

Propeller Blade Protractor

I just received a propeller protractor from Warp Drive, maker of composite 2, 3, and 4 blade ground adjustable pitch props. This protractor unit was developed by Warp Drive to check blade angle of variable pitch propellers while installed on the airplane. It could also be used to check blade angles on fixed pitch propellers.

Are you having excessive vibration with your prop and think your prop is in balance? Perhaps your blades don't have the same angles at all stations. Consistent pitch from blade to blade is imperative for smooth performance. This unit makes it possible to take a survey of the blade angles on your prop like a pro.

My brother had a prop on his Cassutt that he thought was OK except for a little vibration. He checked the blade angles and found that some stations had up to a 5 degree difference from one blade to another. Your prop might be a victim of this also.

If you wish to borrow this protractor send me a note and I'll send it right out. Please keep the loan time to a week and you'll be responsible for postage both ways.

Tool collectors who must have their own to caress and fondle may call Warp Drive free at 1-800-833-9357. Before you pay your \$35 you might wish to try this one out, however.

They also have an interesting looking stainless steel leading edge kit to be applied to "just about any propeller". The cost is \$7 per blade.

Great Quotes

"As soon as the stewardess serves the coffee, the airliner encounters turbulence"

Roger's Law

Explanation of Roger's Law:

Serving coffee on aircraft causes turbulence.

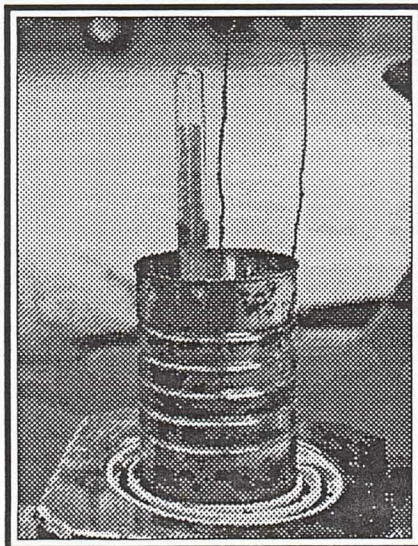
4 Pipe Exhaust Support Plans

Bob Sudderth (WA) - Some of you people have expressed an interest in my approach or in a general approach to support the Hal Hunt 4 pipe exhaust system. The brackets I designed were covered in the January 95 CSA newsletter, however the pictures were not good enough to build from. I have since taken additional photos and have made sketches that should be adequate to build from.

My O-320 Long-EZ has the Hunt 4 pipe exhaust system without ball joints or slip joints. With these brackets installed I have had no problems in the 150 hours of flight accumulated so far. I have observed the engine run with cowl removed and can tell the brackets do a good job of supporting the pipes. One advantage is that these brackets clamp on. Nothing is welded to the exhaust pipes that will crack and break off.

If you wish a copy of the photos and sketches send me a SASE (2 stamps) and \$2.00 to cover expenses and I will be glad to send you a set.

Bob Sudderth
P. O. Box 1194
Snohomish, WA 98291



Plans For Sale

Defiant plans - \$900
Cozy plans - \$300
S-Glass - \$400

Contact:
Andy Budek
(619) 942-8405

OSH Composite Workshop Volunteers Needed

I recently received a letter from Ron Alexander, formerly of Alexander Aeroplane, who will be responsible for operating the OSH composite pavilion workshop this year.

Ron is looking for capable experienced volunteers to staff the demonstration facility. Many of us received our first working exposure to composites in this facility. This is an excellent opportunity to pass on your knowledge to the next generation of composite builders.

If you are qualified and interested in this opportunity please contact Ron Alexander and "help spread the word" on composites. Phone: 800-WORKSHOP or write:

Alexander SportAir Workshops
219A Barry Whatley Way
Griffin, GA 30223.

Calibrate Your Instrumentation

I had not done any instrument probe calibrations since the original ones prior to first flight, 1800 hours ago. Since that time I have changed all probes at least once. I really did not **know** if the instrument was accurate.

A simple and safe way to calibrate CHT probes is to place a coffee can, with label removed, on a hot plate add about 4" of vegetable cooking oil and start recording temperatures. I used a candy thermometer as temperature reference and it is easy to obtain. Hot oil is extremely dangerous to skin! Be sure the hot plate is on a firm foundation and the can doesn't rock on the hot plate!

If Charlie Can Do It So Can We

Editor: The following was taken from a letter to me by Herb Sanders, witness of the fatal roll over and former hangar mate of Charlie Hillard.

Herb Sanders (TN) - Charlie was one of the best pilots in the world - former world skydiving champion, former world aerobatic champion, flawless airshow pilot for more than 25 years. The thought of a pilot of Charlie's ability to get killed on landing roll out should make us all plan seriously and do our very best to fly safely on every flight!

The crew from Breckenridge, TX that built the Lone Star Fury examined the plane along with the NTSB and found no brake problems. The Monday morning quarterbacks tell me when armor and turnover structure is removed to make room for a jump seat, the CG is at the forward edge. Recommended technique for landing is to retract the flaps immediately on touchdown. The low wing in ground effect with flaps extended makes the tail very light and subject to turn over if brakes are applied.

As the Fury went over it appeared as in slow motion. No great amount of energy was present and it did not appear to skid after it fell over. I did not expect Charlie to be injured at all. Apparently the vertical tail penetrated the sand which allowed the canopy to crush down. I am told that his neck was bent over and death was from suffocation.

I shall remember him as a superb pilot, always easy to visit with and a gentleman to everyone.

Long-EZ Parts For Sale

I have enough parts and materials to build one Long-EZ, including HD brakes, engine cowlings, main and nose gear. All parts - materials \$2000 or will part out. Also I have one Bendix fuel injection unit for Lycoming O-360 \$600.

Contact: Roger Spurgeon (513) 429-4139.

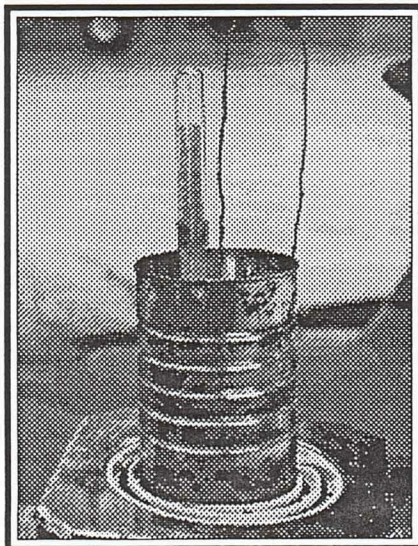
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Oil Cooler Installation

John Sheffels (MT) - Yesterday was 80° - today is 30 with 6" of new snow. Such is springtime in Montana. The 80° gave me a chance to try out my latest oil cooler mod (#6). By the time I made this mod last fall it was too cold to see if it worked. At 40° OAT the oil temperature was 138°. At 80° OAT, 23" MP and 2500 RPM @ 4500', the oil temperature was 175 after flying for one hour. I will wait for a real hot day and see how it cools in both climb and cruise. If it continues to show promise, I'll send information for a short article.

The 9 section oil cooler pictured is oversized from the plans recommendation. I am sure I am creating a little drag with this installation but I can't see it on the airspeed indicator. It appears I have reduced #3 CHT about 20°F.

Editor: I have heard nothing further from John but it has been cool in MT this spring. If you are having oil temperature problems you might call John about this. It looks like it might be a solution. A drop in CHT is always nice too.

Wanted

Complete Long-EZ plans with the template sheets.

Contact:

Tony Livic

6322 Lariat Loop N.E.

Bainbridge Island, WA 98110

(206) 842-0754

Wanted (tractor type prop)

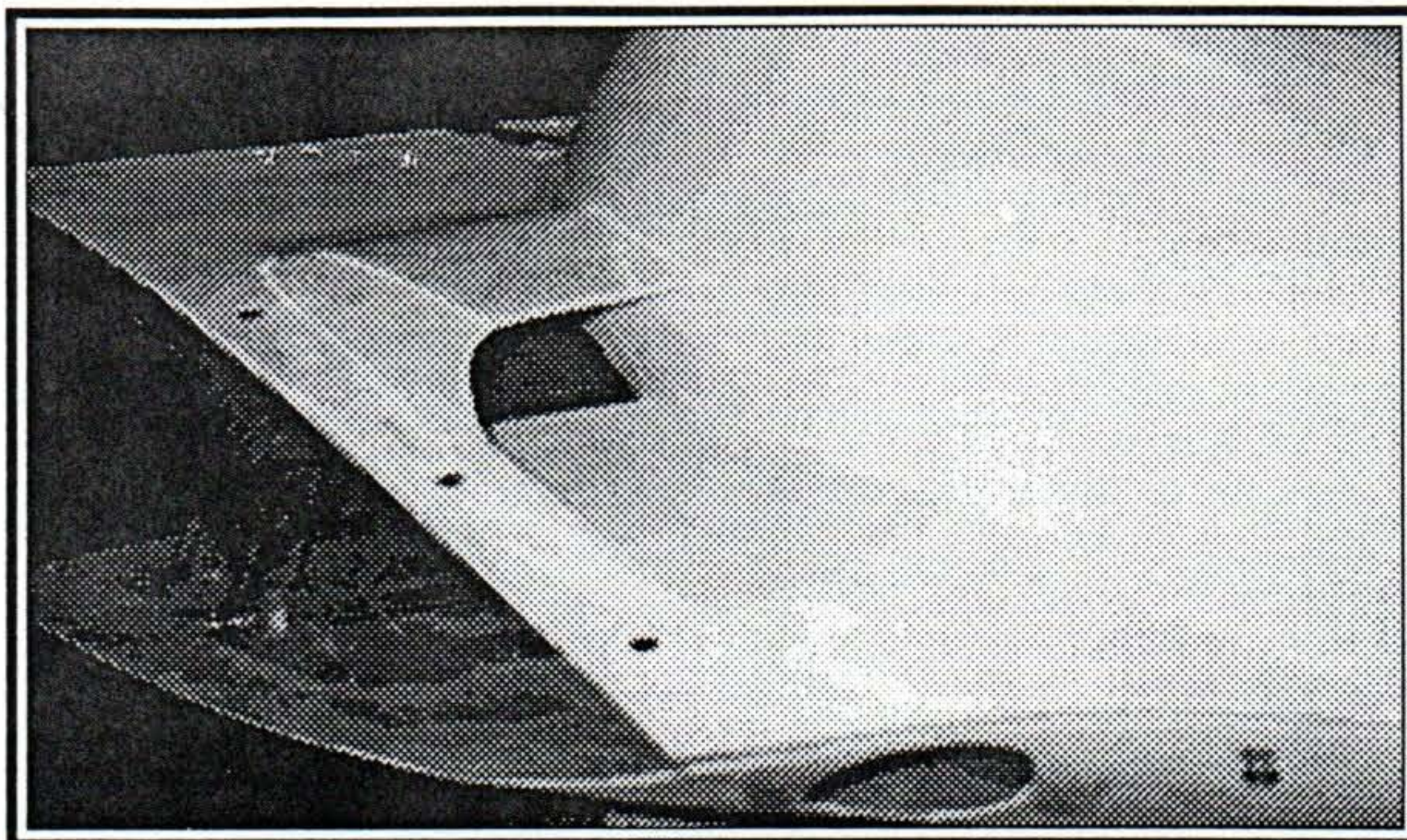
Prop 64 x 76 (or close) or one that can be cut to that size. Wood or metal. For Lancair O-235/320 project.

Jim Willer

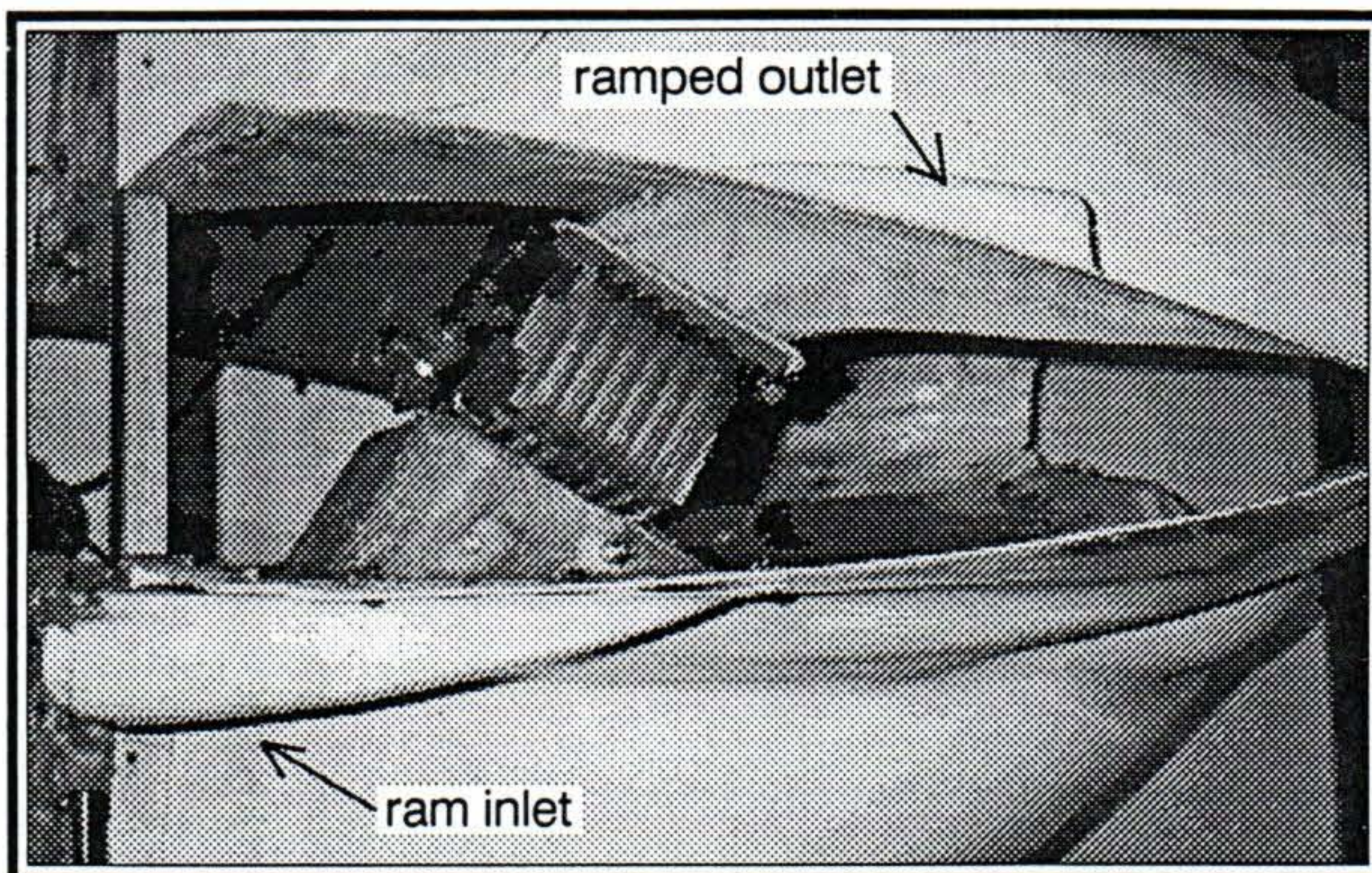
4764 Beverly Lane

Erie, CO 80516

(303) 233-7887



Dedicated inlet and outlet help assure adequate airflow to the oil cooler and reduces the heat load in the cowl



Superior workmanship is evident on this oil cooler installation



Hector Roman's Velocity looks beautiful in the Puerto Rican sun

Does Your Intercom Buzz?

Walter Gee (IN) - A while ago I found a new set of problems with my Long-EZ. I had an engine related buzz in my intercom and the transponder interrogation light stayed on all the time.

I found the threaded spark plug ends

of my automotive type plugs were not screwed down tightly. These little nuts that make contact with the plug wires were evidently vibrating and causing some kind of EMI that effected my intercom and transponder. When I tightened the 2 loose terminals the interference went away.



Congratulations

Dee and Charlie Airesman were married May 18 and honey mooned in Key West. Dad's wedding present was an O₂ system for the Vari-Eze.



GPS Interference

The following was based on information in an Aviation Consumer article sent to me by Mike Stolle (NM).

As more GPS installations are being made it seems interference problems are becoming evident. One pilot of a PA-30 had dual Narco Mark 12D's that would block a handheld GPS antenna when it was within 3-4' of the nav-coms. Placing the GPS antenna on the glare shield made things worse as the antenna was right over the nav-coms.

It seems certain Narco radios (MK 12D/E & Nav 824/825) present a special situation causing GPS interference. Like most newer radios with electronic tuning, Narco has a memory function to retain the last frequency when the radio is turned off. That memory has to be powered by wiring directly to the battery. Many installers choose not to hook it up. When the nav-com is turned on, it therefore defaults to 115.5 MHz, a harmonic that interferes with the GPS reception.

Trimble recommended that the interference problem could be reduced if the memory was hooked directly to battery power. Narco says they aren't the only manufacturer to have those problems and are working on fixes.

Aviation Consumer stated, "In general, all radios can jam all GPS units having an "in cockpit" antenna. VOR

receivers and com radios generate an intermediate frequency by the IF oscillator which jams GPS reception. Every manufacturer uses a different IF and it varies even on their own radios, so you can't say a certain frequency will cause a problem universally on all radios."

Trimble published a chart showing frequencies that can cause problems with certain radios.

"A KX 155/165 transmitting on 118.15 was shown to jam an External antenna.

MK 16 tuned to any 115 or 109 nav channel was shown to jam a handheld GPS.

All radios can generate GPS jamming harmonics when **transmitting** on frequencies near 131.285 MHz and 121.186 MHz.

The **reception** mode also causes interference.

Narco MK12D/E, Com 810/811, Nav 824/825: Com - 131.220 & 119.285, Nav - 115.464 & 109.672

King KX 155/165: Com - 131.820 & 119.885, Nav - 116.128 & 109.564

King KX 170/175: Com - 122.285 & 130.186, Nav - 113.651

Collins Microline: Com - 132.720 & 120.785, Nav - 116.028 & 109.464"

EZ Writers

Vance Atkinson (TX) - Nat Puffer called and has the Franklin engine mounted in the Cozy with baffles done and a few minor things to do. It will probably fly by mid June.

A Berkut builder from Montana reported that Dave Ronnenberg is going full tilt with the 540 powered Berkut and will be finished and flying to OSH.

New members of the Canard Travel Club

The following are names of people who wish to be added to the Canard Travel Club roster.

Randy Porter Athol, ID (208) 683-3126, or cell phones: 699-0227 & 699-0226. He lives on S61 Hackney Airpark, 3500' "fairly smooth" grass.

Ted Hall St. Charles, MO (314) 946-4040.

Bill Cook Hamilton, MT (406) 363-4238

Tony & Brenda Rothwell Chapman, ACT, Australia E-mail 100035.3030@compuserve.com

Carl & Joan Denk La Grange, OH (216) 458-5598 based at 22G

Walter & Kathy Gee Indianapolis, IN (317) 271-5618 based at Eagle Creek

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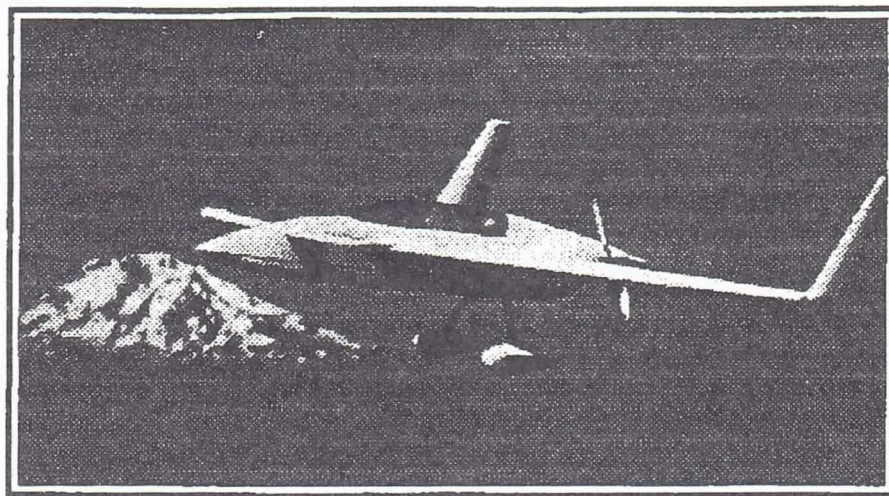
Walter & Kathy Gee Indianapolis, IN (317) 271-5618 based at Eagle Creek

Cooking Success

Bob Holliston (WA) - After rebuilding my O-290-D2, I decided to try to protect my investment by lowering my CHTs. Even with ramps in the lower cowl the hottest cylinder was running about 425°F. I followed two suggestions in the CSA news letter -

Vance Atkinson's tip on "clamshells" around the cylinder bases and Al Coha's idea with glass and silicon on the heads. (I used graphite cloth as it looks slightly cooler) Guess what? **A 100° F drop!**

I even jury rigged a borrowed CHT gage and bayonet to double check. Previously, I always had to throttle back and stay full rich on climb outs. Now full throttle to 18,000 = 340° F max. I'm very pleased. Also I installed an LSE ignition system. It took about 10 hours.



CHT's are down - Thanks to Atkinson & Coha Ideas

After overhaul, I broke the engine in using both mags. I wrote down lots of data on RPM, speed, fuel burn, and stuff. I removed the non-impulse mag and fired up the LSE ignition. It actually worked the first time around!

All the stuff you hear about these systems is true. Static RPM is up slightly, while at 10,000' full throttle gives a 65 RPM gain. Fuel burn is about 15% better.

Wanted

Serviceable 62 x 66 SAE #2 prop for an O-235, Weldtech engine mount for O-320, suitable prop for O-320 Long-EZ, prop extension, 5" Cleveland brake discs, exhaust system for O-320.

Art & Bonnie Lazzarini
P O Box 1691
Hailey, ID 83333
208-788-9284

Don't Go To Janesville For Breakfast

Marty Pavlovich (WI) - The restaurant at Janesville, WI's Rock County airport has been closed due to a problem with the IRS. Those of you who plan to attend the monthly scheduled breakfast meetings should determine an alternate site.

Fly Safely!!

Great Service From Advanced Aircraft Electronics

Rob Martinson (CO) - While installing a new AEC com antenna I bent it a little too much and it broke. There was no question, it was my fault. I called Bill to see if it could be fixed and he told me his products are unconditionally guaranteed and he would send me a new antenna for the cost of shipping. Now that is service! I wish all suppliers were that good!

Upholstery Wanted

Wanted: set of front and back Long-EZ cushions. I prefer blue, but at this point I'll take anything. If you are parting out your Long-EZ or if you can make some "basic" non-exotic seat cushions, please give me a call. Thanks.

Jesse Groh
Fort Lauderdale, FL
305-771-4645.

Vari-Eze For Sale

Lost medical forces Vari-Eze project sale. All major glass work is done and all materials to complete the project less radios and paint are included.

Kit and unassembled parts - \$4500.
OSMOH - O-200 Continental - \$3500.
FOB Harvest, AL. Contact:

Bob Hugus
205-837-8859

Excellent FBO

While returning from Florida recently I stopped at Lumberton Municipal Airport in North Carolina. I found the facility to be well cared for and staffed by friendly competent people. They had Weather Channel, \$1.74 fuel, multiple runways, clean restrooms, low traffic, and a desire to make travelers happy. Try them. I think you will like the treatment.



Cowl Investigation Part 3

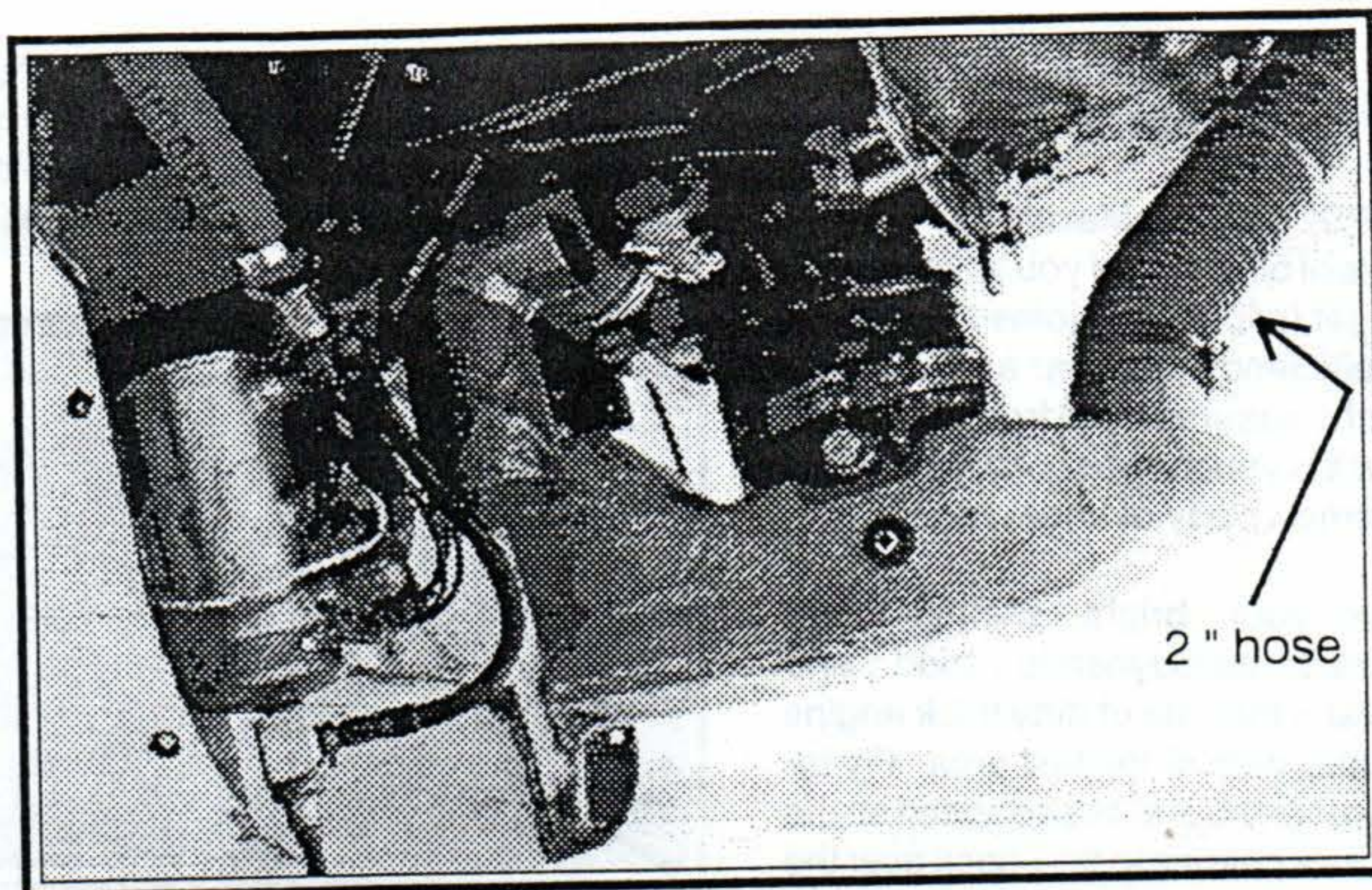
Previous attempts at increasing speed and efficiency by changing cowl outlet and profile gave pretty meager results. Increases of 2-1/2 knots were hardly worth the effort. The noise reduction was nice but I needed something more. (Isn't greed wonderful?)

My ole pappy used to say, "If your ideas aren't working then use ones that do work." In this case of EZ efficiency I had to see what the gurus were doing and copy that.

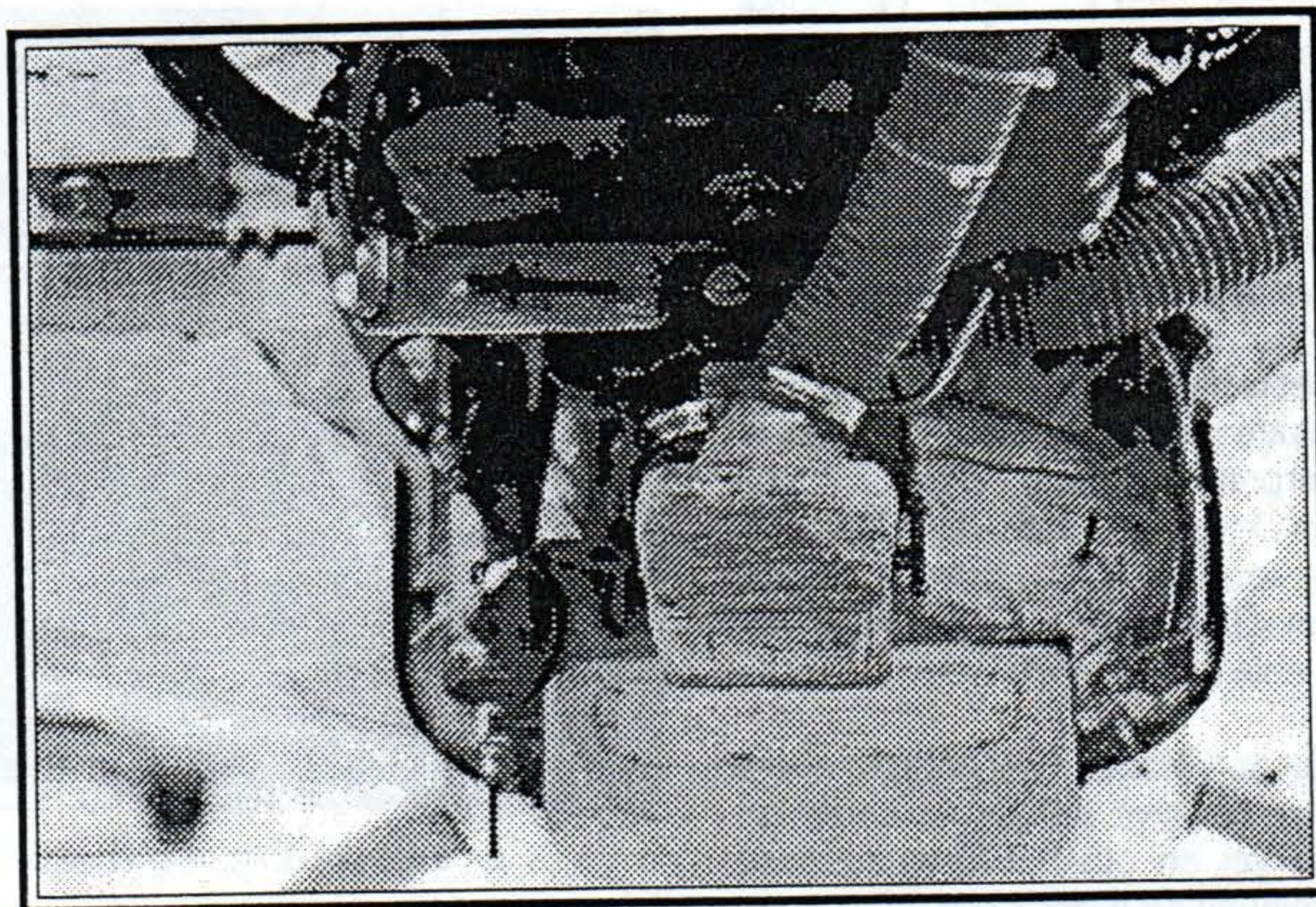
My CHT's on the right side have always run hotter than the left side. I believed this to be the result of the stock air filter to carburetor induction hose deflecting the air to the left side of the cowl. Earlier tests back in November had shown removal of the Amsoil foam filter and all flex duct hoses to have had little effect on CHT but I thought I'd try the idea again.

The November test was with large ramps installed in the lower cowl directing air toward the base of cylinders #3 and #4. Removal of all hoses, filter, and elbow had the following effects on CHTs. #1 did not change from the previous 350° F. #2 increased 19° F from 360° F. #3 dropped slightly from 380° F. #4 dropped 11° F from the earlier 435° F. Because of this previous test I did not expect to see major improvements in CHT when I installed the new carb air box and removed flex duct that appeared to block the path of cooling air to the forward cylinders. I did hope to see a gain in static and top RPM and airspeed as well as rate of climb, however.

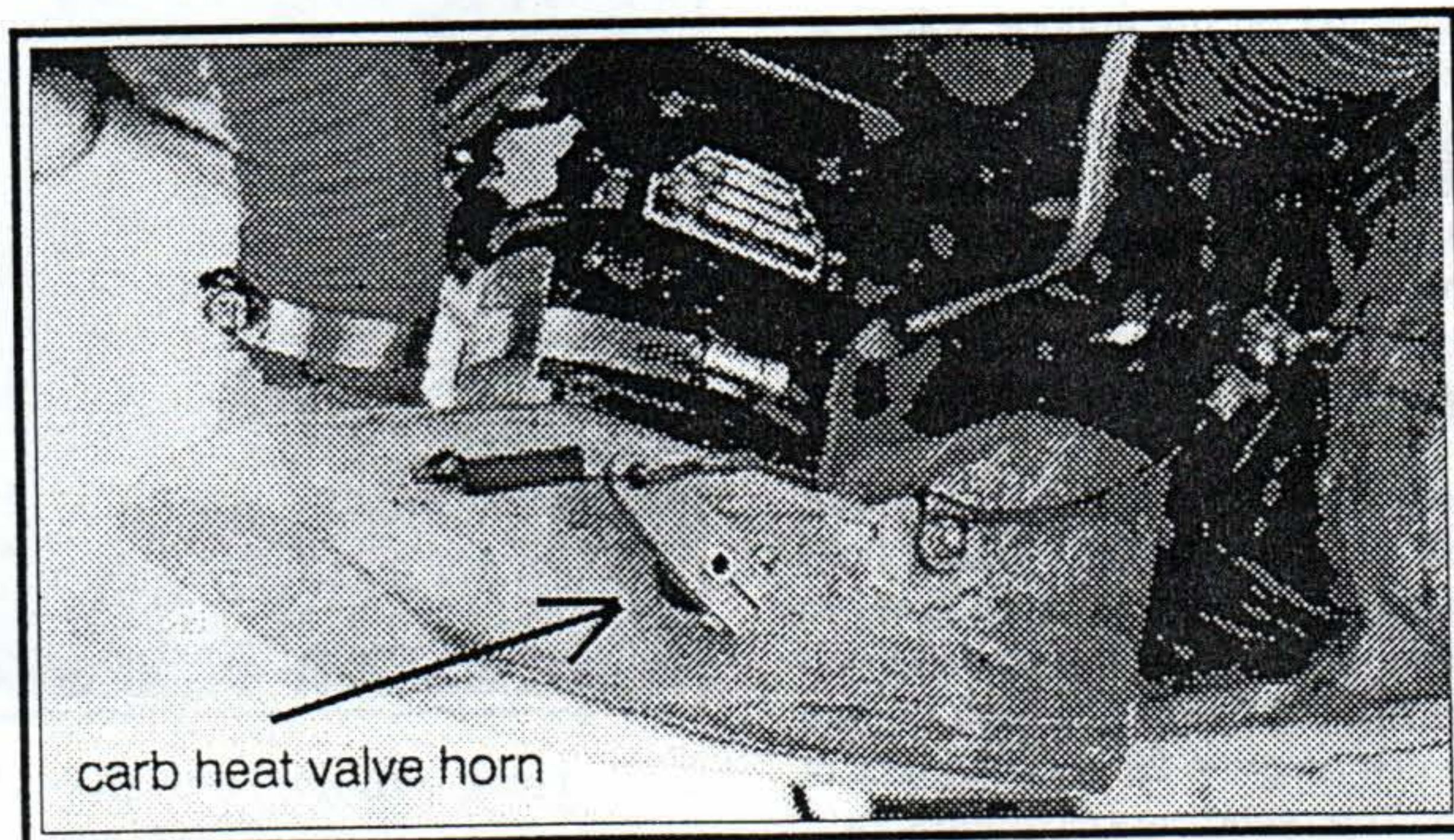
I designed a carb air box that would allow use of my previous carb/cabin heater muff and permit both to function. Since I had only one heat muff I decided to use a design that permitted selection of carb heat or cabin heat, but not both simultaneously.



Heat enters aft of the carb from a muff on the right side exhaust



Note clear path for NACA duct inlet to the cylinders (above) and air box clamp mounting to carb (below)



You Are Invited to a Mazola Oil Party

OOPS! Did I say Mazola oil? I meant mess of oil. Many of you adventurous builder/pilots have joined the quest for efficiency this year as a result of much treasured input from the gurus. Now it is your turn to contribute to the common body of knowledge.

Take your bright shinny, newly painted aerodynamic mod and smear a thin line of dirty thick engine oil upstream of the test area. Fly for at least an hour at cruise speed so the oil has a chance to flow back over the test area. If you fly less, the oil will probably run down off the cowl when you park after the flight. Of course this will happen before you can get the photos taken.

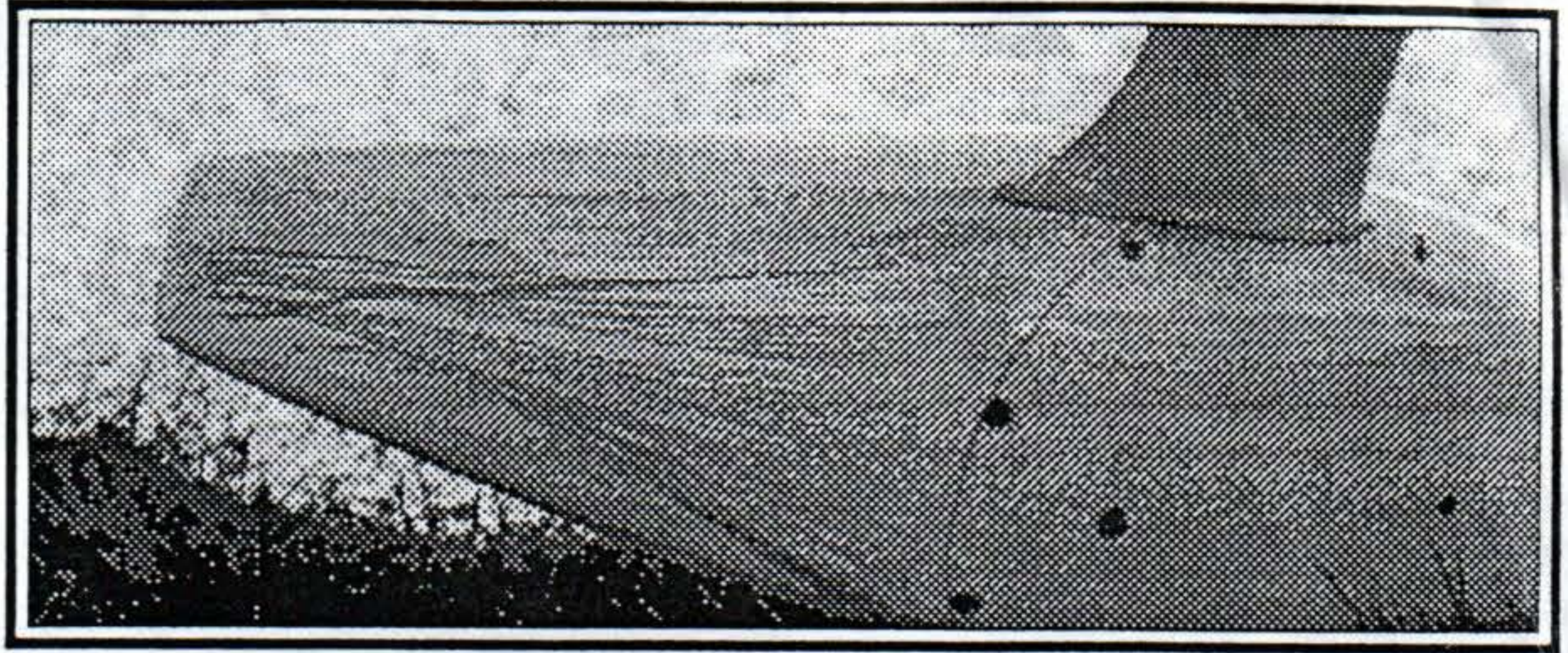
I know you hate to write, so just shoot some photos and put a note in the envelope as to what the photos describe. If you know and understand what is happening in the oil flow field include that too as I don't do well at interpreting other's photos. If you don't know why something is occurring send the photos anyway. Maybe some CSA speed/efficiency guru will be able to explain it.

Your good ideas may just spur some other creative thinker to come up with yet another way to increase efficiency on these birds.

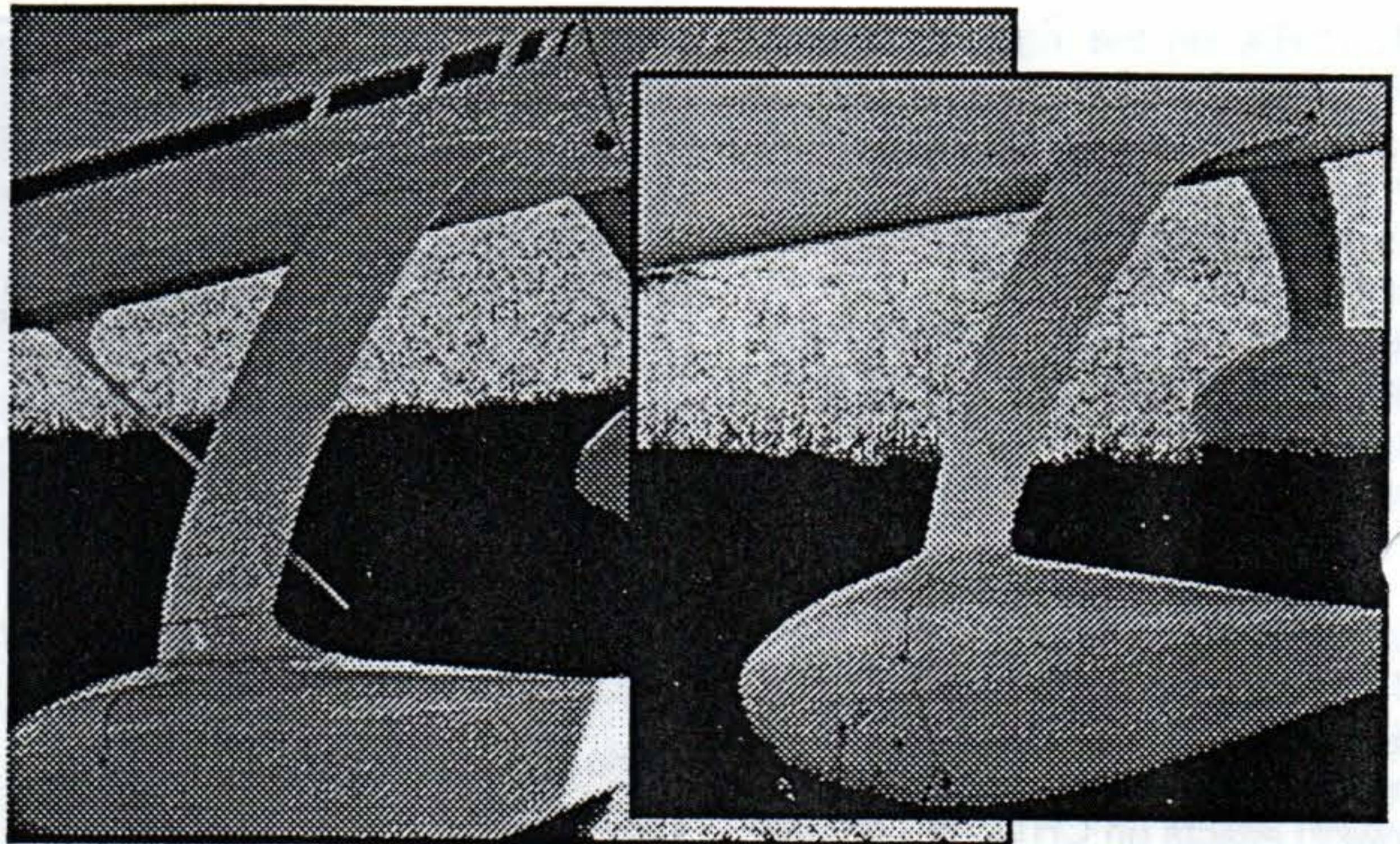
Please remember, your photos must be light to be most effective when reproduced on my antique software. Expose your film for the subject area. It is really easy to shoot a cowl and have the camera meter read the sunset behind the airplane thus under exposing your subject area. Read the camera manual and expose for the subject.

Please send two photos of each area you find interesting. One photo should be just far enough away to show what part of the airplane you are investigating. The bottom two photos on page 28 are examples of this. Then send me a close-up shot of the interesting area of investigation, similar to the top photo on this page.

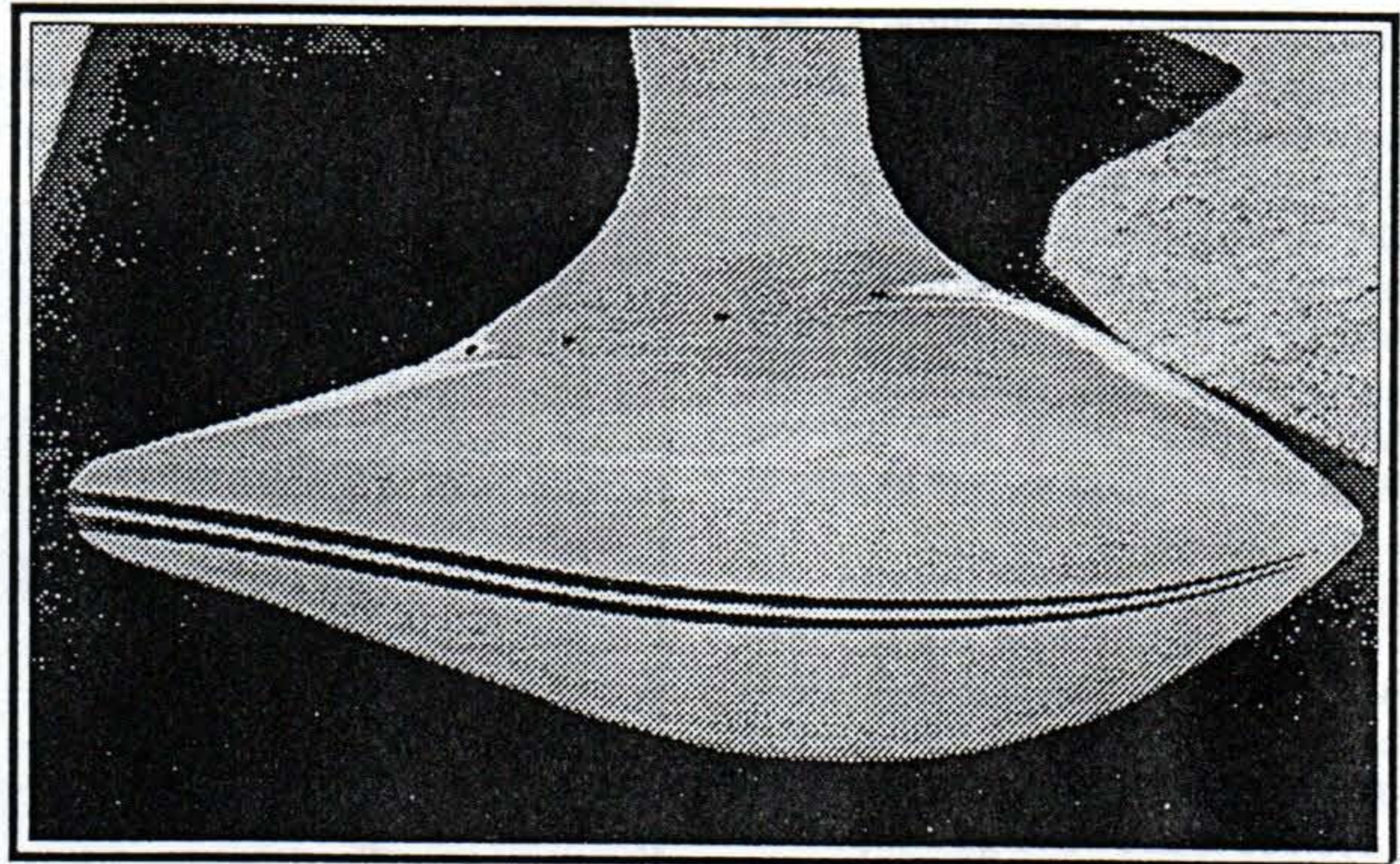
For this first oil flow investigation I plan to limit study to wheel pants, landing gear and cowling. If you find something interesting on an other part of the airplane please send that too as the field is wide open. I would hate to miss a chance to go Mach on 4 gph because I put a limit on you.



Come to the party dressed like this



I can't wait to see these "Great Legs" oiled up!



Herb Sanders' new pants will want to come to the
"Mess a oil" party

The extra induction hoses were removed and the air box was fitted with a Bracket foam air filter having just over 16 square inches of surface area. A traditional throttle style valve was fabricated using silicone baffle seal material to cushion the edges of the valve. This is the way the stock carb heat valve is done. Due to close proximity of the cowl bottom, my carb air box is only about 2-1/2" high at the carb inlet. That allowed me only about 9 square inches of cross section at the carb air box valve.

The new carb air box mounts to the bottom of the carb with two fiberglass straps that go up the front and back of the carb body and are secured with a screw type hose clamp. I did not want to have unsafetyed bolts inside the induction system to come loose and go through the engine. The clamp method has worked well so far. I have not seen any loosening or slipping of the box. (photo p. 26)

The carb heat inlet is in the aft portion of the air box and is fed through a 2" flex duct that comes from the heat muff. The duct is arranged to prevent obstruction of cooling air traveling to the cylinders.

I installed my original stock baseline cowl with the 3/4" clearance from the prop to the rounded aft edge of the cowl. I wanted to be sure I was just testing the effects of induction system change and nothing else. Flight tests confirmed that relative CHTs changed little. Number 2 and 4 cylinders were still the hottest. As in the November tests, removal of the flex ducting did nothing to drop CHTs on the right side. If anything changed at all it seems the temperatures were higher. The OAT had increased 20°F. But the average CHT increase was close to 35° F. Power and mixture were very similar on the runs. I don't know why the temperatures increased more than the OAT increase.

Performance was enhanced a noticeable amount. Full throttle RPM, after a 200' roll at 2,000' density altitude, was up to 2440 RPM while it

usually is about 2360. Charlie Airesman says a K & N filter would offer less restriction and give even more power. The rate of climb increased several hundred fpm. I don't have good history on rate of climb but I was able to keep an honest 1000 fpm at 100+ kts IAS to 8,500' MSL (10,500' density altitude).

Full throttle at 8,500' pressure altitude (10,500' density altitude) gave 2880 RPM compared to the previous induction system that allowed 2780 RPM. The 100 RPM gain increased top TAS to 165 kts from the previous 158.5 kts. Unfortunately CHTs were also increased considerably. Many builders have reported such increases so it seems a waste of time for anyone, especially O-235 powered, to build the original filter on the firewall carb air system.

The next test was to determine the effect of a cowl profile change to reduce drag. I decided to add a boat tail to my modification cowl. The inside shape remained the same. I merely added foam to the outside and carved a boat tail shape.

Charlie Airesman said to make the cowl sides and bottom come in at the same rate to keep the air flow straight. If the boat tail is carried all the way back and not brought up toward the prop, efficiency is lost. It should be remembered that the maximum angle of closure for a flat surface is 7 degrees.

The lower cowl surface is curved, however, and I have not been able to determine what effect that has on maximum closure angle. I decided to stick to the 7 degrees as measured from the firewall to the aft end of the lower cowl. Such a shallow angle would not permit cowl sides to meet forward of the prop unless I installed a prop extension longer than my present 6". The O-235 has a thin crankshaft flange so I was uncomfortable doing that.

I decided to construct a flat trailing edge and keep the cowl sides shorter

while trying to keep the 7 degree angle. (Subsequent oil flow flight tests, photo p. 28, show fairly constant oil stream width thus indicating air flow is not slowing down very much. That leads me to believe the curving angle is not excessive which would cause drag by disruption of the air flow).

If memory serves me correctly, Klaus said airfoil trailing edges can be up to 3% of the chord and not have a big drag effect. I decided to apply that rule to my cowl and computation showed the maximum dimension of the trailing edge to be about 1". I made my trailing edge 5/8" wide with square edge intersection to the cowl sides. I learned from previous cowl trailing edge flight tests that round trailing edges were high in drag and noise. They also seemed to disturb the air going into the prop, thus decreasing efficiency.

Finally, the modification cowl with boat tail addition was ready for flight test. This was a rough test as the surface finish was not completely filled and perfectly smooth. Perhaps an extra knot may have been had with another 10 hours of work but I was anxious to see what the rough results would be.

Flight tests showed the same initial static RPM that I had with the previous cowl version where I installed the new carb air box. Rate of climb seemed to be down about 50 fpm from the previous version but it was too close to call accurately.

The low altitude test, 2000' pressure altitude @ 70% power, showed similar speed power relationship and even the CHTs were very similar. The dB meter was not available for the test so I can not comment on possible noise change.

The full throttle 8,500' pressure altitude (10,500 density altitude) test showed 164-1/2 kt TAS with a 2890 RPM top speed. Speeds and temperatures seemed very close to the original cowl. At this point I can not

23c554

make a decision as to which cowl has the edge on performance.

Oil flow still indicates disruption around the exhaust outlets and perhaps the 4 pipe exit inside the cowl, as recommended by Charlie, Gary, and Klaus is called for to get further performance gains.

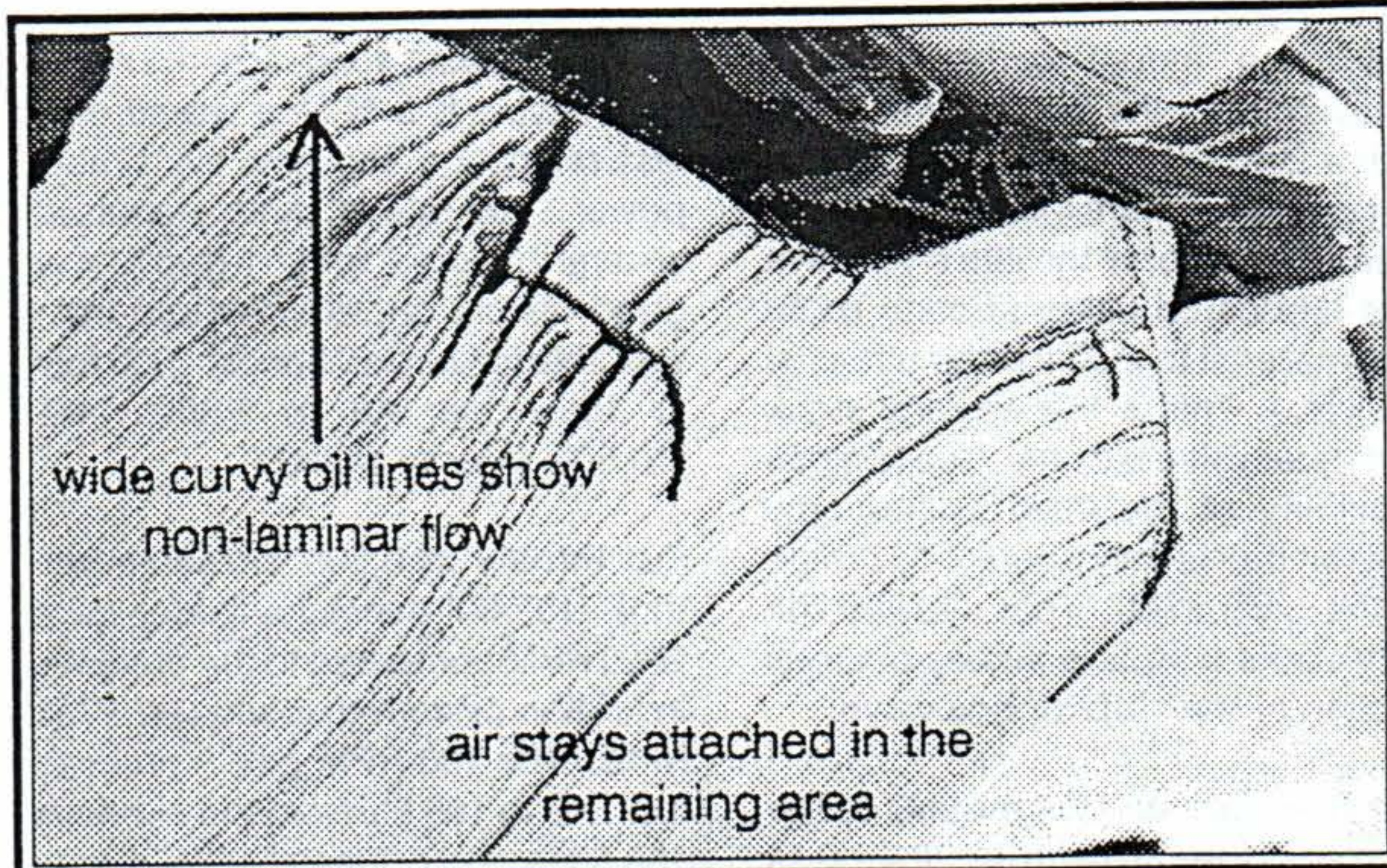
It appears the air flow on the rear end of the boat tail is effected by the prop's rotation. The right side seems to have air flow pulled to the right and away from the right surface. It is strange that pulling effect is not visible on oil flow on the original cowl. See Jan 95 page 25 issue photo. Perhaps there is another reason for the apparent non-laminar flow on the right aft end of the cowl.

The only other noteworthy item to report is that my large internal ramps to direct air flow to forward cylinders may be blocking total airflow though the cowl. The modification cowl has no internal ramps and temperatures for all cylinders usually run about 15° lower than the cowl with the internal ramps. In addition, oil flow tests show air spilling out of the NACA duct on the cowl with the internal ramps while I saw no such event on the modification cowl without internal ramps.

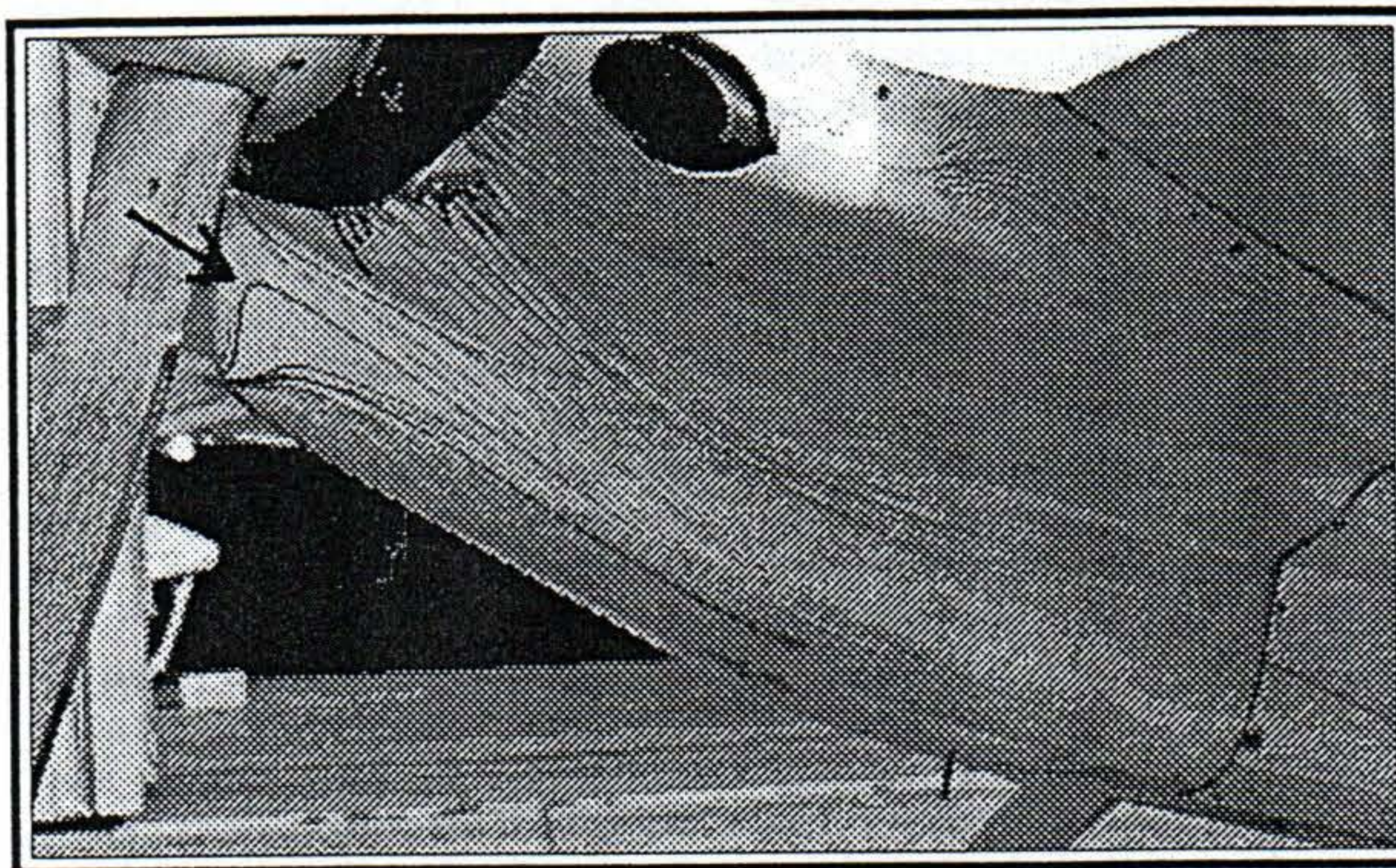
I made one final change on the stock cowl with the internal ramps. I installed fiberglass fences along the straight parts of the NACA inlet duct just before the air goes into the lower cowl. The fences stuck about 1" above the duct sides and were installed to prevent air from spilling out of the duct. I hoped the air would enter the cowl and lower CHTs.

That did not happen. The CHTs are still hotter on the right side but the "delta P"s are all the same - 67 mph. Perhaps the air is now spilling out below the NACA lip and going straight back under the lower cowl. I didn't take time to oil flow it.

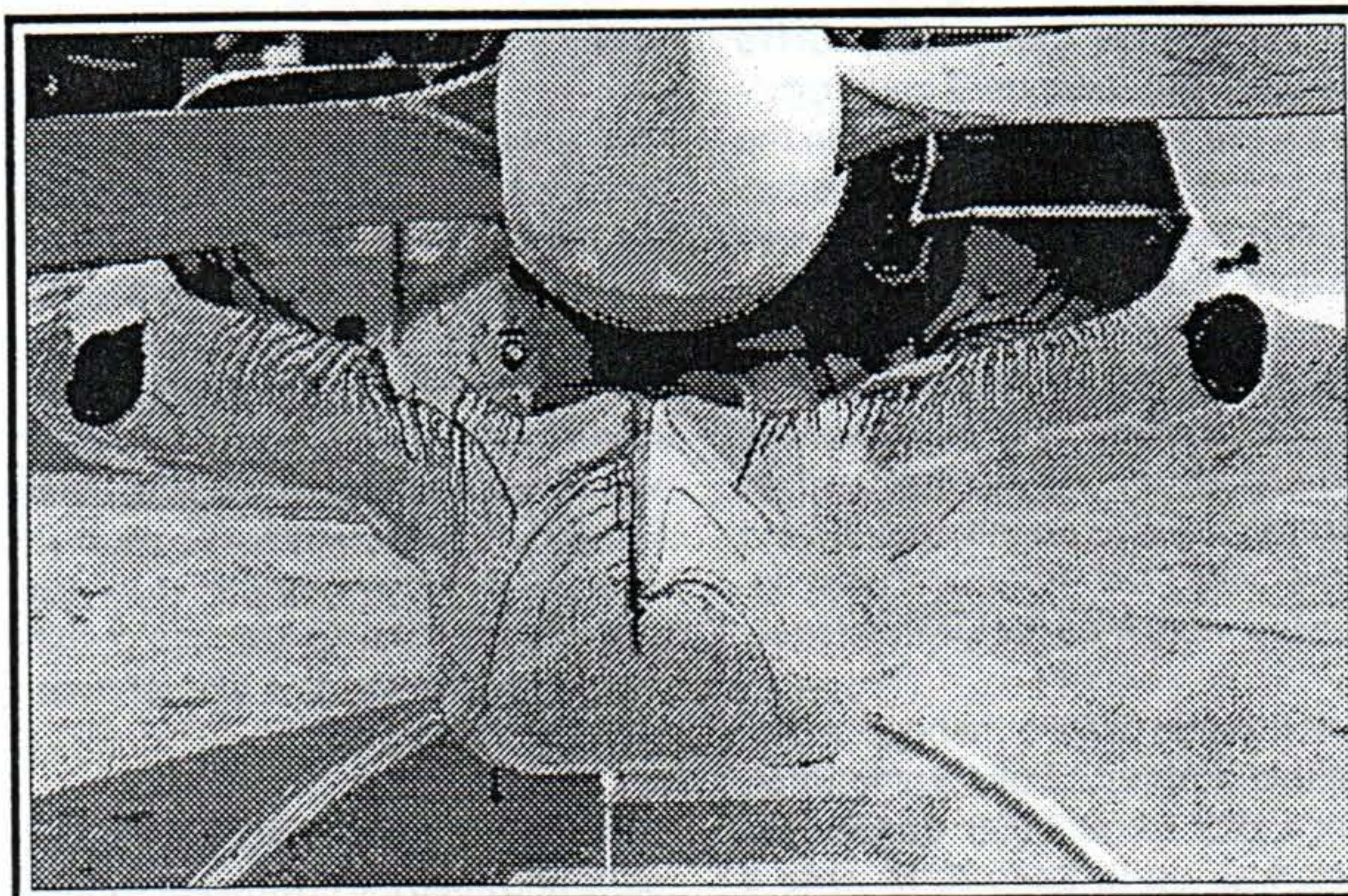
While looking at oil flow photos of the landing gear and wheel pant I saw . . . OOPS - gotta look into that for the October issue.



Note laminar flow except near outlet



Interesting oil flow appears effected by prop rotation



First They Got to Vote - and now

a 1997 "EZ" Girl Calendar

Kathy Gee (IN) - I plan to make a 1997 calendar for Central States distribution. Send a unique photo of yourself and your aircraft, posing in a bathing suit, lingerie attire or your "Daisy Dukes". Send a color photograph and short biography about yourself and the canard airplane to:

Kathy Gee
9932 Village Ct
Indianapolis, IN 46234

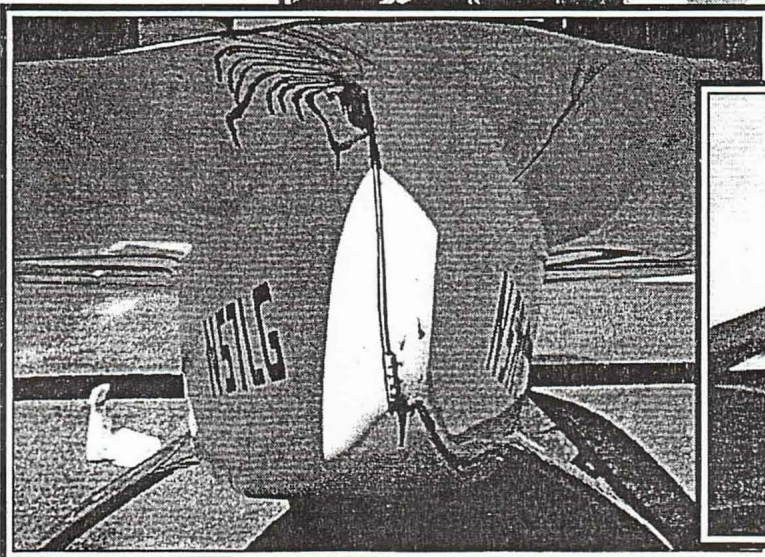
The deadline date is
November 25, 1996

Canopy For Sale

Vari-Eze canopy and frame approximately per plans \$200.

Ted Barrow
P.O.Box 981360
Park City, UT
84098-1360
(801) 658-2284 - H
(801) 269-1276 - W

Not all boat tails
are equal, some
are more equal.
Observe the flow.



Rough River 97 Room Coordination

Concerns have been expressed about monitoring lodge reservations for next year so that all rooms may be held for fly-in attendees. Fly-in dates will be September 26 -28, 1997.

Kenna Crandell (800-848-6537) volunteered to track this and help assure that any cancellations are held for CSA use. Details of this service will be in the January 97 newsletter issue. Call Rough River lodge for reservations at 800-325-1713.

O-200 Cylinders For Sale

4 - C90/O-200 Continental cylinders, standard steel with new pistons, 300 SOH, \$1200.

Sandy Mondary
317-852-2890

Broken Engine Mount Extrusion

Klaus Savier (CA) - I found the upper left extrusion connecting the O-200 mount to the spar was cracked. There is only one way to get to that extrusion. Take a saw - - .

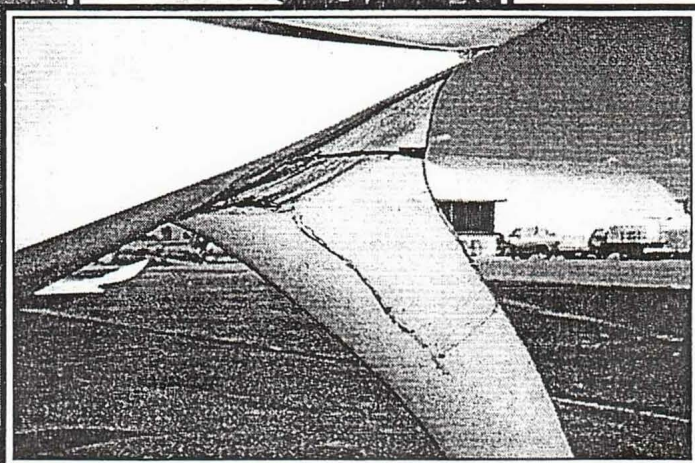
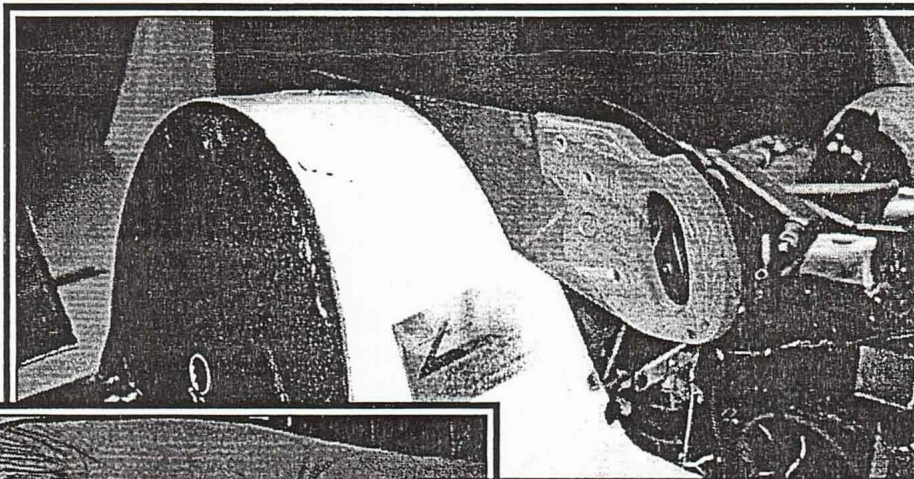
While the Vari-Eze was down I installed a new KLX 135A, rewired the airplane with F117 surplus light weight wire and installed a new solid state DC power system, light weight and no more breakers. I installed a new KS Avionics gage - EGT/CHT/oil press/oil temp all in one. I like it.

The new ignition system will be ready soon. Thorough flight testing shows an amazing improvement below 70% power and is equal to my previous CDI system above that. Weight is only 3 pounds!

The latest flight test, using heavy expensive coax, I was able to hear the Las Vegas tower clearly from 235 nm miles away. (winglet antenna) The

new ignition systems make no noise. Transmit range is yet to be determined.

Take
a saw!



The good and the bad: Fuel seepage out of the fuselage side walls showing good attached flow to the trailing edge