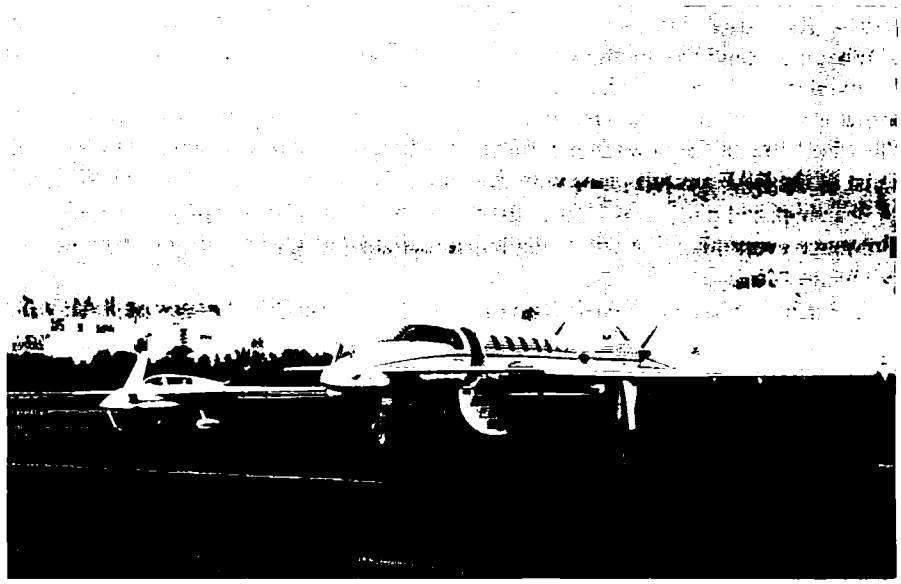
We left on Tuesday before Thanksgiving and flew to the town of Guaymas where we would clear customs. On the way to Guaymas and after crossing the border, a huge desert appeared — sand dunes for miles, with no roads or habitation. Next came an area that looked like the San Joaquin Valley with miles and miles of agriculture and complex irrigation systems. We were told later that all the farming is done by small farmers with no big co-ops as we have in the U.S.

We landed in Guaymas after 3 1/2 hours of flying. I have to admit I felt a little nervous. Michael disappeared into the customs building while I refueled the airplane and then sat waiting in the shade. Twenty minutes later Michael came out, grinning. He said it was a breeze. Right off, we found the Mexican people that we met were charming, friendly and helpful.

After three hours of flying over beautiful country and glorious beaches with the mountains beginning to show to the east, we landed at El Llano. Alex and Nancy, our hosts for the week were there to greet us. Over the five days of the fly-in, approximately 40 airplanes flew in. There were all types including VariEzes, 150s, 180s, Bonanzas and even a Navajo. The group was probably about two-thirds Mexican and one-third from the States. They took us in buses to the hotel in Guayabitos (about a 15 minute ride).

We found Guayabitos gorgeous! The hotel was right on the beach with a huge swimming pool. Each evening when we gathered for dinner, Alex had all of us change tables so we were able to meet everyone. The group

see Mexico pg 3



Two bright stars — A Long-EZ and Starship share the tarmac at a local airport. Long-EZ N675JL, built by Jack E. Carver of Johnson City, Tennesse, has flown 1100 hours. First flight was in August '85.

New exhaust system for N26MS

by Mike Melvill

The 4-pipe exhaust system that I built back in 1986 has served faithfully for 1360 flight hours, with only a couple of minor cracks (after the original trial and error test program). For some time now, I have wanted to try a 4-pipe exhaust system that does not run the high pressure exhaust plume through the prop, right at the hardest working area of the prop blades. I have discussed this idea over the years with anyone who would listen, but just never got around to doing it somehow.

I guess I have just been too lazy to get it done, but I also knew that my existing exhaust system had performed essentially without problems for many years. I worried about going through all the development hassles that I was sure I would have to endure if I went ahead with my plan.

Just a few weeks ago I decided to bite the bullet and try it. I have long felt that the high pressure exhaust pulse trashing what is essentially the highest activity area of each blade, was probably costing some prop efficiency, and may have been causing some of the vibration felt in our Long-EZ. I also hoped that it might be quieter if the exhaust was not being cut to pieces by the high speed prop blades.

As I saw it, I had two choices: (1) I could route the exhaust out-board far enough to completely miss the prop (maybe the best choice?)

see Exhaust pg 4

from the editor

CD-ROM update

Wow, word travels fast. A lot of you have been asking about the up-coming RAF CD-ROM. We're still in the planning stages, so there's not a lot we can tell you, except that we hope to have it ready by Oshkosh '96.

The RFP we issued in November '95 has generated ten responses. We set a deadline of February 1 for bids. We'll know more — including how much it will cost — soon after that.

What we would like to produce in the CD-ROM is an encyclopedia of information for aviation enthusiasts, EZ pilots and for those of you who are still building your airplanes. It will give you a really neat search mechanism by which you can access the whole line of CP newsletters; owner's manuals; Moldless Composite book and most of the RAF aircraft plans with the typing of one word. It will include hundreds of drawings and photos, as well as the color composites we sell as posters. We'll announce everything that will be included on the CD-ROM as we get closer to a production date.

As I said, we hope to have it ready to sell at Oshkosh '96. Otherwise RAF will take orders. RAF no longer has a booth at Oshkosh, so Tonya will let you know where to find us in the July issue of the CP. If you are interested in the CD-ROM, drop us a line. Tonya will add your name to a special mailing list.

SHHHH, it's a surprise

1996 is a banner year. After all, this is the year George & Irene Rutan turn 80.

Here at RAF, we'd like "Mom & Pop" to have the best birthday ever. You can help by showering them with birthday wishes.

George & Irene are those famous folks who produced three aviation-lovin' kids — Dick, Burt and Nell. You know what Dick and Burt have done for aviation, but were you aware that their sister Nell was a flight attendant for nearly 30 years? Burt often points out that his sister Nell has racked up more flight hours than he and Dick put together. That's quite a record.

Many of you who have met Dr. George and Irene, aka Mom and Pop, know how they have long supported their children's extraordinary adventures.

George becomes an official octogenarian on April 7. Lovely Irene merits the same milestone on September 6. Wouldn't it be neat if the two of them received congratulations from their many friends? Nothing would please them more.

You can send your Happy Birthday greetings to George & Irene Rutan in care of RAF. We will present all cards and letters to the folks at a family gathering in April.

Don't forget, it's a big surprise!

RAF
1654 Flightline
Mojave, CA 93501

The Canard Pusher
is published quarterly
(January, April, July, October)
by Rutan Aircraft Factory, Inc.
1654 Flightline, Mojave, CA 93501
Editor: Mike Melvill
Publisher: Tonya Rutan

U.S. & Canadian subscriptions
$14; Back issues $3.50
Overseas (Airmail) subscriptions
$16; Back issues $4

RAF is no longer accepting multi-year subscriptions. Please renew only after your current subscription has expired.

If you are building a RAF design, you must have the following newsletters:

VariViggen (1st Ed)
CP 1 to current
VariViggen (2nd Ed)
CP 18 to current
VariEze (1st Ed)
CP 10 to current
VariEze (2nd Ed)
CP 16 to current
Long-EZ
CP 24 to current
Solitaire
CP 37 to current
Defiant
CP 41 to current

A current subscription of the Canard Pusher is mandatory for builders, as it is the only formal means to distribute mandatory changes. Reproduction and distribution of the Canard Pusher is approved and encouraged.

was very interesting because of the diversity of people. There were student pilots, airplane captains, pleasure pilots and a couple of 99ers. (The 99ers are from a women pilots' association). It seemed as though we had always known these people. We felt completely as ease.

The first day, the group did a Young Eagles Flight. This consists of giving rides to kids who have not flown before. Seventy-three kids came out from the local school and what a field day! The kids were aged 14 through 19 years and they were a super bunch.

On Thursday we had the thrill of helping release a group of barely born turtles into the ocean. A group of locals are trying to preserve the turtles in that area. They bring the eggs to an incubation area, wait for the eggs to hatch, then release the babies. They are releasing approximately 12,500 a year. The survival rate is only 5% when they are not given assistance. If the eggs are not gathered, they are taken by humans and animals for food.

Back at the airport, we were divided into teams of four airplanes and given 22 photos. In a given time (25 minutes) the team had to locate the areas photographed, return to the airport, burst a balloon, and do a spot landing. This was tricky! One of our Mexican teammates named our team the Teddy Bears after his dog. Can you guess who won? The TEDDY BEARS!

At the hotel we had a Thanksgiving dinner and surprise — it was turkey! Each person's serving of turkey was placed in foil which was shaped like a turkey!

On Friday, we all flew over to Puerto Vallarta and floated up the coast for three hours on a replica of the *Santa Maria*. The boat was really beautiful. Some folks enjoyed it and others felt queasy.

Saturday was the Air Rally which was also quite tricky. I stayed on the ground and I'm glad I did. A young Mexican pilot flew with Michael. This time, Alex covered up all the instruments that are usually used for navigation and the pilot and his navigator had to fly to points that they found on a map the old-fashioned way. They were asked to answer questions such as "Which soda was advertised inside the baseball park?" This meant that the pilots must fly "very" low! Again this all had to be done at a predetermined speed. A pilot with a mid-range speed airplane won this one.

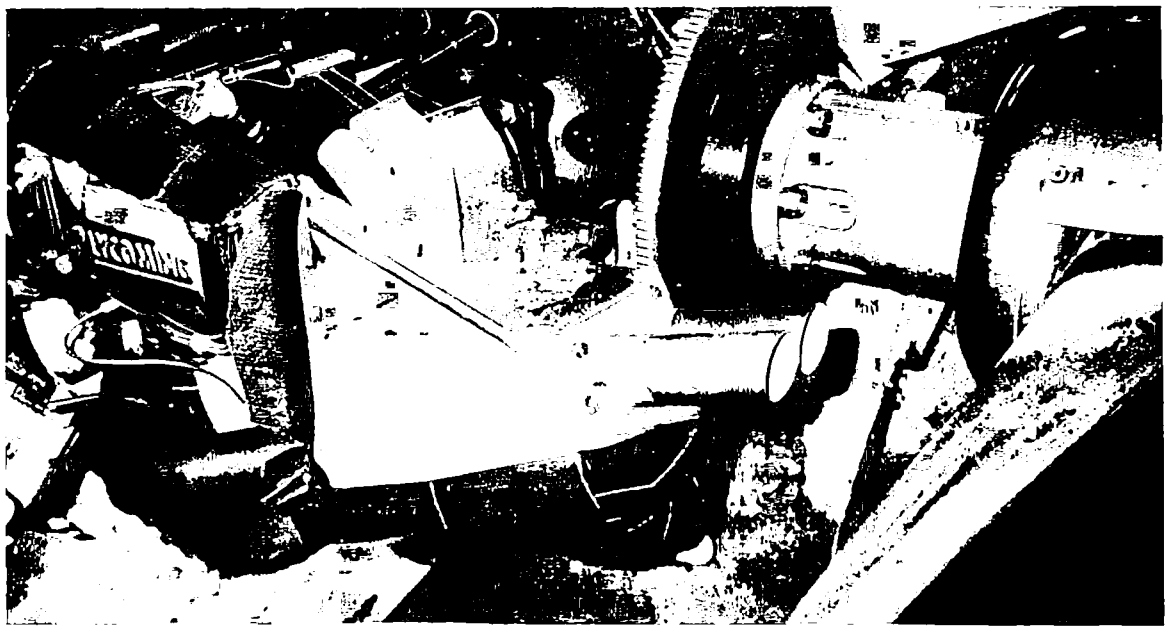
We left early Sunday morning, thanking the militia for guarding our airplanes. We flew across the Sea of Cortez and flew back up the Baja. This was quite different landscape since the Baja is very dry and has practically no vegetation. There are, however, a number of dirt landing strips and some dirt roads. We cleared customs on the U.S. side at Calexico and were home by 1:30 pm.

What a wonderful trip. I do believe that we have been bitten by the Mexican bug. We can't wait to go back •

RAF HOURS: Rutan Aircraft is officially open Tuesdays only. Please call between 9 am - 12 am and give your name, serial number and nature of the problem. If you are not in an emergency situation, we ask that you write to Mike.

Note — Sometimes you can catch Tonya at RAF Monday thru Friday. She is in and out. Try and try again.

When writing to RAF, send along a stamped, self addressed envelope, if you have builder's questions that need to be answered. Please put your name and address on the back of any photos you send.



Left side — two exhaust pipes supported by aft baffle extension. Note exhaust gas deposit on prop very close to the spinner.

Exhaust

or (2) I could route the headers to direct the plume through the prop, close to the spinner, where the prop blades really aren't very aerodynamically useful, and just as important, where the rotational speed of the blade is a lot slower.

I decided the problem of running a hot exhaust pipe *inside* the wing roots was too great, so I designed and built a system that consists of four separate pipes that terminate about 1-inch inside the cowling cooling air exit. My cowling goes aft much further than the standard plans-built cowling, and I also have a 9-inch long heavy duty prop extension. The exhaust pipes end about 4 3/4 inches in front of the leading edges of the prop blades, close enough to the spinner so that most of the grayish exhaust deposits end up on the spinner! (One of the disadvantages of this system). I did feel that in order to see any improvement in prop efficiency, I would have to run the exhaust through the prop as close-in to the spinner as possible, and I have done just that.

I built the exhaust system, one header at a time, in place, on the airplane/engine. I felt this was the only way to ensure that it would fit, would not interfere with the top or bottom cowling, and would point right at the prop where I thought it would cause the least disruption to the smooth flow of air into the prop disc.

I ordered all of the tubing from Ken Brock and started cutting and fitting. I used Hot Stuff model glue to "tack' the pieces together, then drove over to Scaled and tac-welded the pieces. I had to bead-blast the Hot Stuff glue off the headers before I could finnish weld, because Hot Stuf could contaminate the weld. After almos two weeks of evening and weekend work, I had the exhaust system done.

I had modified the rear baffle (see photos) and patched up the areas of the cowling where the old 4-pipe exhaust system used to exist.

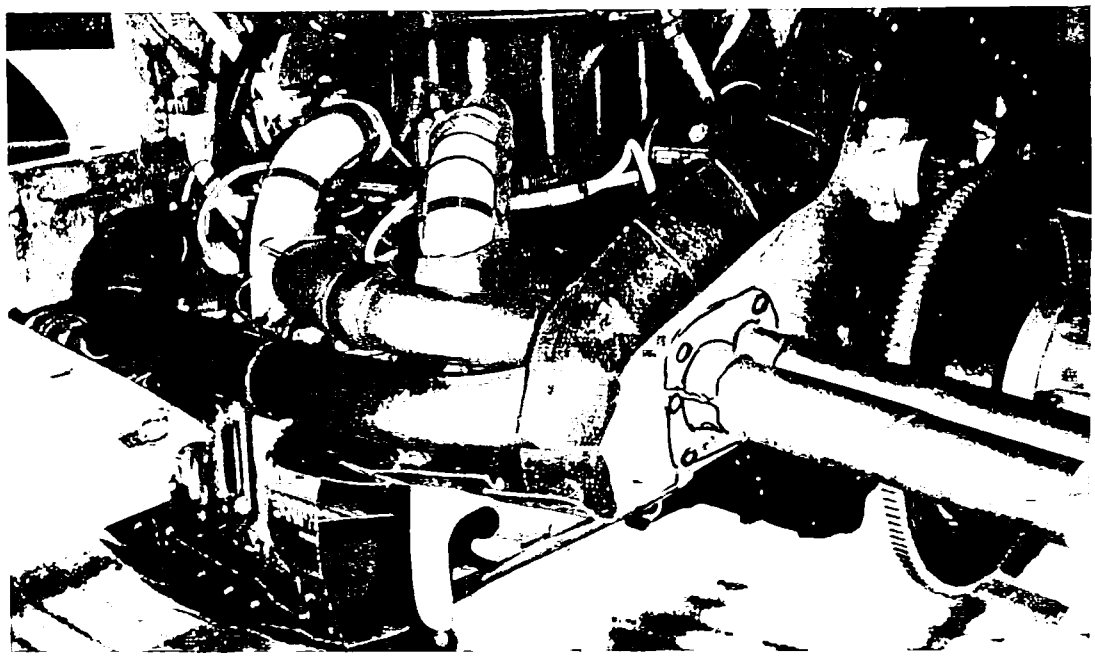
see Exhaust pg 5

What's happening to our exhaust valves and valve guides??

There is currently an unusual amount of exhaust valve guide wear and valve failure being reported in the aviation press. We at RAF are hearing from more people reporting exhaust valve and valve guide problems than ever before. Part of this problem may be in the way we, as pilots, operate our Lycoming aircraft engines. Here is a summary of how Lycoming recommends we operate our engines.

CLIMB — Below 7,000 feet, always climb at full throttle and with the mixture set at full rich. Never lean for peak RPM in a climb below 7,000 feet. Once above 7,000 feet, lean just enough to eliminate the roughness caused by excessive richness, but not lean enough to achieve maximum RPM. (Does this sound like something you have been doing? *Editor*). The only exception to this rule is a high altitude take-off. If you are preparing to take-off from an airport where the density altitude is greater than 7,000 feet, lean to peak RPM at full power, then use this mixture setting for take-off.

CRUISE — You can lean to peak EGT or to slight roughness (then richen just enough to run smooth) any time your engine is producing less than 75% power. A rule of thumb for 75% is 22-inches manifold pressure or less, at or above 7,500 feet density altitude. You may also lean aggressively when taxiing, but don't forget to go to full rich for take-off!



Right side — Shows routing of pipes and the baffle support.

Exhaust

I now had a much cleaner, neater-looking installation, but how would it fly? My first impression, when I started the engine, was that it was much louder! It certainly sounded different. On the take-off roll, I noticed it was much smoother. In fact, smoothness is the most noticeable change. Up at altitude, after I had flown it around for a while at different power settings, I opened it up to full power and let it settle for several miles. I did this at an altitude and temperature where I had gathered this same data with the old exhaust system. The final result was that at exactly the same engine RPM, manifold pressure, and fuel flow I was looking at five knots indicated faster!

I was blown away. I honestly never expected that large of an increment. The prop must be that much more efficient without the high-speed exhaust plume disrupting the "sweet spot" on the prop blades.

I have since heard from other builders and flyers who have assembled similar exhaust systems. Several achieved similar results, and others gained nothing. I believe you must direct the exhaust plume through the prop as close to the spinner as you can in order to get this kind of improvement. If you just move the plume inboard a few inches, chances are you won't gain any performance.

The disadvantage of the dirty spinner is overshadowed by an even more important concern to me — the fact that I once again have an unproven exhaust system that I can't have much confidence in until I get several hundred hours on it with zero failures. I was so sure of my last exhaust system, it is an uncomfortable feeling at this point. In fact, for now, I remove the cowl and inspect the new exhaust after every flight. Only time will tell if this was a good idea. ●

RAF aviation travels the airwaves

ESPN2 featured the VariEze, Starship, ARES Jet and Voyager in a January segment of their "Ultimate Flights" show. If you missed the action you can order a video from EAA. It costs $12.95 + $3 shipping. Ask for Show #5. EAA (800) 843-3612. Here's a list of aviation shows you might want to catch —

Air dates for "Ultimate Flights" on ESPN2

Sunday February 11	05:30 PM (EST)
Monday February 19	03:00 AM (EST)
Sunday March 10	03:30 PM (EST)

Also look for an interview with Burt and dynamic formation flying by Dick Rutan, Doug Shane and Mike Melvill in the Fall production of "Understanding Flight" on the Learning Channel.

Long-EZ drivers — *Attention!*

by David Orr

Some of the things that the Owner's Manual won't tell you about these wondrous beasts —

(1). When you get rushed, it is tempting to crank the nose gear down about 3 inches, and leave the plane on three wheels. It will work a few times — until the day you shred the nose gear.

(2). When getting flight following, the FAA controller will sometimes come to a complete halt trying to figure out "Your Aircraft Code" in the Long-EZ or VariEze. The old generic code is "HXB" (Homebuilt Experimental B speed range); the nifty new one for these Rutan types is "VZ10)."

(3). The tender nose on an EZ will sometimes bounce high enough to cause you to wonder if the EZ will backflip. Whether pushing it on the ground or taxiing, approach gutters, tie-down wire or pavement edges at an angle so that only one main gear has to clear at a time.

(4). You may as well plan on a gear-up landing or canopy opening in flight on the first day that the warning system goes down. You may remember both for a few days, but inevitably you will forget them if either warning system is out.

(5). The old-timers never try to make the turn offs, they let the plane run the speed down and then use the brakes only to turn. Oh, but old-timers then don't land in front of jets.

(6). The Long-EZ doesn't have a reserve tank. Always keep about 10 gallons on one side as a reserve for bad planning. Get in the habit of balancing the tanks until you have that reserve. Then by all means clean out the non-reserve tank by running it dry at altitude — the prop will restart the engine.

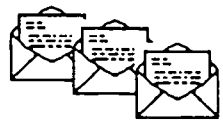
(7). Don't be the macho guy who lifts the plane up or down with someone in the back seat. Frankly, sitting in the rear seat with the nose down isn't particularly comfortable. Secondly, add some weight one day and a bad footing, and you will suddenly discover new ways to ruin your back.

(8). The nose tire is never fully tested until you plan a long trip heavily loaded (even with a spare nose wheel and mounted tire on board). The nose tire is out of sight and out of mind on that long flight day. Let something about filling the tank near the top remind you to fill the nose tire — they go together.

(9). With such a small cross section, figure that nobody else can see you. Fly and taxi like your life depends on getting out of the way. The best motorcycle drivers think "invisibility."

Right on David, these are so true, especially #1, 4, & 9!
Editor

Reader Mail



Dear Mike,

Per our telephone conversation, I replaced the original roll trim system in my VariEze with the 12 volt "MAC" Electric Servo System. None of the old problems like eliminating the "backing down," due to high speeds, by shorting the terminals or installing lights in parallel have to be done with this unit. It activates 40 pounds of thrust and/or resistance, far more than will ever be needed. Installation time was about six hours without additional help.

If any other EZ pilots would like information regarding installation, they may call me at (707) 745-8399. I'd be happy to pass along my experiences. The unit is available through Aircraft Spruce, but it's not cheap.

Jerry Martin
VariEze 222SK

Jerry Martin, ATP-ASMEL, CFI-1, is an aircraft appraiser living in Benicia, California

Dear RAF Folks,

I want to report on a maintenance item on Long-EZ serial #1696 (407). This Long was completed in 1988 and has 926 hours. I noticed over the last couple years there was increasing aileron slop developing. On the last couple flights I could feel the vibration transferred to the stick but no evidence of any flutter.

It was time to find the problem. A check of aileron hinges and pins (with Teflon sleeves) were in good order. The aileron bell cranks (new style) were also in good condition.

As I started through the push rods and rod-ends, I discovered severe wear of the rod-ends HM-3 (s).

With the push rod system, common sense tells me now that this rod-end was the only logical wear point. Check for any slop in your controls.

David W. Jones
Susanville, CA.

Thanks for the feedback David, and yes, the aileron rod-ends do eventually wear, primarily due to engine vibration, and it is usually the rod-ends in the wing roots. See CP 58, page 7; CP 59, page 9; and CP 60, page 8 for information on rod-end wear in the aileron control system. Editor

To report accidents and incidents

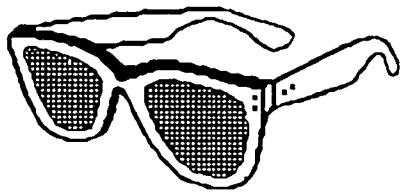
Write: Rutan Aircraft Factory
1654 Flightline
Mojave, Ca 93501

or Fax: (805) 824-4174
Attention RAF

Even more observations on cooling

Over the years, writing this newsletter, one of the most visited subjects has been that of how to cool the cylinder heads in an EZ.

We have recommended almost every kind of fix you can think of. There have been numerous in-depth studies by homebuilders as well as here at RAF. The thing that has puzzled us has been the fact that one EZ will have excellent cooling, CHT's of around 350 degrees F in cruise and no more than 390 degrees F in a long climb, using the stock, plans baffling and cowling. Oil temperature might be 170-190 degrees F. Yet, another EZ, using exactly the same engine, cowling and baffling system, has trouble keeping his CHT's below 400 degrees F, and might see 450 degrees F in a climb, and his oil might reach 240 degrees F! How could this possibly be?



This kind of example has been reported to RAF many, many times over the years, that is why there have been so many articles and so many different "fixes" suggested in past CPs.

As far as I can remember there has not been any mention of carburation, that is, fuel flow to the engine at full throttle with mixture set at full rich. Depending on the main jet installed in any carburetor or fuel injector, this number can vary by several gallons per hour, and this fact on it's own, taking nothing else into account, can change CHT's by as much as 60 degrees F across the board!

I recently experienced this myself on our Long-EZ N26MS. I put 1300-plus hours on my Lycoming using an Ellison throttle body, instead of a carburetor. The jets in this unit were not changed over this period of 10 years. CHT's were perfect. A maximum of 400 degrees F in a long climb and 370 degrees F in cruise. Oil temperature ran between 200 degrees and 220 degrees F — a little high, but not bad. Then I had the engine and the Ellison overhauled to factory new specs.

I re-installed the engine using the original baffling, except where it was cracked or damaged, but I reproduced new pieces of baffling exactly the same as the original. The engine ran incredibly hot, CHT's all above 450 — one reached 482 degrees F!

Knowing it was essentially a new engine, (I bought factory new cylinder assemblies) I expected it to run hot. I perservered, and flew it often, making small baffling improvements, even cutting more inlet holes in the cowling, top and bottom, with essentially no improvement.

Ultimately, out of frustration, even desperation, I installed an Airflow Performance fuel injection system, with a calibrated maximum fuel flow designed for my engine at sea level.

Frankly, I could not believe the difference! My CHT's dropped back to what I used to have and even a little lower. But fuel flow at full power was up a dramatic 17%!

What happened here? I don't believe there was anything wrong with the Ellison, I was always completely satisfied with it, and on my engine, *before* it was overhauled, it worked great. The Ellison has *by far* the best mixture control fidelity of any carburetor/fuel injection/throttle body system I have flown. I believe it may be that my "old" engine (before overhaul) was not putting out full "book" power (indeed, this is quite probable) and therefore the Ellison worked well, because that was the engine it was tuned (bench flowed) for.

When Mattituck overhauled the engine, it was rebuilt to new *stock* specs. It was not "hot-rodded," it has stock 8.5:1 pistons, stock cam, and I have been assured, it is a standard engine with the single exception of having been balanced by carefully selecting parts that weigh the same.

In it's present state my engine requires more fuel flow to cool than it did prior to the overhaul. The whole point of this article is to alert you EZ builders/flyers that high cylinder head temperatures and/or high oil temperatures may not be curable by "improving" baffling, or increasing the size of the cowling inlet or outlet. Keep in mind, the full power fuel flow may be the culprit.

Get a copy of the Lycoming engine specification (a stapled collection of data sheets, including a fuel flow curve) for your *exact* engine, e.g. LYC 0-235-L2C; look up what your sea level, maximum power fuel flow should be, then check it in flight.

This was easy for me since I have a digital, calibrated fuel flow meter on my instrument panel, and can read fuel flow real time, all the time.If there is a significant difference, one or two gallons per hour, get your carburetor checked/overhauled to the correct spec. Keep in mind, engines used by homebuilders come from all sorts of sources, mostly used, and may or may not still have the original jets installed. Indeed, these jets get changed by the airframe manufacturers many times, based on cowling/cooling requirements for the particular airplane that they are installed on.

'Nuf said, just food for thought! •

Help, does anyone know where to buy 6-ply 3.40x5 tires?

If you do, write or fax RAF — 1654 Flightline, Mojave CA 93501 Fax (805) 824-4174

Any "reply" will be published in the July issue of the Canard Pusher

Wood prop blade failures

Over the past several years there have been a number of blade failures, two of which have now been closely examined by the Forest Products Laboratories (FPL). This group are experts in the field of properties of wood and adhesives for wood.

Both of these props were two-blade Performance Props, and were flying on Long-EZ's. John Sheffles prop failed catostrophically in flight, loosing about 1/3 of one blade. Fortunately John made a safe landing on a road. The FPL engineers concluded that this prop had fluttered in flight, and the heat generated by the high frequency flexing at the trailing edge played a large part in the structural failure.

Terry Schubert's prop fractured in a simple bending break. Again there was evidence of high temperatures. This failure occurred right in the area where the exhaust plume impinges on the prop blades.

These were contributory to the failures, but not the only reason. Both props had higher than normal moisture content in the area of the blade failures, and lower than normal moisture content in the hub and blade shank. The FPL believes that heating in the hub and shank area from the hot prop extension, tends to drive the moisture from the hub out into the blades (helped perhaps by centrifugal force? *ed. comment*). The combination of high moisture content and heat makes the wood glassy, chrystalline and brittle. This condition in wood is known as depolymerization, and creates a small amount of acetic acid (vinegar), which has a strong and distinct smell.

In view of the number of wood props functioning normally on many hundreds of homebuilts (and factory airplanes, J-3's, clamps etc.) We must conclude that this cannot be a wide spread problem.

What can you do to protect yourself?

1). If there is any evidence of overheating (charring) of either or both blades from the hot exhaust, rotate your prop one bolt hole. Our experience has shown that if a two-bladed prop is installed at approximately the 1 o'clock / 7 o'clock position, with the number one cylinder at top dead center on the compression stroke, this overheating due to the exhaust, will be completely eliminated. You will still see gray exhaust deposits on the blades, but they will remain below 150 degrees F at all times.

2). Seal the inside of the center hole in the prop with an epoxy such as the West System. We seal all bolt hole and counterbored holes as well.

3). Always leave the prop in the horizontal position when parked. This prevents the moisture that is in the wood from migrating into the lowest blade due to gravity.

4). Repair any damage to the finish on the wood prop immediately, and refinish and check the balance of the prop once a year or as required.

5). Inspect your prop carefully and often for signs of blistering and or checking or cracking on the surface, especially on the forward face (top of airfoil).

6). *Editor Opinion* — I would conduct this inspection even more often and carefully if you fly a prop with very thin and/or small blade sections, such as the Performance Prop and the Warnke "almost constant speed" type props. Be especially vigilant about flutter, If you feel a sudden unexplained vibration or roughness as you bring the power up to do your mag check, or in flight, reduce power, land and inspect for evidence of flutter. This may be in the form of a darker color in the wood especially near the trailing edges, at or near the 2/3 blade station (typically the highest activity area of the prop). There may also be checking or cracking of the finish along the trailing edges. Once you have experienced flutter of a prop, you are not likely to forget it. It is a harsh roughness or vibration that comes on rather suddenly. Any prop that exhibits this tendency to flutter, should be discarded and not flown.

NOTE — Terry Schubert, editor of Central States Newsletter, has been conducting a survey of a number of different pusher aircraft, with different exhaust configurations, looking for signs of high temperatures in the hub area (under the spinner) and in the area of the exhaust plume. We will publish the findings when we receive them from Terry. (By the way, if you do not already subscribe to the Central States Newsletter, you are missing a sure bet. This is an excellent source of neat ideas and information on all the RAF designs as well as other composite aircraft. Send $20 to Terry Schubert, 9283 Lindbergh Blvd, Olmsted Falls, Ohio, 44138).●

Non recommended props

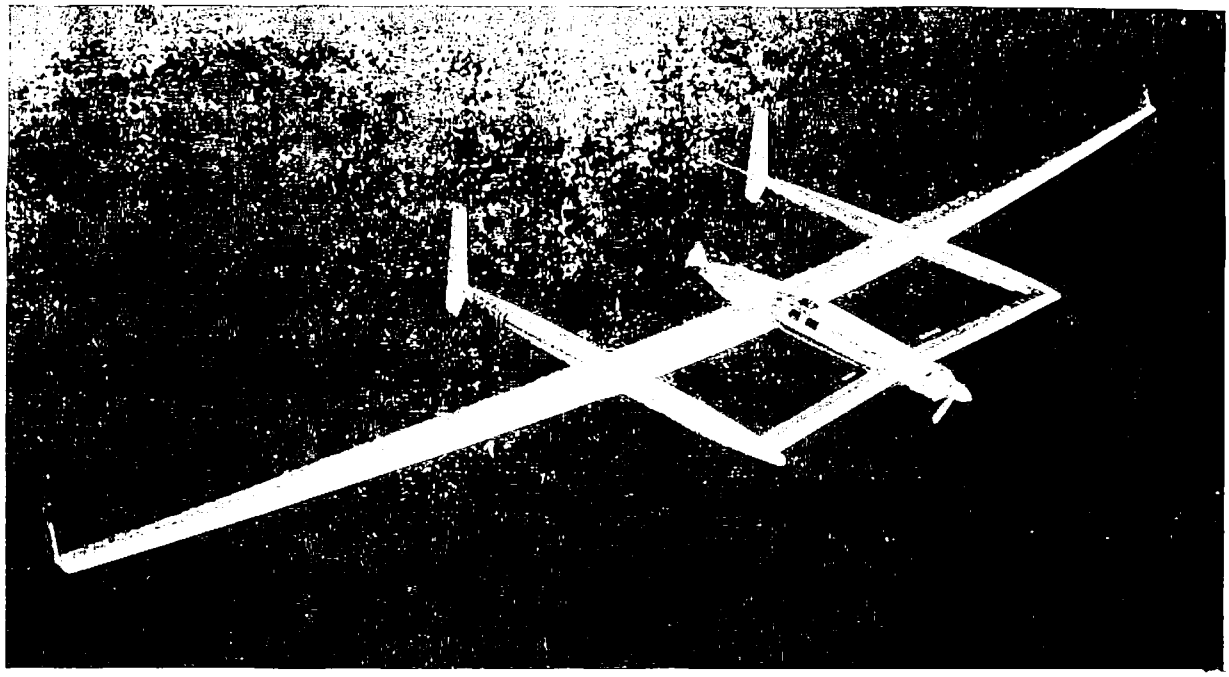
Be very cautious of narrow chord, two-blade unreinforced wood props, particularly if the blades have sweep. If you are flying one of these be extremely vigilant for any unusual vibration. Read the following examples of wood prop failure, reprinted from CP46, page 7.

We recently heard from an EZ builder pilot who was using a non-RAF-recommended prop. After only 22 hours of operation, upon noticing a new feeling or vibration, closely examined the prop and found compression failures in the wood about 8 to 10 inches out from the spinner on the forward face of both blades. Remember, most times you will get some type of warning before the prop really lets go. Pay attention. Any new noise or vibration should be investigated.

We are becoming more and more advocates of the so called "multi-laminate" Canadian maple wood props. In our experience these props are stronger and allow more torque to be applied to the prop bolts without crushing the prop hub. We have routinely used 300 inch/lb of torque on the 3/8 inch prop bolts found on Lycoming 0-235 and Continental 0-200 with these props with no problems at all. *Caution: Do not* use more than 220 inch/lb of torque on the older style four or five laminations of birch-type props. Also, remember to check the prop bolts frequently, particularly when the prop is new.

see Props pg 9

Voyager reunion slated for Smithsonian



The renowned Voyager, which now spends calm days suspended in the front lobby of a national museum with only the breeze of an air conditioner across its fuselage, will once again be celebrated with tales of wild tail winds. This year Dick Rutan plans to salute the 10th anniversary of his historic flight under the very wings that carried him aloft, surrounded by the folks who helped him realize the round-the-world mission.

Voyager volunteers will be honored December 13 at a black-tie gala hosted at the Air & Space Museum in Washington D.C.

The '96 celebration, while still in its early planning stages, is scheduled for the "after hour" romance of a quiet museum. According to Rutan, Voyager volunteers will be welcomed at a reception, where brief speeches will be made before retiring to the museum's theater for a 45-50 minute program. Aircraft aficionado Cliff Robertson will do the honors as Master of Ceremonies. Later, guests will break bread over a hors d'oeuvre buffet and let the memories fly.

Props

The following is an incident report from VariEze builder/pilot and Defiant builder, Emerson Grooters of Norway. It concerns the failure of a propeller and points up the importance of selecting a good reliable prop. If you want to experiment with untested or unusual props, do yourself a favor and follow the Formula One racing guys lead, install a safety cable on your engine. This is at least a 1/8 inch aircraft cable that ties the engine to the airframe. If you lose a prop blade, and don't get the engine shut down in time, the engine could come loose from the firewall.

"During testing of a new wood prop which I intended to use for some altitude and speed records, the prop failed with multiple fractures in the root area of both blades — forward face. The prop was not one recommended by RAF, however, I think that there my be a good point here for everyone — that is, just because you have a wooden prop don't think that it will automatically work with your aircraft/engine combination. I had 2.15 hours on the prop when I retorqued the bolts prior to an altitude test of the aircraft, my RR 0-240 powered VariEze. I took off, climbed to 10,000 feet and checked various power/cruise settings for about 25 minutes. I then climbed direct to 20,000 feet and started full throttle cruise test prior to further climb. At about 107 KIAS and 2700 rpm I noticed an increase in vibration from the engine. The vibration was not severe; however as it was a change from the norm, I canceled my next planned step to 25,000 feet, reduced power to about 1/4 throttle and descended for landing. Total flight time 1.25 hours and total on the prop, 3.40 hours. On landing I saw the cracks in the prop. I was also glad that I had just had my chute inspected and repacked, even though I hadn't had to use it.

Last summer, my wife and I stopped to talk to another couple about their new beautifully executed homebuilt. They were both dead about 15 minutes later in a crash resulting from losing most of a prop blade. It was a one piece wooden prop recommended for their type aircraft — not a RAF type. I mention this because, just because you have a nice looking wood prop does not mean you are home free. Also any change from the normal operating conditions of your aircraft should be fully investigated as soon as possible. A precautionary landing may be inconvenient and take a little time but it could save your aircraft and yourself." **Emerson Grooters**

Fly-In with friends

Central States Florida Gathering
Tuesday, April 16, 1996
Tailwinds Airpark (FD-15)

There will be a fly-in lunch for Central States members and their guests during this year's Lakeland Sun N Fun Convention. This fly-in is designed to complement, not compete, with the great Lakeland convention.

For flight instructions and lunch reservations, please call your hosts —

Jack Fehling (407) 744-1309
CSA Florida State Representative

Paul Weiss (407) 744-5566
CSA member

Northeast EZ Flyer Spring Fly-in
May 10-12, 1996
Lawrence, MA
Municipal Airport (LWM)

The week-end fly-in includes shopping at Quincy Market, a guided tour of the Boston, Cambridge and Charlestown, and a lovely buffet supper at Canobie Lake. Cost per couple will be $40, plus motel and lunch in Boston. Please send $20 per couple deposit by April 10 so they may plan food purchases.

For motel and airport information, contact your hosts :

Paul & Barbara Adrien
73 West Shore Road
Windham, NH 03087
(603) 898-6146- h (508) 682-5656- w
(508) 685-7949- fax

RAF Recommended Suppliers

These suppliers are still the only authorized RAF dealers for all your various aircraft materials and components.

Aircraft Spruce
PO Box 424
Fullerton, Ca 92632
(714) 870-7551

Brock Mfg.
11852 Western Ave
Stanton, Ca 90680
(714) 898-4366

Feather Lite
PO Box 781
Boonville, Ca 95415
(707) 895-2718

Wicks Aircraft
410 Pine Street
Highland, IL 62249
(618) 654-7447

Prop Manufacturer
600 Superior St
Concrete, Wa 98237
(206) 853-8947

"Grazing in the Grass"
Canard Fly-In, June 21-23
Clarence Page
Municipal Airport (F29),
Oklahoma City, Oklahoma

This is the Sixth National Gathering for Canard Type Airplanes held in Oklahoma.

Social events, seminars & prizes will abound. Each year this fly-in has drawn canards from both coasts and offered great technical seminars.

Contact Pete Peterson for more information
4429 NW 48th, Oklahoma City, OK, 73112
(405) 946-5003.

Oshkosh 1995
Burt Rutan & John Roncz
forums on video

The Future of General Aviation
by Burt Rutan. Burt discusses the panel he is designing for his newest homebuilt aircraft, "The Boomerang." Beyond "heads-up" and "glass cockpit", you'll be surprised at his concept. Burt also hints at the revolutionary way Boomerang will be fabricated out of composite. It's the next step beyond filament wound, pre-preg material. Also included is how the air traffic control system should be organized in light of GPS navigation. Aprox. 80 minutes instereo VHS.

The Aerodynamics of Dragons
(with and without a Virgin)
by John Roncz. John takes you step by step in analyzing the lift, drag and flight characteristics of medieval dragons! Using aerodynamic formulas and full citations, John shows you how you can analyze any aircraft design. As John says, "You can do this. There are engineers dumber than you doing this every day!" Aprox. 80 minutes in stereo VHS.

Tapes are $15 each from:
Bruce Talbot
222 Sunshine Drive
Bolingbrook, IL. 60440
E-Mail: Buzz112@AOL.com

F-16 DEEP STALL INCIDENT VIDEO

Gives a pilot's-eye view of a deep stall which almost doesn't recover. Includes a letter describing what the important learning points are from the video, especially as they apply to EZ pilots who are unfamiliar with deep stall, as well as a transcript of the audio portion (for clarity). Price - $13.00.

Contact: Charlie Precourt
7015 Little Redwood Dr.
Pasadena, TX 77505-4433

Lycoming engine for sale

Lycoming 0-235 C2 — 115 HP
TT 190 hours — Performance Prop
One electronic ignition

I am open for price and will take the best offer. This engine was rebuilt in Pocatello, at Idaho School of Aviation by Mr. John Bakken. Any replies would greatly be appreciated.

Martti Riekkinen
67-49A 192nd Street
Fresh Meadows, NY 11365
(718) 454-2524 Phone
(718) 454-8027 Fax

For Sale

Solenoid Engine Valves

Two electric solenoid engine primer valves (Skinner) 28V — cost $35 new, sell for $15 each.

Contact Mike Melvill

24120 Jacaranda Dr. wk (805) 824-4541
Tehachapi, CA 93561 hm (805) 821-1805

For Sale

1 Defiant engine mount
(Dynafocal rear engine), 0-350, manufactured by Brock. $285.00

4 rolls S-Glass — $100 each

Byrdell Mathews
(713) 367-5071

For Sale

Two Whelen strobe 12-Volt power supplies $75 each
20 Grimes instrument post lights (new) $14 each

Call Dan Worley, Long-EZ 63EZ
2609 Beach Dr., Heber Springs, AR 72345
(501) 362-6178

Classes

Offered

The Alexander SportAir Center and the Experimental Aircraft Association offer a number of workshops nationwide for those of you who are looking for instruction.

According to their brochure you can choose from one of the following 2-day courses:

Introduction to Sport Aviation
Composites I — Moldless Construction
Composites II — Vacuum Bagging & Bonding
Fabric Covering
Sheet Metal
Welding

Call for prices and the 1996 workshop schedule

1-800-831-2949

MOLDED VORTEX GENERATORS

These pre-molded generators are specially engineered for aircraft application. Available in white, they can also be custom molded in quantity to match specific paint colors for aircraft manufacturers and OEM suppliers. After installation, the sail appears to be molded an integral part, rather than and "add-on". The final result not only looks better, it performs better than typical hand-made aluminum fences. Molded vortex generators adhere better, do not corrode, require no painting and are easy to install: one Long-EZ canard can be equipped with a full span of generators in less than 90 minutes.

A kit containing fifty generators is available for a price of $25.00 plus $2.00 shipping and handling per kit. Two kits are sufficient to equip the full span of a typical canard (i.e. Long-EZ, Dragon-Fly, et al) or both ailerons on either canard or conventional planforms. Documentation is included. Please send check or money order to:

CCI, PO Box 607, Plainfield, NJ 07061-2318
Please allow 2-3 weeks for delivery, Sorry, no COD's.
For more information 6:00-10:00pm EST, Mon.-Fri.
908-757-9573 908-755-9639 FAX

Note: These vortex generators are not TSO'd for use on type-certificated aircraft.

Further update on the all stainless steel 4-stack exhaust pipes

– New Product now available for VariEzes with Continental engines –

The new "Hidden" / "Tucked-In" style 4-stack stainless steel exhaust pipes are now available for VariEzes.
All exhaust pipes are now available with springs & slip tubes at the flange or with ball joints, builder's choice. The springs and slip tubes have proven to greatly minimize cracking.

Also New!! Welded-on Stainless Steel Heat Muffs are available for all styles of exhaust pipes. Cost is $50.00.
All styles of the exhaust pipes still have the orginal slip tube support on each side to keep the pipes totally independent of each other. They have 1/4" type 321 stainless steel flanges and type 321 .035 inch stainless steel tube, and the tubes are "degreased" inside and out before they are purged or back-gassed with argon while being welded (others don't do these two very important steps). They fit Lycoming engines for any pusher aircraft such as EZs, Cozys, etc. The cost is $500.00 plus $15.00 shipping & handling.

The **Ram Airbox** is still available at $325.00. Reusable foam air-filter $20.00, ($11.95 shipping & handling).
The increase in performance of both the 4-stack exhaust pipes and Airbox combination is very impressive, about 200 rpm on the average Long-EZ installation. Builders can call or send a self-addressed stamped envelope for a flyer. Both items come with an installation sheet.

Hal Hunt, 6249 Longridge Avenue, Van Nuys, CA 91401-2528
(818) 989-5534

FLUSH, INTERNALLY MOUNTED ANTENNAS

A complete line of antennas, specifically designed for, and flight tested on, composite aircraft. The antennas are tuned for maximum performance and in general those who have used them so far report reception is doubled over standard external antennas.

VariEze builder/flyer Bill Butters has started a company to develop a full range of buried antennas. These are normally supplied with a BNC connector built into the actual antenna, but can be supplied without connectors to include enough length of co-ax cable to facilitate easy installation with minimum weight and bulk. Call Bill Butters, Advanced Aircraft Electronics, PO Box 4111, Florissant, MO 63032
800-758-8632

Feather Lite

LONG-EZ PARTS PRICE LIST

Main gear strut	$349.00		
Nose gear strut	$58.00		
Engine cowls, pr. (glass)		$329.00	
Engine cowls, pr. (Kevlar)		$480.00	
Cowl inlet	$48.00		
Wheel pants (3.5x5)		$150.00	
Wheel pants (500x5)		$180.00	
Above item in Kevlar		$215.00	
NG 30 cover	$21.00		
Pre-cut canard cores	$160.00		
Pre-cut wing & winglets			$1199.00
Leading edge fuel strakes w/bulkheads			$524.00
Strut cover SC	$19.50		
Nose wheel cover NB	$19.50		
Sump blister	$19.50		
NACA inlet		$47.00	
3" extended nose gear		$70.00	

Feather Lite, Inc. is proud to announce another product to re-introduce to EZ builders: The original Space Saver Panel by the late Rusty Foster. This is a bare fiberglass panel with a molded recess for builder installation of an aluminum flat stock electrical panel. $40.00
Contact Michael Dilley or Larry Lombard (both former RAF employees and EZ builders and flyers)

Feather Lite, Inc., PO Box 781
Boonville, CA 95415
707-895-2718

Feather Lite bought Bruce's equipment from B&T PROPS and will soon make an announcement as to when they expect to begin producing props.

NOSE GEAR RATCHET

Dr. Curtis Smith's nose gear crank ratchet is available for $40.00 which includes postage and packaging. No need to call, just send check or money order. This little device should be considered a "must" by all Long-EZ and VariEze builder/flyers. Once you have flown with it you will wonder how you ever did without it.

Curtis Smith, 1846 Sextant Dr.
Worden, IL 62097
Note new phone # 618-656-8209

NOSE WHEEL SHIMMY DAMPER

Bob Davenport tells us that he can still supply this excellent damper. Unfortunately he gets very few orders nowadays but can sell them even if he gets only one order. Including the set up charge, the cost is $236.00 delivered in the USA.

Contact Bob Davenport
PO Box 650581, Vero Beach FL 32965-0581
407-567-1844

TITANIUM ACCESSORIES AVAILABLE!

Custom anodized to any of 15 different colors, shades of copper, purples, blues, greens, yellow/gold, even rainbow effect. Rudder and aileron gustlocks - $20.00-30.00.

GU canard full span vortex generators with layout template - $170.00. These are very exciting! Rudder horn CS-301L&R replacements, $25/pair. Shipping inc.

Ti Specialties, PO Box 1052
Grover Beach, CA 93483-1052
805-489-8155

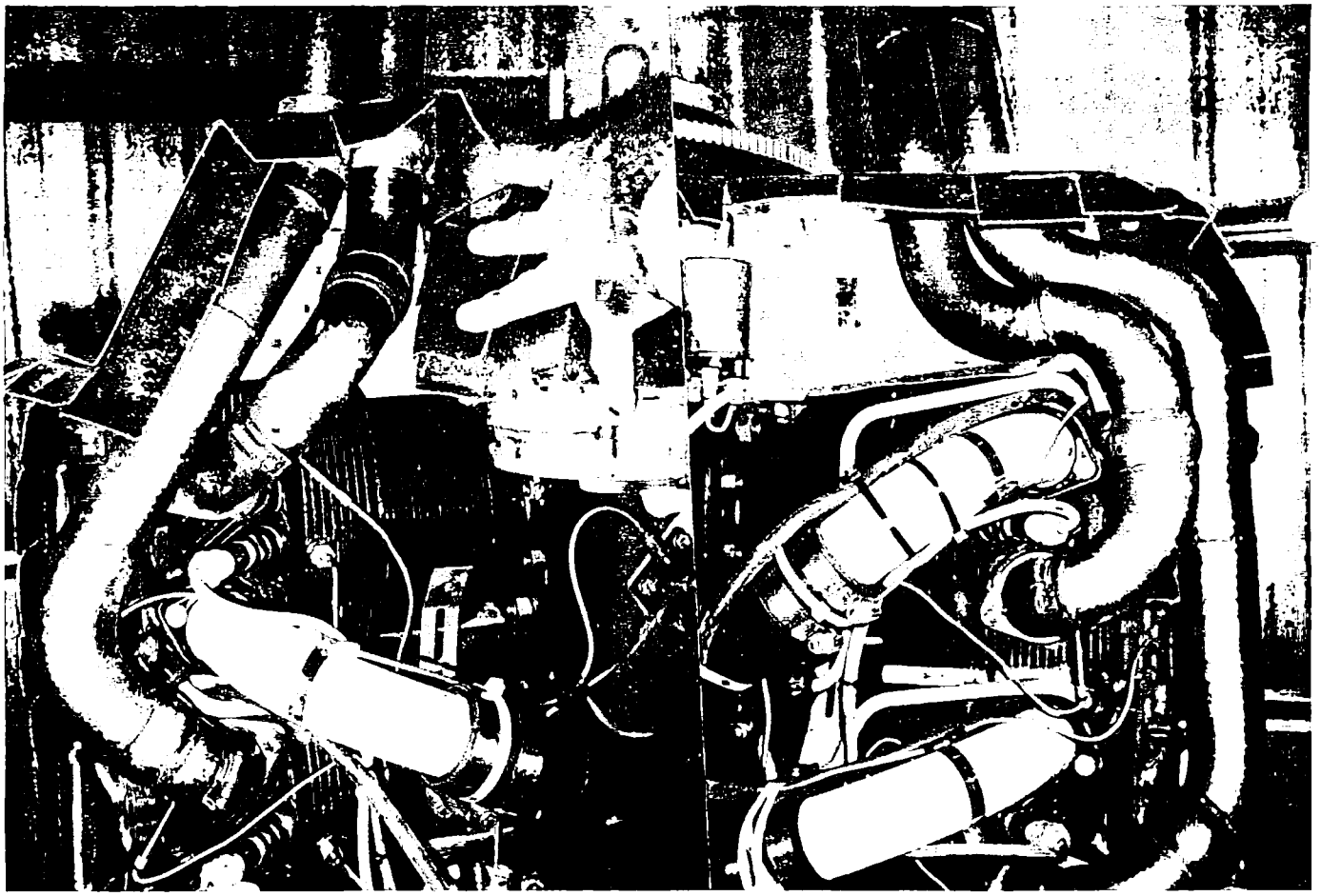
STARTER FOR 0-200 CONTINENTALS

B&C Specialty has introduced a beautifully made, 12 volt starter specifically designed to be installed into the accessory housing on a Continental 0-200 engine, or on an 0-240.

This starter has been thoroughly tested at Teledyne Continental (more than 5000 start cycles without a single problem!).

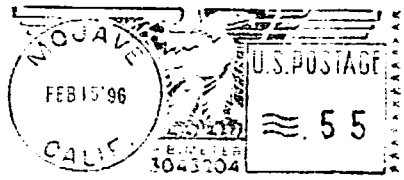
Bill Bainbridge has these starters available for immediate delivery and they can be had STC'd or for homebuilts.

Contact: B&C Specialty Products, Inc.
123 East 4th Street, Newton, KS 67114
316-283-8662



N26MS tries a new exhaust. (above) View from directly below of both left and right side exhaust system. This system is contained completely within the cowling. See story on page 1.

RUTAN AIRCRAFT FACTORY
1654 Flight Line
Mojave, CA 93501



Inside

87* LAST CP IS 99
SCHUBERT, TERRY *
9283 LINDBERG

OLMSTED FALLS OH
44138

Jan 96
CP 83

If your label says **LAST ISSUE CP 83**, this is your last issue and you need to renew.