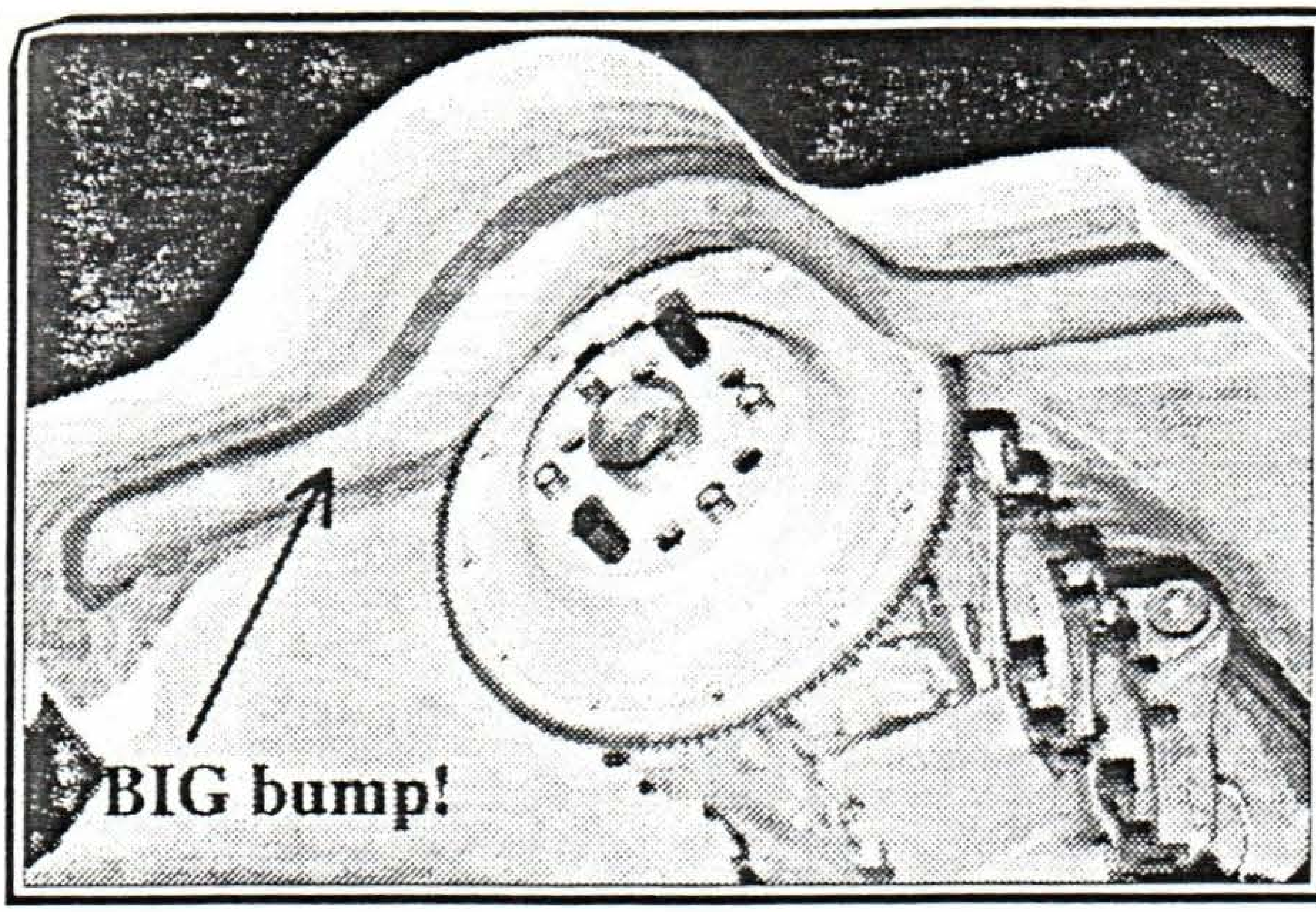
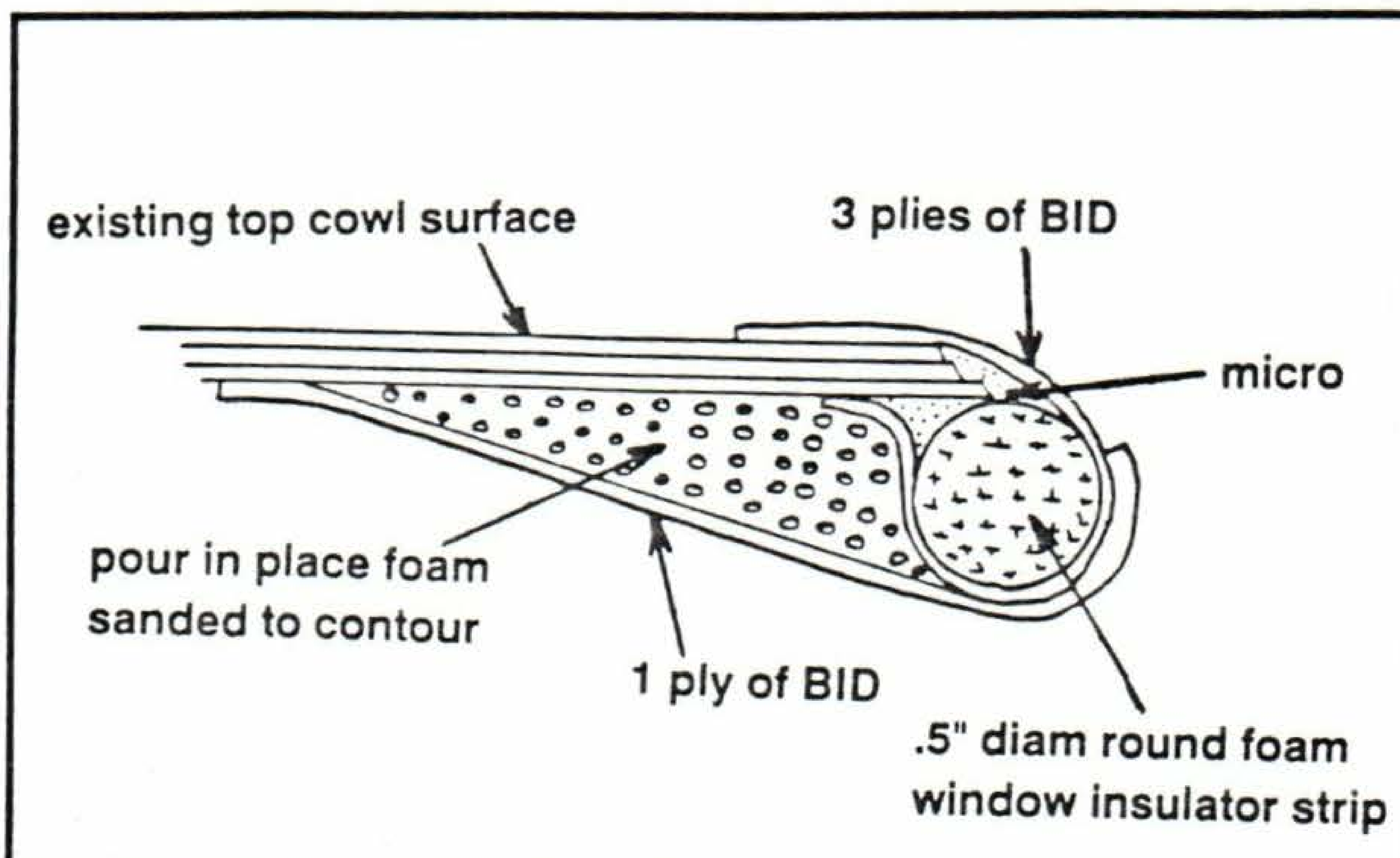
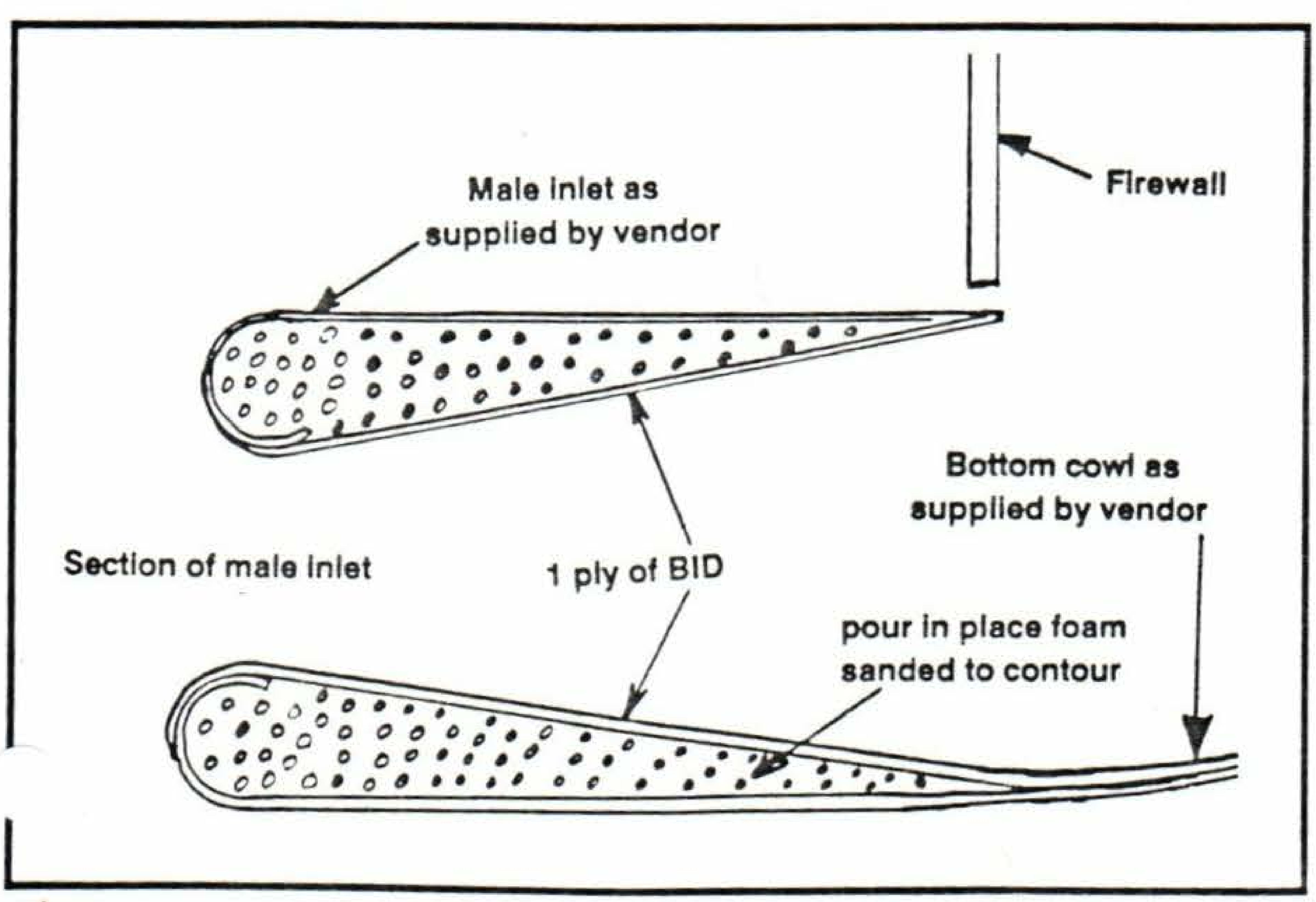






Cooling Drag

The drag on a Long-EZ is relatively low but, as with all designs, there are places where improvement may be made. You'll not get whiplash after installing this modification. It probably isn't worth the trouble for a retrofit but it is an alternative to consider if you are beginning cowl installation.

Cooling drag is the result of snatching high speed air flow and routing it throughout the engine compartment. It has to bend and twist around all the parts and bumps. Each deviation in direction robs some energy which must be replaced by the engine's power. The less the air flow is slowed - the less cooling drag there is and the faster the airplane will go on the same amount of fuel. The bottom line is to keep the inside of your cowling as smooth as possible.

Look at the stock cowl in the adjacent photo. It shows great craftsmanship in application but the design could be improved upon. Notice the huge bump that high energy hot air must "climb over" as it exits the cowl. There is a similar stiffener on the bottom cowl too. The stiffener is needed to give the cowl rigidity but perhaps there is a better way of providing the stiffness.

My self made cowling has over 850 hours on it and has, thus far, proven to have adequate stiffness. The adjacent upper drawing shows a section view of my cowl exit lip.

I installed my cowl and then made up a streamlined flange by wetting out a 4 ply BID layup 4" wide and the same length as the cowl outlet. Do this on a piece of plastic wrap. It will be easier to squeege out. Attach the 4 ply BID lip to the cowl by wrapping a piece of round soft flexible foam insulation inside the BID layup. The plastic will hold the BID in shape while you wrap it around the foam insulation. Attach the wet layup to the cowl and let it cure. After cure, fill the low spot with foam-in-place and sand a taper from the cowl surface to the outlet lip. Cover with 1 ply of BID and you are done. If you wish, you may want to install a piece of squashed aluminum tube through the outlet lip to route the engine breather. That will help keep oil out of the cowl.

The same foam ramp treatment would help get air into the cowl if you are using the male inlet. The very early, (when you made your own cowl), Vari-Eze plans showed a similar foam filled ramp between the ram inlet lip and the cowl floor. When prefabricated cowls became available this little bit of finesse went by the wayside. Some of you purists might take an other look at it.

Fast Fannies

While at Oshkosh I started looking at the fast ones and asked the usual question, "What makes them stand out?" Obviously they are very well engineered, benefit from superb craftsmanship, and have been tweaked to within a gnat's hair of perfection; but what am I missing? "What in the end makes them stand out?"

That's it - - the end. Look at Klaus Savier's CAFE winning Vari-Eze and Miller's formula racer, Pushy Galore. They have modified boat tail close out on the lower cowl.

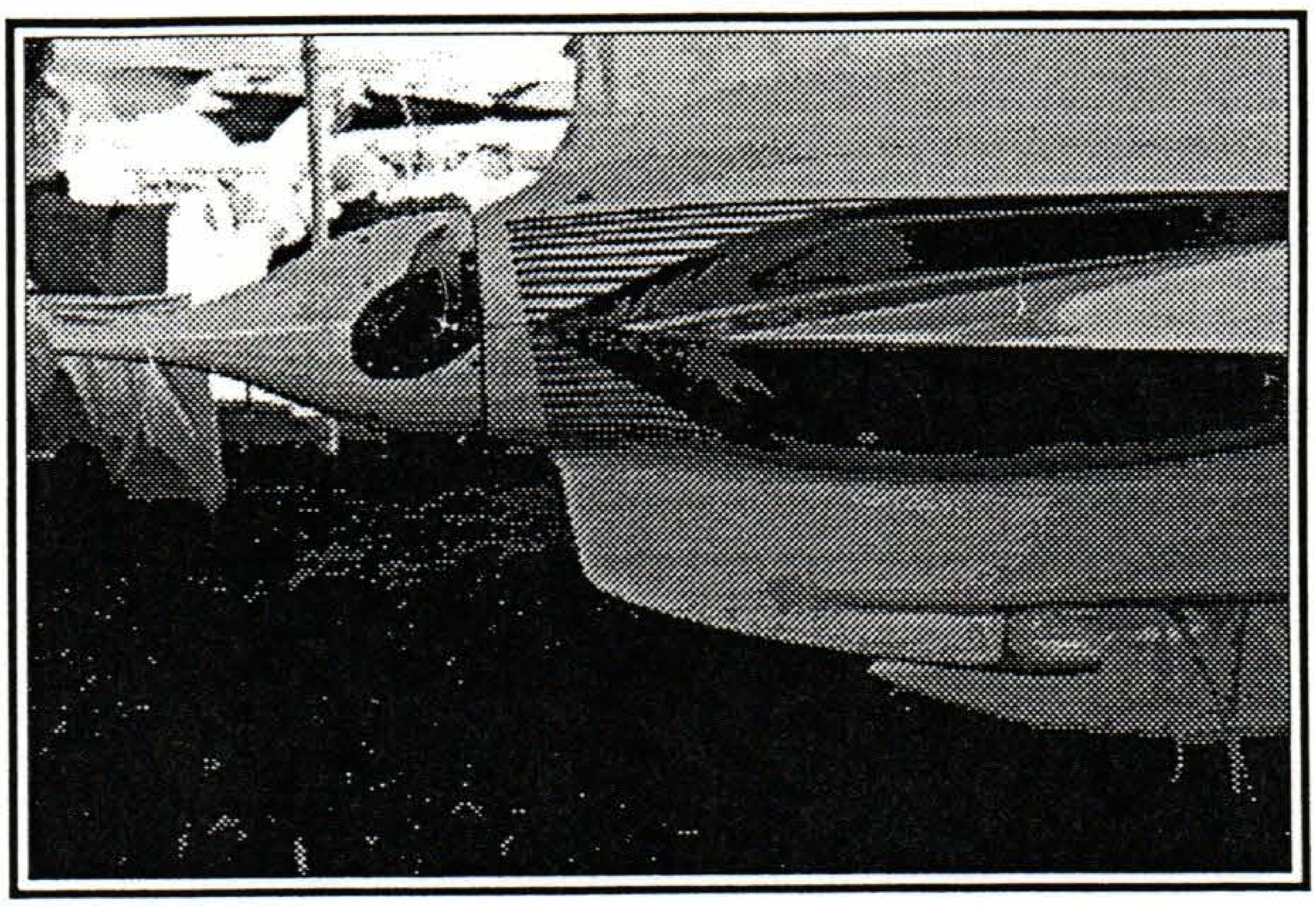
If fast fannies look like these I wonder why we are building the traditional blunt tail cowls. The aft end of our cowls are a mess of disrupted air flow that acts as a big suction cup holding back on the cowl.

Klaus said a 7 degree angle is about all that air will bend around without becoming non-laminar. Our cowls certainly bend up at more than a 7 degree angle thus causing dirupted flow. What can we do to decrease that angle and keep the air attached to the aft face of the cowl?

Gus Sabo of Las vegas, NV successfully used vortex generators to help keep the air attached to his cowl. His race speeds are impressive so this is probably doing some good.

Lets quit dragging our fannies around the sky and see what can be done to get more speed from these slick birds.

Klaus' boat tail winner



Miller's Pushy Galore sports a boat tail too

Discount Stainless Brake Discs

While in a display building at OSH 93 I visited the Flight Life, Inc. booth and looked at their stainless steel brake discs. They are heavy duty 5/8" thick and, importantly, have no holes drilled in the rotor portion to chip the brake pads.

They are compatible with all FAA approved brake pads and have no welds to crack or corrode.

I asked the vendor if a group discount was available for Central States Association and he replied he would sell them for $275 to CSA members if they would identify themselves as such when ordering.

The booth was closing and I didn't have the opportunity to pursue the subject further. You might contact them at:

5 Lynbrook Lane
Doylestown, PA 18901
215-348-3275

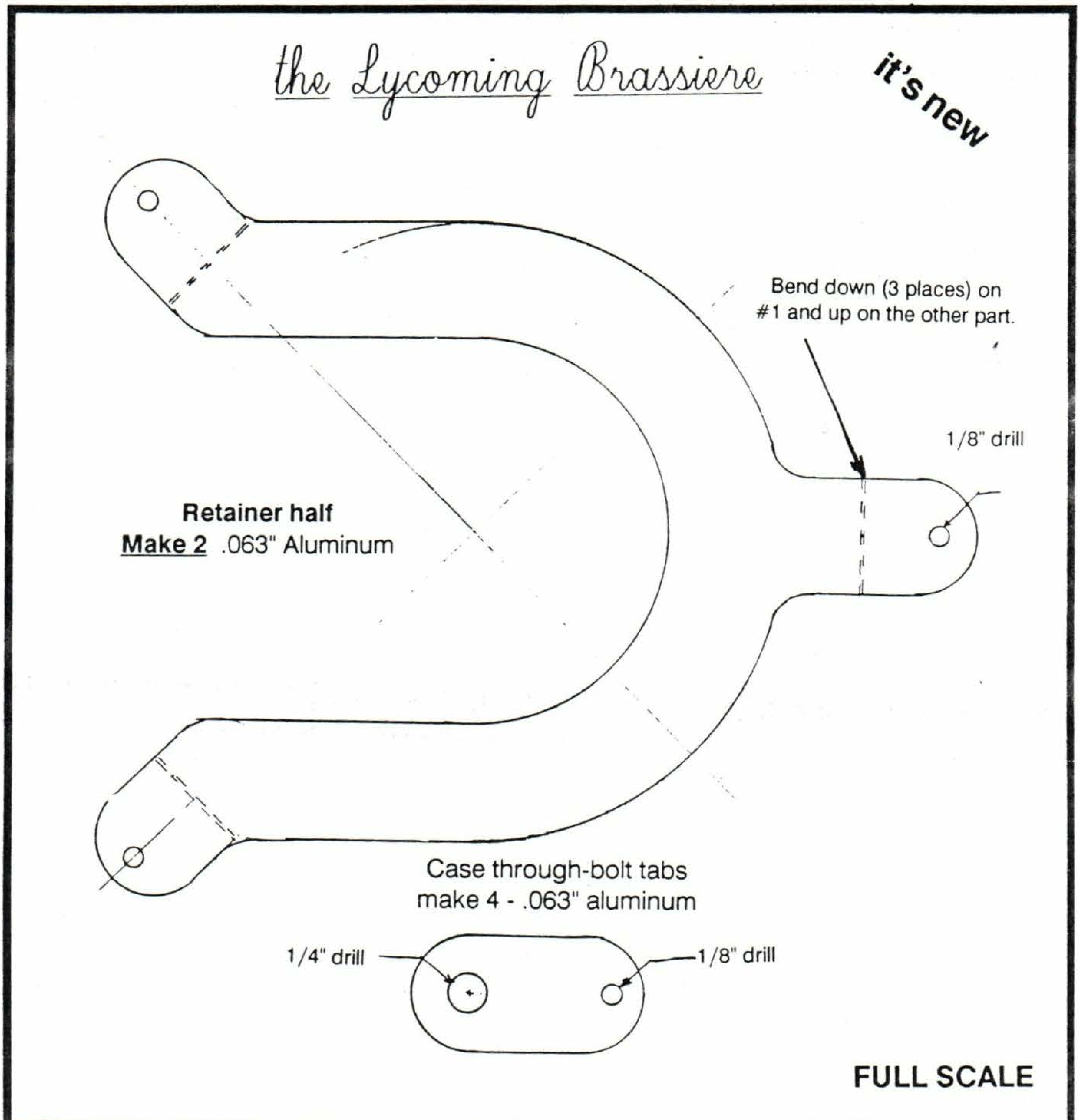
Lycoming with a Bra?

Doug Shane - After a short maintenance flight one day, I noticed more than the usual oil on the cowl. Closer inspection revealed a **lot** more and I also noticed that the crank seal was lying on top of the #3 cylinder. While I thought that was an awfully curious place, at least I didn't have to look far for it.

In evaluating the situation, I decided that the no-retainer approach used on my IO-320B1A was inadequate, and set out to build a - yes - ***Brassiere*** for my crank seal.

The adjacent sketch shows the shape and size, and although it is a long way from elegant, the problem has not recurred. In assembling this mess, as I've noted, I followed the Lycoming Service Instructions for cleaning and Pliobonding, etc. With all the bad things that **could** happen should this seal fall out, I think a positive mechanical retainer makes good sense.

Install the split crankcase seal with Pliobond Per Lycoming S.I. 1324A, then put through bolt tabs under through bolts in 4 places. I then coated the mating surfaces of the retainers with Pliobond and safety wired it to the tabs in six places. **Works good, looks odd.**



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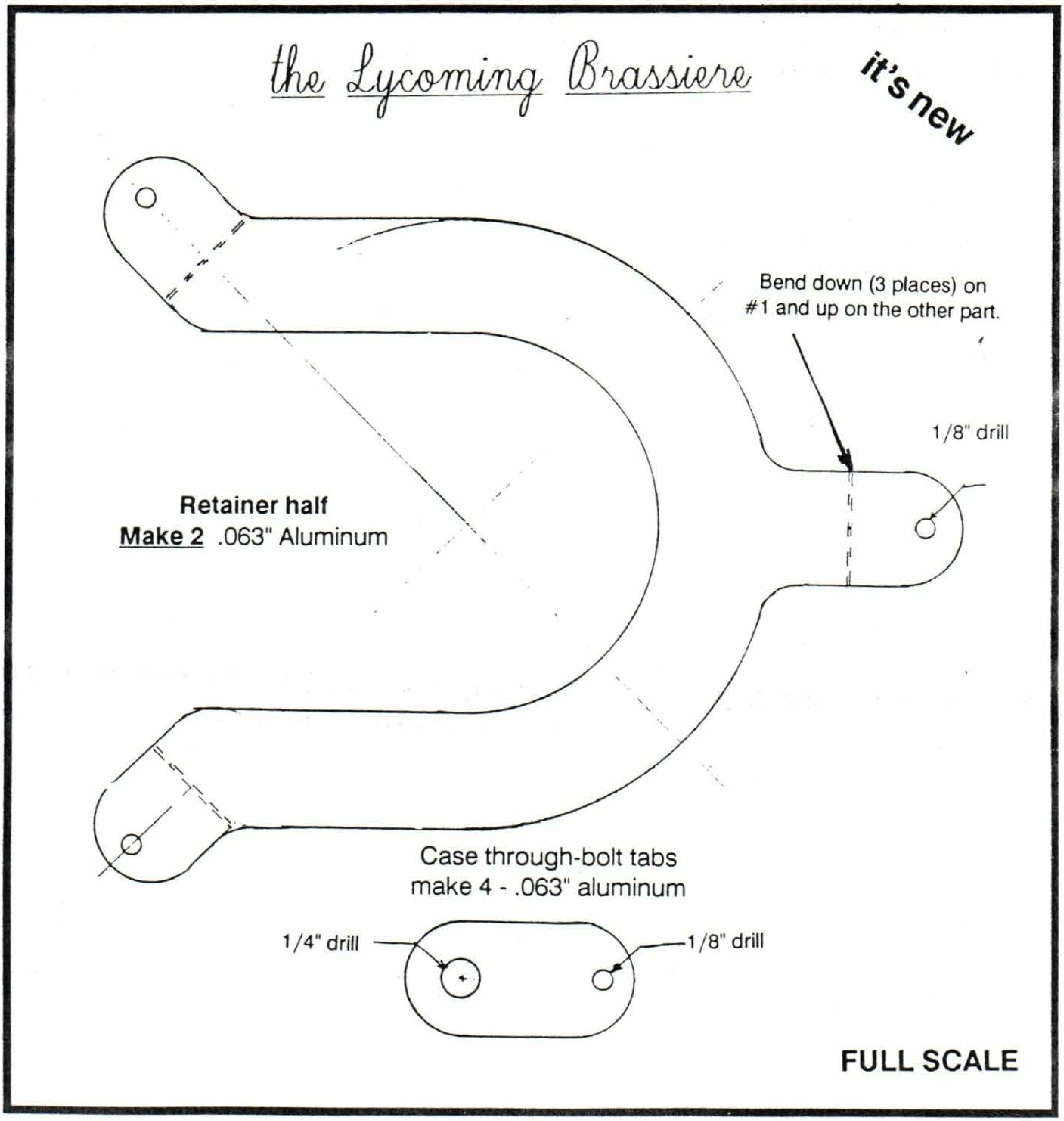


Engine Compression Check

Bill Freeman and Terry Yake - As part of the annual inspection, a compression check is specified. If you are not familiar with why you are doing it, how to do it, or what to look for, here are some tips and education.

Simply stated, the compression check is made to determine if the piston rings and intake/exhaust valves are sealing properly. Timely measurements, described below, can find problems before they become serious from an operations and/or cost perspective.

The compression test technique utilizes an apparatus with a fixed inlet pressure of 80 psi through a precision orifice, yielding a defined pressure drop on the low pressure side of the orifice in the presence of a leak. (NOTE: The quality of the tester will determine the accuracy of the readings and the error between the different testers. The precision of the orifice size is the critical factor.) While performing the test measurement and maintaining 80 psi on the inlet side meter of the test apparatus, the other meter will indicate some lower reading. A pressure drop up to 25 percent is reasonable. That number is dependent upon engine design and manufacturer. (Check with engine manuals or the factory if you aren't familiar). A reading varying by more than 25 percent might indicate a problem. Remember, the reading can be affected by engine temperature, number of hours on the engine, manufacturer, and/or other factors. (Lightplane Maintenance is a good reference for assistance in understanding the various engine model quirks that may be experienced).

It is important to keep the differential compression test in proper context. While compression checking is a valuable diagnostic tool, it can easily be misused or misunderstood which may lead to unnecessary and expensive cylinder work. What we are really looking for is a change in the test results, over time, for an engine. If your engine is running fine, the aircraft seems to be climbing out well, and is not using a lot of oil, a "low" compression check, with all cylinders showing similar values, probably means nothing at all. On the other hand, if your engine has always tested 73/80 on all cylinders and is suddenly 45/80 on one, you need to start looking for other symptoms and their root cause.

Many people will tell you that any leakage above 25 percent is serious. Saying that a cylinder with a compression score 25 percent below perfect (60/80) is absolutely in need of corrective action is hogwash. Even the FAA only says that a cylinder with a score below 25 percent, "is cause to suspect the cylinder of being defective." This information is found in FAA publication AC 43.13 - 1A. What? You don't have a copy? You should have, if you work on your own aircraft. So, if you get a 56/80 reading on two cylinders, DON'T just jerk the jugs and get them reworked immediately. There is a significant chance that you could be wasting precious time and money. Now, on to the actual testing and investigation.

Generally, better results, i.e. results which more nearly indicate the performance of the cylinder components when the engine is running, are achieved with a test done on a hot engine. This is a real nuisance since everything is very hot to the touch, but it gives much more accurate results. The best procedure is to go fly the aircraft. A ground run up to warm it is OK, although the temperature distributions throughout the engine will be different than when it has been flown. A cold engine compression check is not valid. Keep in mind that directly comparing a cold test to a hot test may be nearly meaningless.

BE CAREFUL when making the compression test. All spark plug wires must be disconnected and one spark plug removed from each cylinder. Bring the piston, in the cylinder to be tested, to top dead center (TDC). With a second person holding the propeller firmly, apply the compressed air through the attachment fitting in the spark plug hole. Rock the propeller back and forth a few degrees to get the highest low pressure meter reading. Keep the high pressure side at 80 psi. **DON'T LET THE PROPELLER GET AWAY FROM YOU!!** It will whack you good, causing serious injury.

Notice that a very slight rotational movement of the prop may cause large variations in the readings. This is primarily caused by the rocking motion of the piston in the cylinder bore, moving from side to side, or otherwise moving the rings around. Settle on the best readings you can achieve that will hold steady. Do not record just a momentary spike in the pressure. After finding the "best point", you're going to hear air leaking through the engine as the tests are being made. Here's how to diagnose the air noise. Listen at each of three places: the crankcase breather hose outlet, carburetor inlet, and the exhaust pipe outlet serving the cylinder under test.

* Air escaping around the exhaust valve will be heard at the exhaust pipe.

* Air escaping around the intake valve will be heard at the carburetor inlet.

* Air escaping past the piston rings will be heard at the outlet of the crankcase breather hose.

Record both the pressure and where the air is coming from as you test each cylinder. If two leakage points exist, try to estimate the relative amount from each location.

Now, what does all this hissing mean? Air leakage around the rings is the least serious of the symptoms. Sometimes the rings (three to four of them on each piston) rotate into a position where the ring end gaps are aligned, yielding a lower than normal resistance path for air to leak out. If this occurs to a cylinder that previously was testing within specification and other indicators of engine performance are OK, run the engine another five hours and retest. See if the test results improve before you automatically run to your friendly engine overhaul center with an open check book.

Leakage around the valve can range from no problem to serious. The recommended procedure is to "stake" a leaking valve in attempt to dislodge any foreign matter that might be preventing a good seal between the valve and the valve seat. This may sound a little flaky, but it is recommended and is safe when done correctly (AC43.13-1A, again). The procedure is to remove the valve cover and, while protecting the offending valve stem and spring cap with a fiber, plastic, or wooden drift, strike the valve stem smartly several times with a hammer. The piston **MUST NOT BE AT TOP DEAD CENTER (TDC)** when you do this or the valve may strike the piston, potentially damaging both.

If, after staking, the reading is still low, but not catastrophically so (catastrophic is like 20/80), fly the aircraft a few hours and recheck the compression.

A leaky intake valve somewhat messes up the entire intake system, but is relatively harmless. A leaky exhaust valve will eventually develop into a candidate for a broken valve, which usually involves large quantities of money and an off airport landing. A few hours of flying is not going to destroy a valve, assuming you know the problem has developed relatively recently and has not already been going on long enough to have seriously damaged the valve seat. The serious problems usually have 30/80 or lower readings and all point toward the exhaust valves.

Another possibility for leakage is a sticky valve. This becomes much more common with the use of leaded fuel in engines not originally designed for it. Sticky valve guides may possibly be corrected without pulling the cylinder off, if you are adept at using your fingers, mirrors, and string to maneuver the valve stem out through the spark plug hole to work on it and the guide. A borescope may be used to examine the valve seat before pulling the cylinder.

Depending on the severity of the problem, you may be able to minimize the repair cost. Get someone qualified to examine the trouble and advise of the appropriate action to be taken.

We hope this will help you do the next compression check, or at least understand what the mechanic is doing when he does it for you. Carefully recording of differential compression test values and making comparisons over time will yield the most useful information. Pulling a cylinder based on only one 55/80 test result with no other reason to suspect a problem is probably a waste of time and money. On the other hand, discovering and lapping a leaky exhaust valve before it overheats and either needs replacement or fails in service is a very good procedure. Like many other issues concerning your aircraft, the differential compression test can be used for good and bad.

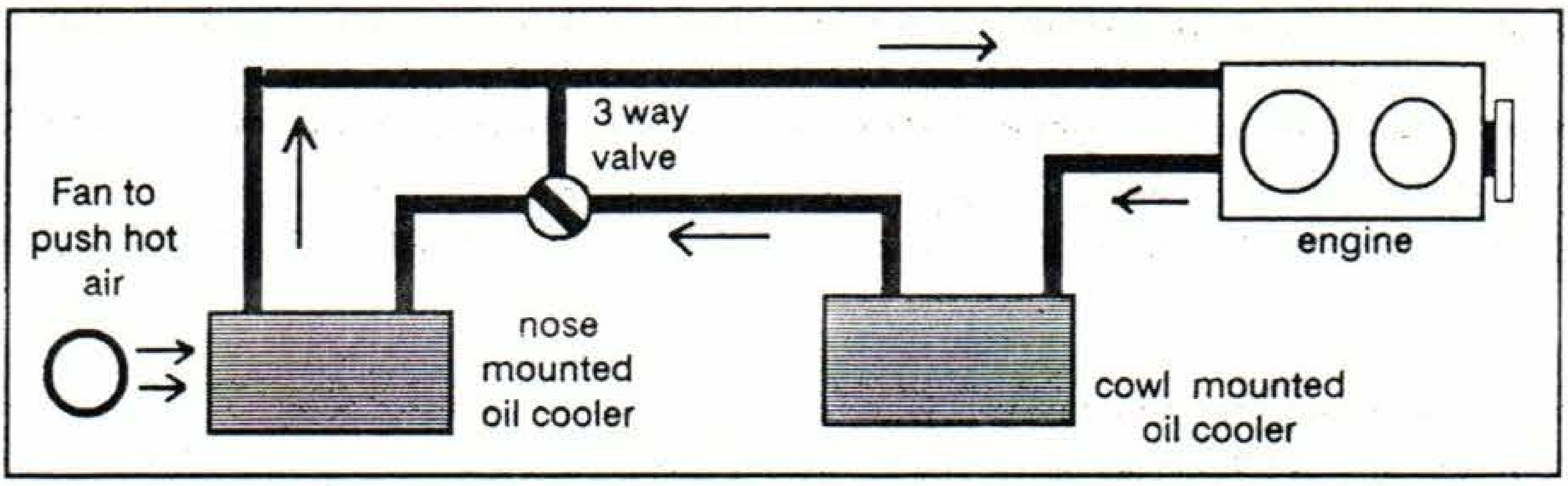
BE CAREFUL!

Oil Cooler/Heater

Vance Atkinson - Recently Tom Mc Neilly (602) 899-7613 rebuilt Bob Beard's Two-Easy. He put a great heater system in it which he swears by!

He has installed two oil coolers. One is in the conventional position in the cowling while the other is in the nose with no outside air ducted to it.

The units are plumbed in series with a 3 way valve up front by the pilot to allow oil to flow to the front cooler. Without no outside air to cool the nose oil cooler it heats up very nicely. Behind it is a small muffin fan which circulates air throughout the whole aircraft. This system works like a car heater except the warming agent is oil.



Evening Up CHT's

Uneven cylinder temperatures may be evened up in many ways. Cowling ramps are a start but are the hard way to go. Look at the cowl air flow and think about what determines air flow by a cylinder. I assume you have a fixed geometry inlet. (you should not limit yourself that way.) See newsletters: CSA April 91 p7 Control That Cooling Drag, CSA July 91 p 30 Variable NACA Air Inlet, CSA Oct 90 p 20 Latest Atkinson Mod, CSA Jan 90 p 2 O-320 Lycoming Cooling Cures).

If you have a minimum of leaks around the baffling, then all the inlet air must go around the cylinders cooling them. The air flow through each cylinder baffle is determined by pressure differential. If you want a greater flow of air by a cylinder, thus dropping its temperature, you must increase the cooling air pressure at the inlet to that cylinder's baffle (use ramps to redirect air flow) or you must decrease the pressure at the outlet of that cylinder's baffle (open the outlet to that cylinder's baffle).

Ramps are kind of quick and dirty. They have extra weight, are not easy to predict exact effect, catch oil from a leaking engine, cause local disturbance of air flow in the lower cowl plenum, may or may not achieve the desired effect, etc.

Another approach is to lower the outlet pressure by adjusting the outlet area for each cylinder to provide equal cooling air flow for each cylinder. If a cylinder runs hot then open up the outlet baffle by rolling the baffle lip back on the hot cylinder. After adjustment - go fly and see the effect. Keep tweaking until you get the desired CHT's. If all CHT's are too high you need more air flow to the bottom of the cylinders. Try opening the NACA inlet by dropping the lip to act as a scoop. Use this technique on climb or high power operation. When in reduced power cruise, close up the inlet to reduce drag. At higher air speeds you need less inlet area because the air flow is much faster and a small inlet will still let in enough volume of cooling air to cool the engine.

"Slim-Fast" for your EZ

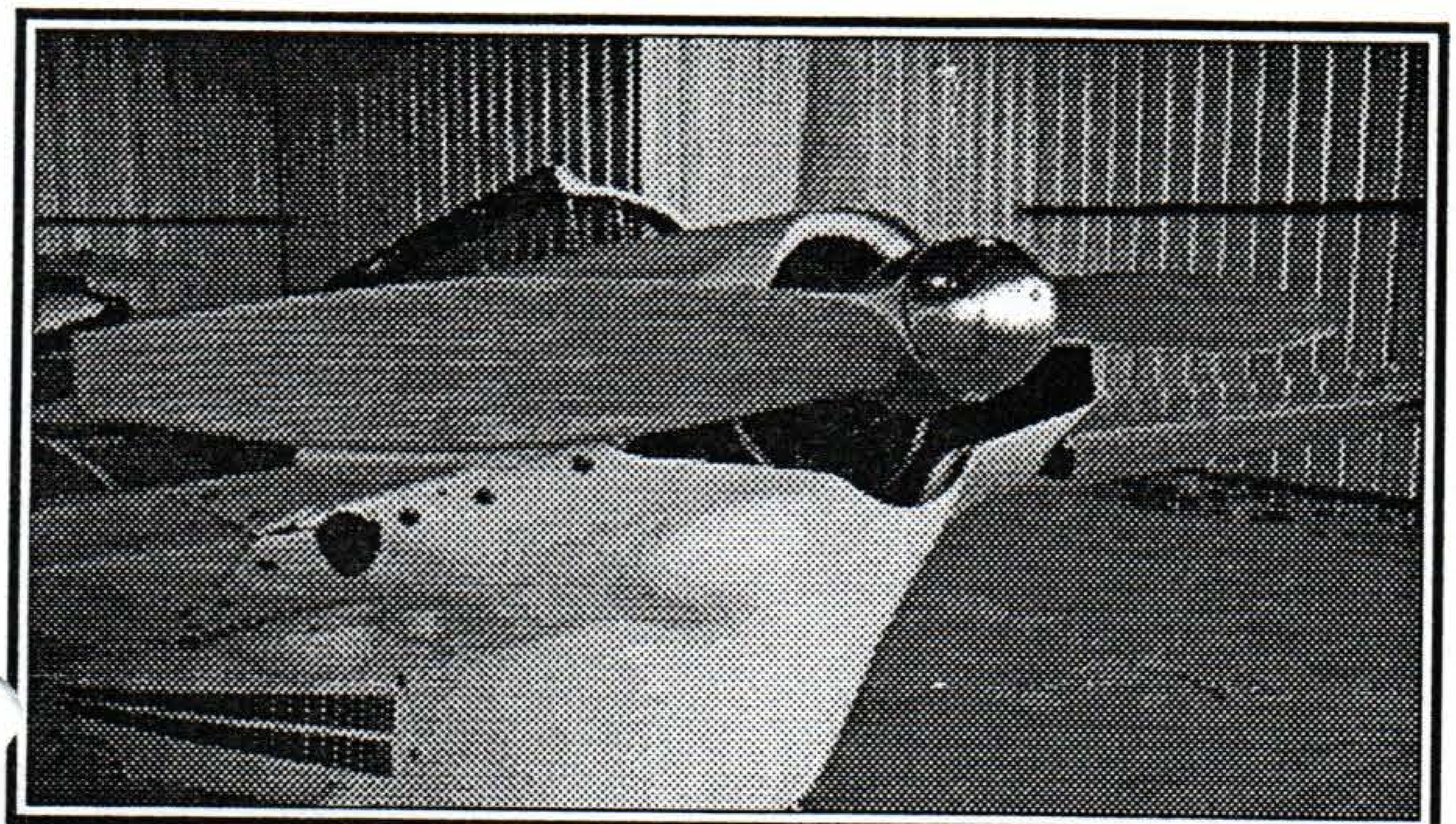
Brent H. Van Arsdell (IL) - Last year, enroute to Sun-n-Fun, I felt a funny vibration in my Long-EZ and then it smoothed out. After landing, I discovered that part of the spinner was gone. Fortunately it didn't hit a winglet and I didn't hear any reports about aluminum gods raining down chunks of beer cans so I felt pretty lucky.

I immediately took the spinner off and put up with a year of, "When you gonna put a spinner on?" from other EZ pilots.

Now spinners don't make airplanes go any faster in the air, but on the ground they can make them look about 25 to 50 knots faster. Since I'm an economy minded guy, I settled on a spinner that looks about 25 knots faster. It's a six inch skull cap style spinner from Wicks that cost $33 (part # PS-6) and weighs six ounces. The old spinner, from Brock, cost a couple hundred bucks and weighs three pounds.

The new spinner is removable for inspection and prop retorquing with just one screw. The spinner base goes over the crush plate but does not quite touch the wood. I had to add a couple of layers of black electrical tape around the crush plate to make it a tight fit.

If you don't have a spinner, or if yours is cracking, you might consider one of these. It's cheap, it's light, and it's simple, kind of like "Slim-Fast" for your airplane.



Slim-Fast Spinner

Electric Landing Brake Part 3

The following is excerpted from a letter by Mike Melvill in reference to an alternate ball drive actuator that he is running in his Long-EZ.

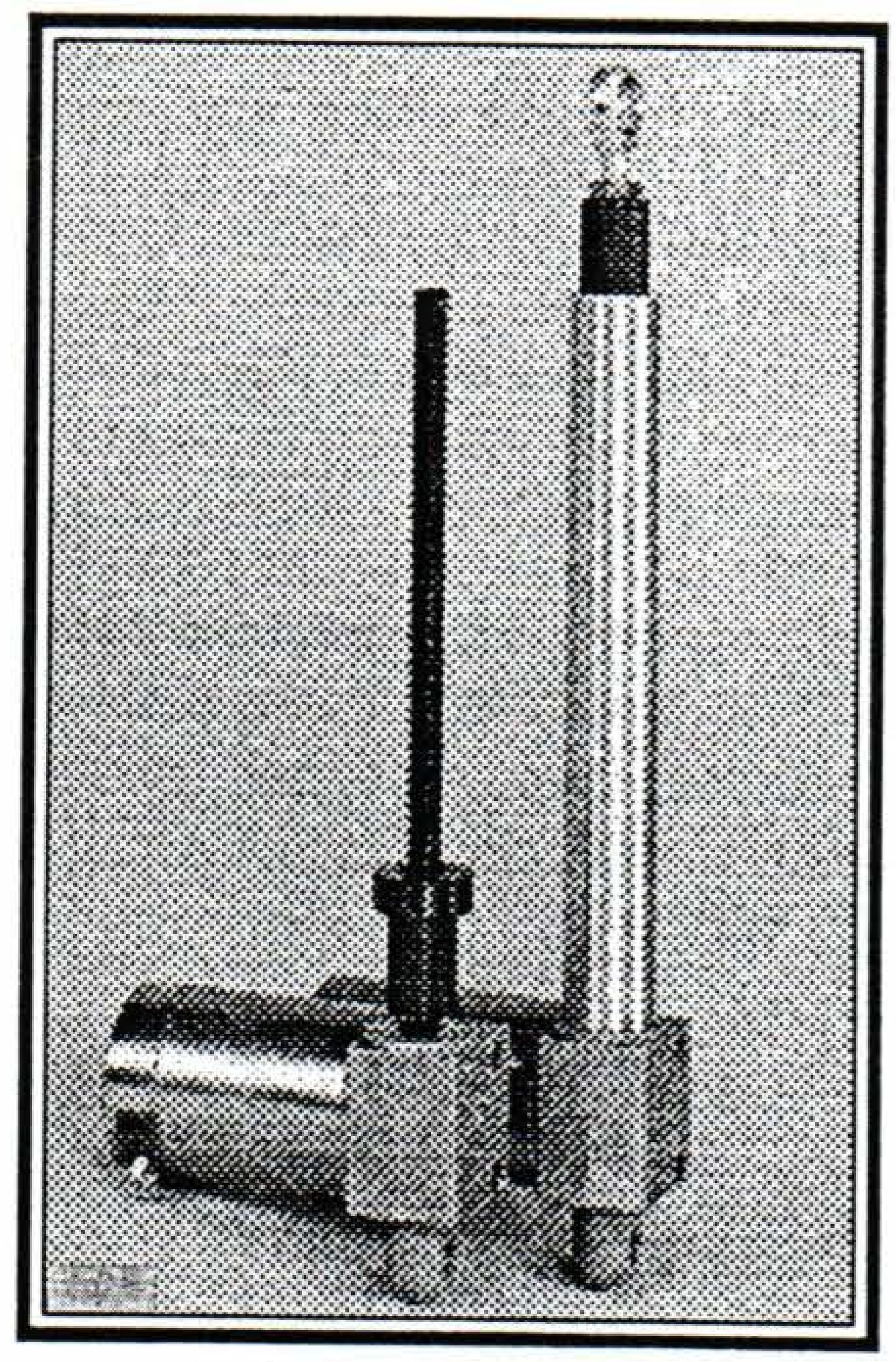
Mike Melvill (CA) - Enclosed is the information on the Pittman actuator. Note that it has 4" of travel, which is what you need, but it does not have limit switches. It will only move the landing brake from closed to full open, but you have no way of knowing where it is! For that reason, I installed a yellow caution light in the top center of my instrument panel which lights up any time the brake is not fully closed.

I feel this is **absolutely mandatory!** I took off twice, myself, with the brake down! This is potentially disasterous, because the engine overheats in just a minute or two.

I am using ball drive actuator #85615 from Motion Systems Corporation. It is used to actuate the landing brake at 110 knots in Long-EZ N26MS. The actuator moves at about 1" per second with no load and takes about six seconds to move the 4" at 100 knots.

Editor note: I called Bill Tyrrell of Motion Systems (201) 222-1800 to get more information on this 1.3 pound actuator. He advised that the units were available in custom lengths at the same price. It seems they would rather make the actuator to fit your system instead of you changing your system to match their unit. Bill stated the price was about $200 depending upon quantity, etc.

*He also stated the rated power was 100 pounds but the stalling force was a **whopping 500 pounds!** You'd better be sure the travel is correct before you turn that thing on or it will pull your structure apart. At that power you will be able to extend the brake at a much higher speed than you can manually. It seems to me, inattention to extension airspeed could destroy the brake structure. Y'all be careful now!*

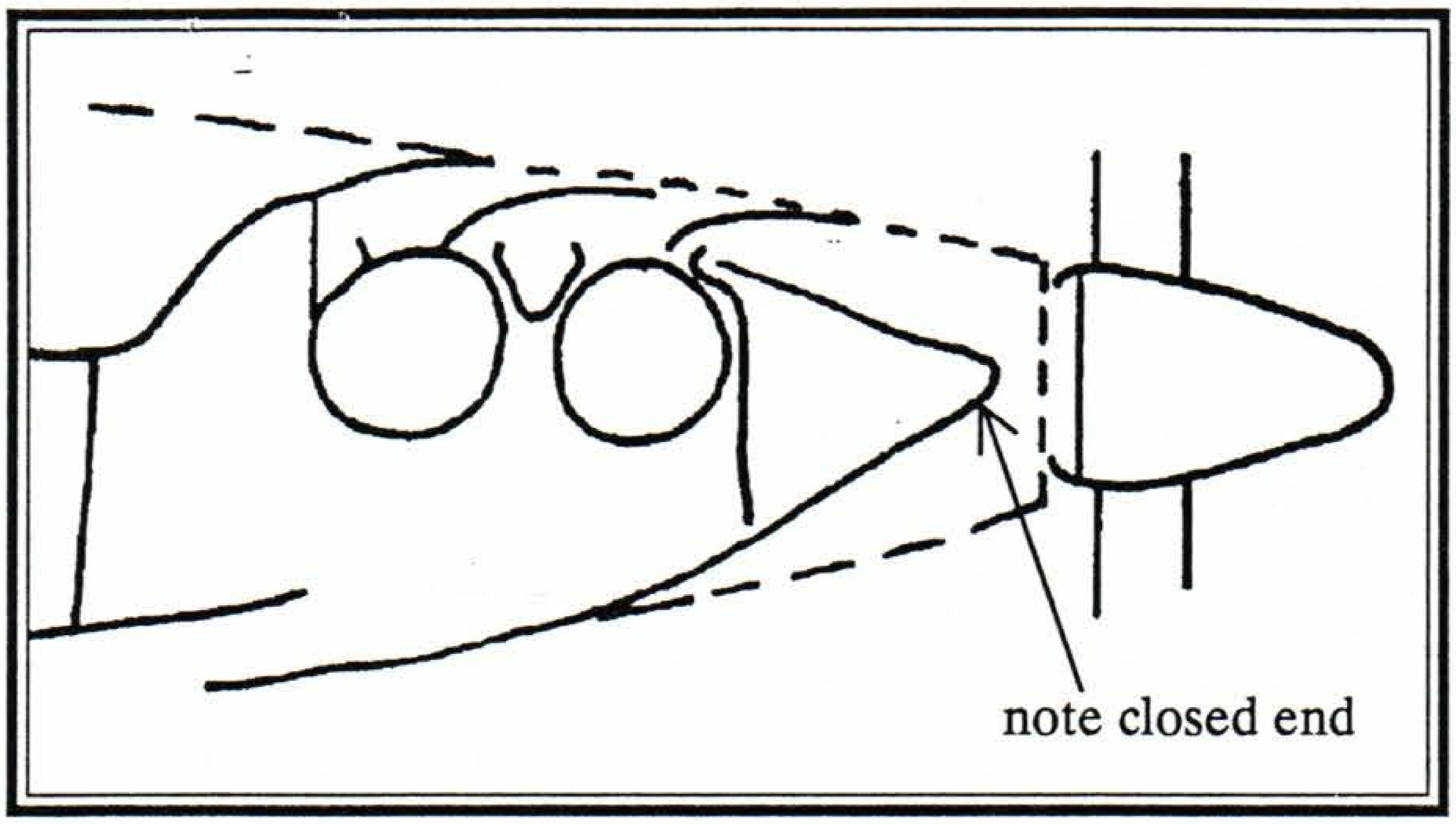


Cowl Cooling Air Exit

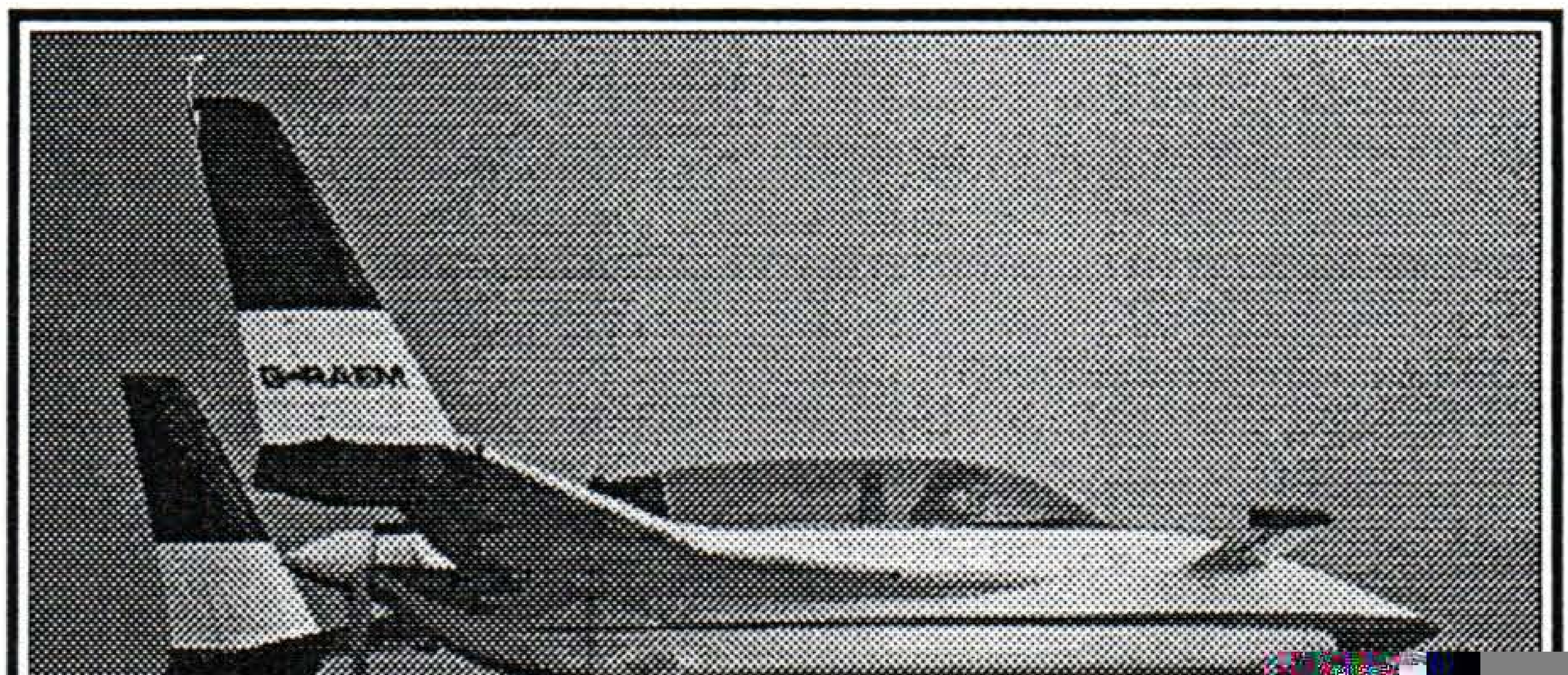
Graham Singleton (England) -
I have molds for a modified cowl that will give a cooling improvement. The gain can be obtained by exiting the engine cooling air on top of the cowling. This is a low pressure zone; whereas, the area in front of the propeller is very turbulent and close to the high pressure air from under the wing.

A further advantage to this design is that moving the outlet allows the area in front of the propeller to be closed up which should give clearer airflow to the propeller disc and, therefore, less drag.

I recently fitted an O-320 with an Ellison TBI to a Long-EZ for a friend. I built a special airbox similar, in principle, to the Ronneberg one. The difference is that the TBI is mounted on Ellison's plenum chamber so that the TBI faced forward.



Low Drag Cowl



Alternate Air Filter and More O-235 Power Mods

James Peck (NM) - On April 20, 1993 I purchased Long-EZ N4706G and flew it from Walla Walla, WA to Albuquerque, NM. I spent the night at Provo, UT in a $2 heated hangar. Normal charge was $25 but **EZs are special**. The next morning mine started immediately while the Bonanza in the unheated hangar next door turned three blades and quit. Thus was my first introduction to the gracious and great world of Long-EZ ownership.

In Washington, at 1,200 ft density altitude, I turned 2,380 rpm static but in ABQ at 5,200 ft. the poor old O-235-C1 could turn only 2,180 rpm. That was totally unacceptable! I'd read of the Aeroduct's restrictive nature and decided to make a change and get rid of it to increase power.

The carb heat valve had been previously modified to bolt directly to the carb inlet with filtered air coming into the front and heated air in from the rear. I next, removed the standard air filter and Aeroduct tubing and put a foam filter from a dirt bike shop with a 2 - 1/2" inlet directly on the carb heat valve. I safety wired the filter to the carb and made a wire mesh to prevent the foam from being sucked into the carb.

Presto, now my static is up to 2,250 rpm and now my maximum in flight is 2,550 rpm, up from 2,425. I plan to replace the foam filter with a paper/wire filter of the same design so I have less worry of sucking the foam into the carb.

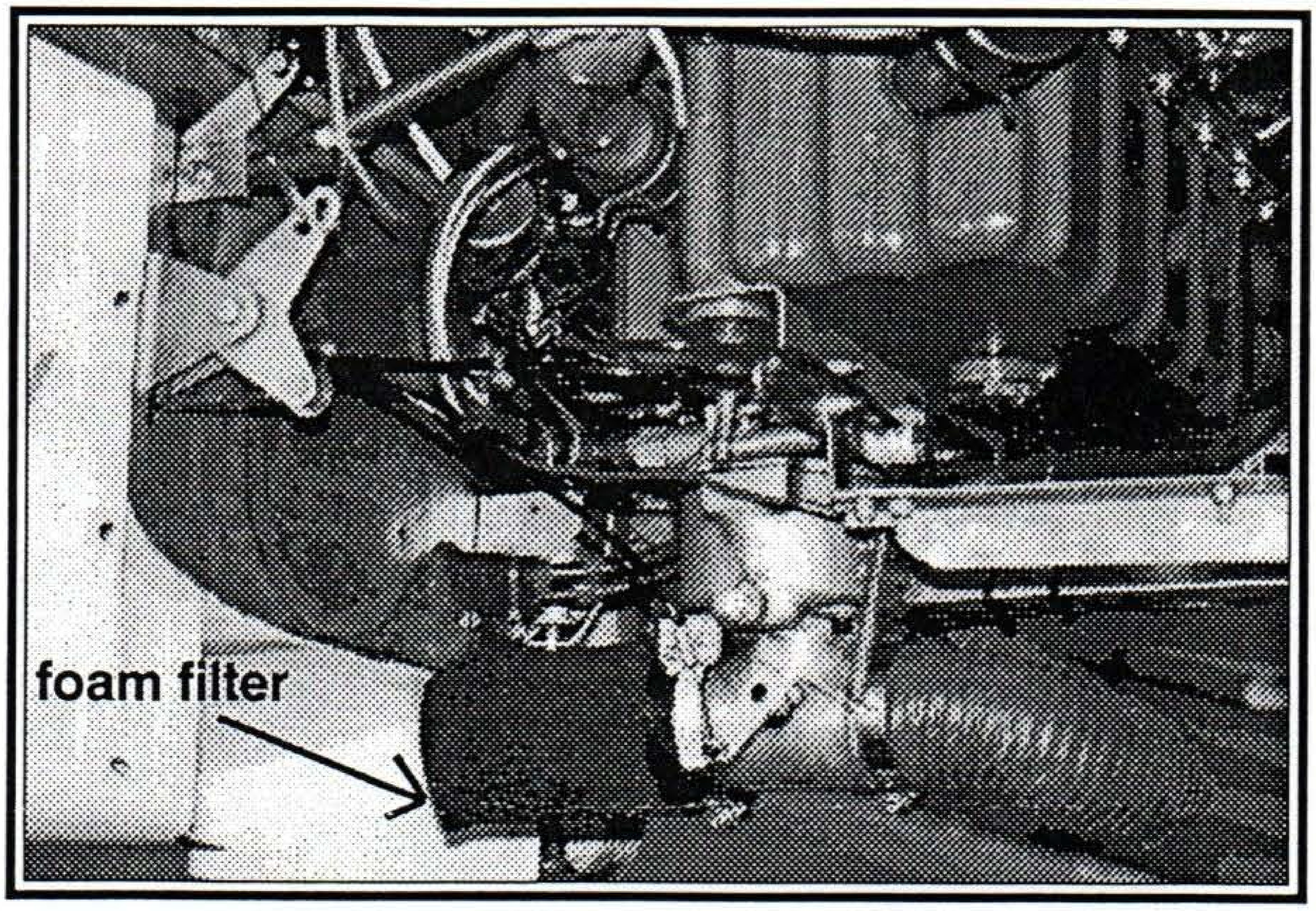
After reading several articles on different electronic ignition systems and their benefits I decided this was the way to go. One of the Long-EZ owners on my field was installing one brand and having a tough time of it, so I opted to go with the Electroair unit. Especially since Jeff Rose was most helpful and patient in getting me the info I needed and in answering all the questions I had.

The installation was simple and straight forward. It took me about 12 hours to install the sensor, the electronic unit, and temporary power to the unit. It mounted nicely in the firewall space vacated by the stock location air filter.

Static rpm came up to 2,375 and max level shows 2,775 rpm. I didn't notice any top speed increase though the plane definitely accelerates better and has a 200 fpm better climb rate. It gets off the ground 200' sooner on take off, too.

Part of the rpm increase may be due to my repainting the flywheel marks that my optical tach reads to determine rpm. I repainted the marks while the flywheel was off for the ignition system installation.

I am also burning about .8 gal per hour less fuel than before.



The new air filter location increases ram air capability and decreases the standard Aeroduct's drag. It may even allow more cooling air to the hotter running cylinders.

Honda Starter Problems?

Terrance Scherman (IA) - I installed a Honda Accord starter on my Long-EZ about 3 years ago. I like it much better than the aircraft starter as it has an over running clutch and produces at least as much torque. On about 6 occasions, in the last two years with a hot engine, the starter solenoid has failed to engage.

While doing an annual I decided to look into the starter problem. A visual inspection of the disassembled unit revealed nothing, however. The starter solenoid uses a plastic tapered bumper ring that fits into the tapered solenoid cap. I think the plastic bumper was getting wedged into the solenoid cap and I believe that the heat from the engine and close exhaust pipe was causing it to stick when the unit was hot.

To solve this problem I installed a fiberglass .80" diameter washer about .125" thick on the back side of the solenoid. I drilled and tapped the end of the solenoid with a #6-32 UNC tap. I installed this washer with a #6-32 UNC flat head screw. I applied Locktite because I didn't want it to come off. Now the fiberglass washer is the bumper and not the plastic ring. I only have about 40 hours on this modification, but have not had, nor do I anticipate any more problems.

Want to carry it all?

Baggage Pods

In recent years there has been an increase in the use of baggage pods, especially on Vari-Ezes. Curious about the drag penalty, I talked with Marty Pavlovich (WI) who indicated he gets a 75% cruise of 175 mph. That is 7 mph less than with the pods removed. If one assumes that his average trip is 300 miles then he will save 4 minutes per trip by leaving the pods off. That's not much, especially if you are the back seater with baggage piled up around your ears.

O-200 Oil Filter Installation

Gary Hertzler (AZ) - The adapter, on the adjacent drawing, will replace the oil screen on all series Continental engines up to an O-200, and I think, the C-145 and O-300 also. The 3/32" cross section O-ring, which goes in the .141-.151" groove, seals against the diameter where the screen bottom formerly seated. The standard copper crush gasket is used as on the stock installation.

One of the two, 1/8" pipe thread, holes in the 2.75" diameter are for an oil temperature sender. After torquing the adaptor in place, use the most convenient of the two for your oil temperatue sender and install a pipe plug in the remaining one. Make sure that your temperature sender isn't too long as it will bottom out before the threads seal. If you have one of the longer senders, either try not to tap the hole too deeply or purchase the shorter sender. I have been told that the Westach part number is 399S for the short one.

The four 1/4" holes, also in the same diameter, are for torquing the adaptor in place. I made a simple spanner wrench out of a piece of 1/2" aluminium stock, threaded a 1/4" bolt into one end, and cut off the head.

The threaded steel insert, item 2, was made from a piece of 3/4" all-thread rod wth a 1/2" hole drilled down the center.

Before removing the adaptor from the lathe, try tightening it on the screen housing. I found that the threads were too tight and I had to re-chuck it up again, with less than satisfactory results. Screw the adaptor all the way in without the copper gasket and check to see that there will be sufficient crush to effect a good seal.

To safety the whole assembly in place, tighten a 3" worm clamp around the base of the filter and safety wire from the worm screw to the engine.

When you first fire up your engine, after installing the filter assembly, be sure you have oil pressure within 10 seconds. If not, check to see that the bottom of the spool is not bottoming out on the accessory, case which could partially block the oil discharge passage. If the pressure is good, run the engine for a few minutes, until the oil is warm, and check for leaks.

The Fram filter, suggested on the drawing, was chosen for its small size, fine filtration capability and built in filter by-pass valve to protect against starving your engine if you clog a filter or during a very cold start. This filter seems to have plenty of capacity since the engine, now, has better oil pressure at a hot idle and less pressure drop at high oil temperatures. Good luck and please let me know of any problems or positive results.

Before starting the adaptor, make sure that the approximately 4" long unit, with a 3" diameter filter will fit in your installation. The large diameter alternator may interfere.

I have included a copy of a letter which I sent to another builder which noted a clearance problem with the large alternator. If you have this style alternator, do some measurements first, using the small diameter filter before making the adaptor.

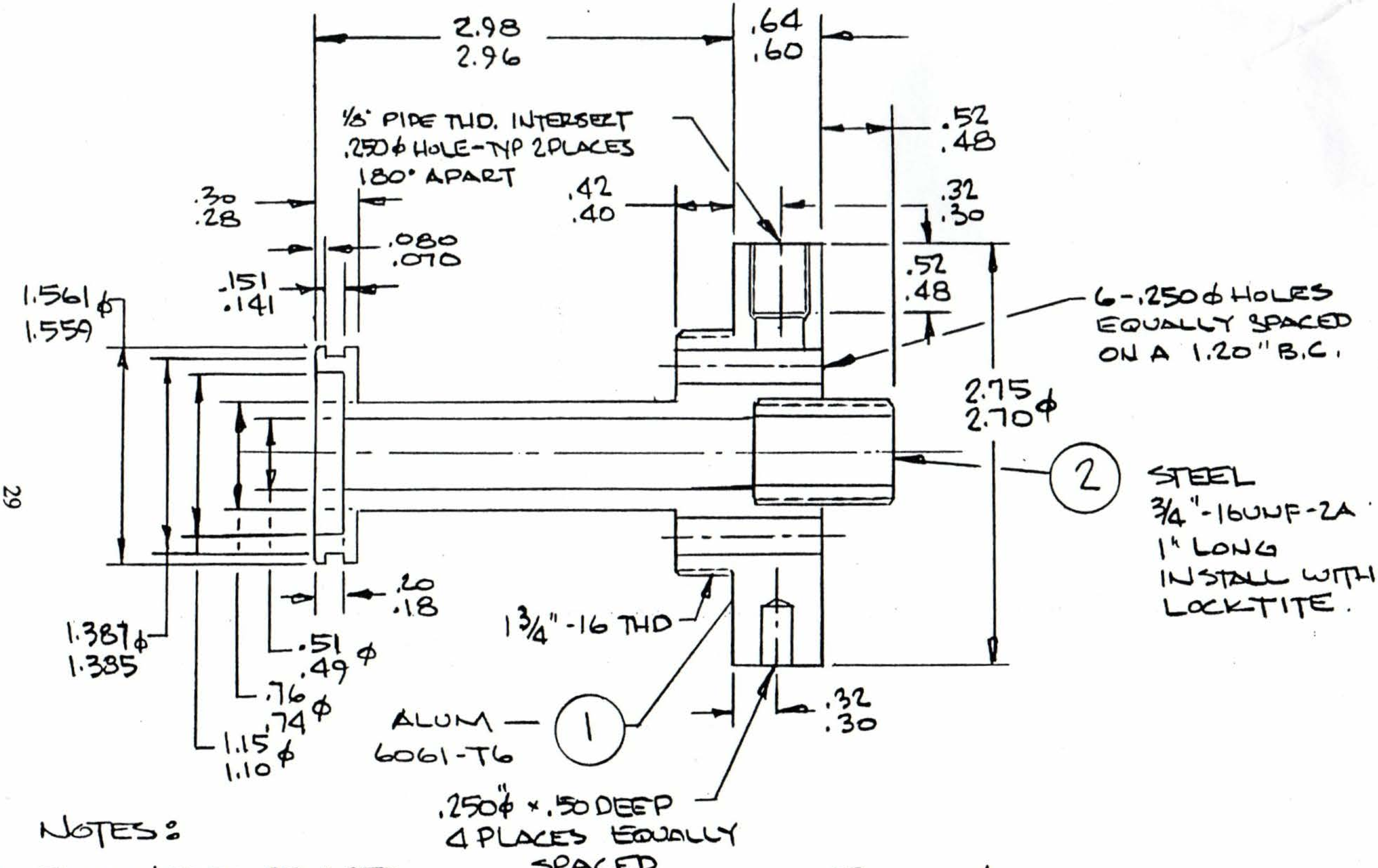
Editor note: The following was removed from the, above mentioned, letter.

"The pitfall, which I got sucked into, was that I have an A-65-8F which doesn't have starter or generaator pads on the accessory case. Consequently, it has plenty of room for the filter. The C-85, C-90, O-200-12 and -14 series all have provisions for the starter and generator. My problem was that I didn't fit check the unit on that case, but only looked at one that had a B & C small diameter alternator mounted. On that installation, it appears to be no problem. Since receiving your letter, I have done some additional measurements and found, that with the Delco Remy generator, about .040" will exist between the filter and the generator body. This is not an overabundance of clearance, but it should work. Another option is to use a Fram PH-4967 filter, which is 2.6" diameter instead of the 3.0" diameter of the PH-2951, and cut down the 2.75" diameter on the adaptor to 2.50". The 2.50" diameter will work for either filter since both seals are smaller in diameter than this. I would appreciate hearing from you on your comments with the smaller filter.

Again thanks for your reply and all the documentation which you sent. I have seen the adaptor which El Reno sells, but was amazed at the high price they were asking for it. It should work fine if it doesn't interfere with any baffling. I was a little concerned at the potential for fatigue, considering its narrow 3-bolt pad and small footprint."

Please communicate your experience to:

Gary Hertzler
2622 South Iglesia Circle
Mesa, AZ 85202.



NOTES:

1. DESIGNED TO BE USED WITH FRAM PH2951 OIL FILTER WITH INTERNAL RELIEF VALVE
2. REPLACES FILTER SCREEN ON CONTINENTAL A65-0200

FILTER ADAPTOR

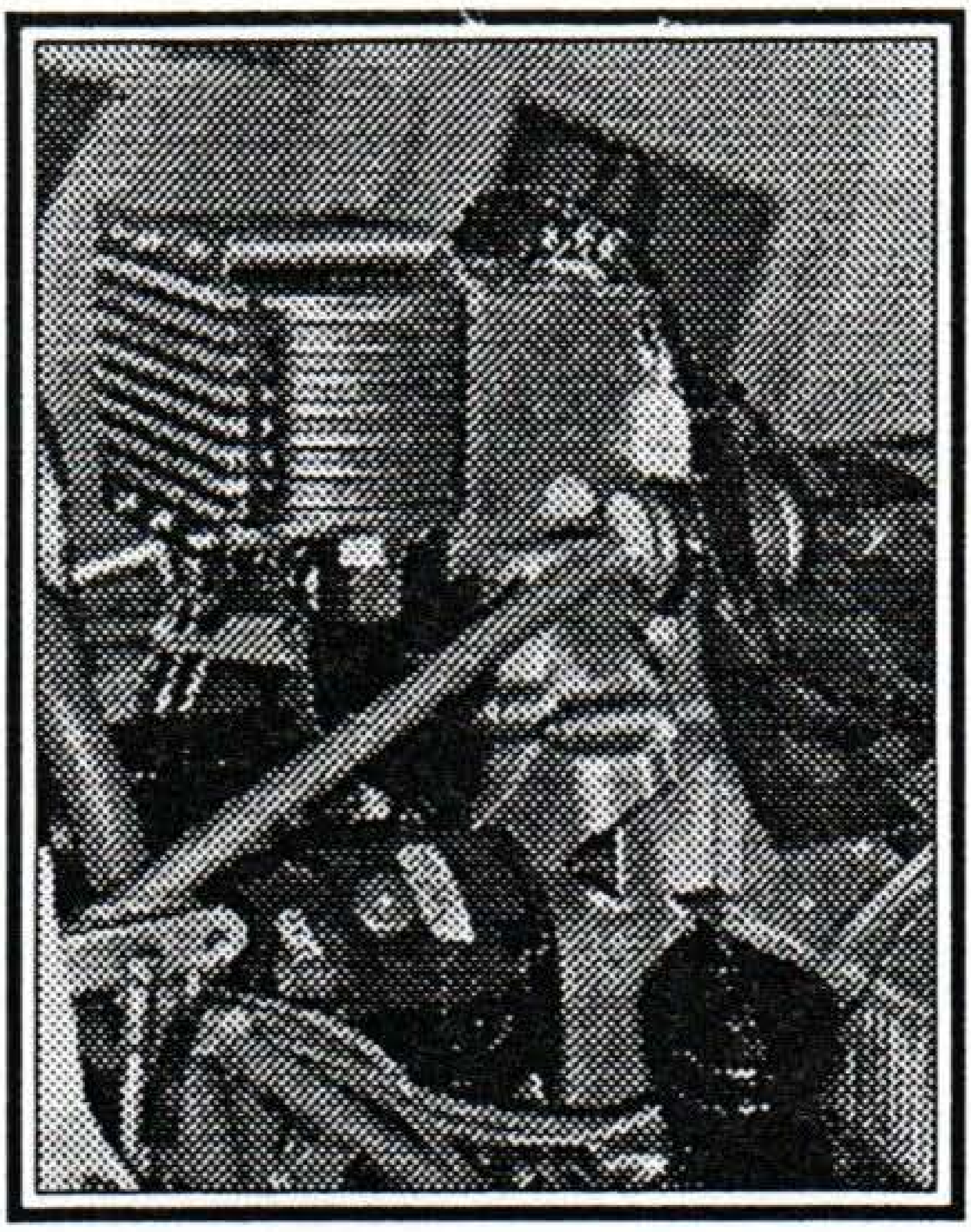
A65-0200 CONTINENTAL

Vari-Eze Oil Cooler

Jack Fehling (FL) - I have mounted an oil cooler for my O-200 in the top baffle. Mounting the cooler here has several advantages. First, you have no additional exit holes on the aircraft. The air exits with the engine cooling air. Second, the installation draws air across your magnetos. Third, it will vent the cowl through the oil cooler after engine shut down.

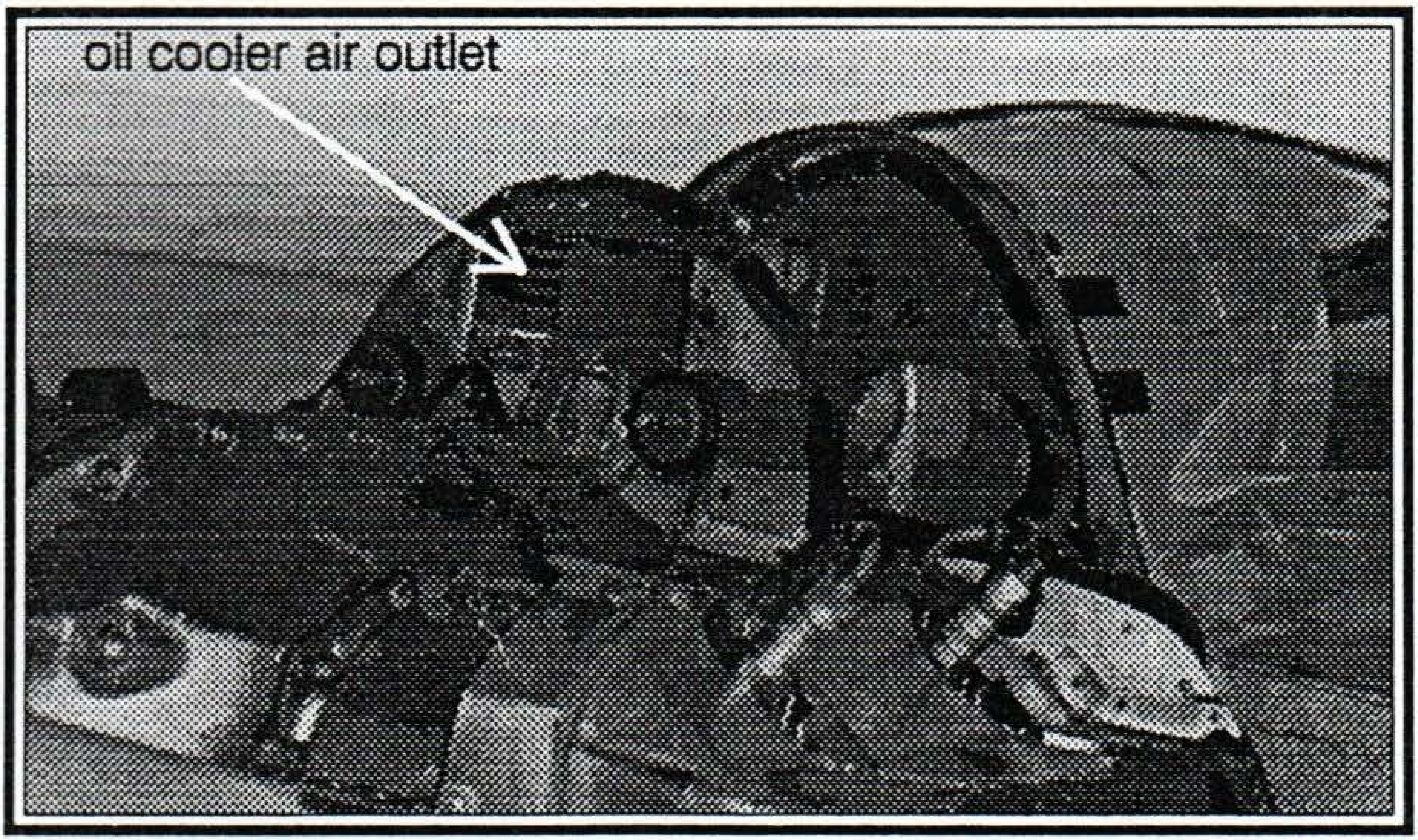
I have run this configuration for two years now. It keeps the oil temperature under 200 degrees F at full throttle.

Editor note: Jack lives in Florida, so 200 degrees is pretty low for full throttle operation. Be sure you have efficient baffles on your cylinders as this installation uses high pressure cool air that used to go through the cylinder's cooling fins. There is obviously enough cool air, in the cowl, to go around. You just have to use it wisely.



Looking aft on a top mounted oil cooler

Notice the rigid baffles on the aft cylinders. Cooling air flow is carefully controlled on this installation.



Automotive Spark Plugs in Aircraft Engines

Martin Pavlovich (WI) - Since exchanging the C85 Continental for an O-200, I have had chaffed top spark plug leads due to extra movement the O-200 mounts have over the C-85. Not wanting to put unsightly bumps in the cowling, using shorter spark plugs was the next logical step!

The engine, used in the following article, was about 100 hrs. from TBO. The frayed spark plug wires needed to be replaced which made this an opportune time for experimenting.

Test aircraft: Vari-Eze
Engine: Continental 0-200A (High Compression Pistons)
Ignition: Stock Bendix Magnetos
Spark Plugs: Only two plugs were originally replaced, - 1 Champion RF11YC, installed on top of #2 cylinder, and 1 Bosh DR8BPX, installed on top of #4 cylinder, with gaps on both reduced from .060" to .018".
Plug wires: 7.5mm silicon wires-steel conductor spirally wrapped around a carbon core.

Not many auto engines use 18mm plugs. The plugs available don't provide much selection of heat range. To find a plug with a heat range, close to a Champion REM40E, I inserted a piece of safety wire down along the center electrode insulator and measured the depth. Next I went to a local automotive store, with my piece of safety wire, and proceeded to check plug depths until I found one that matched. This is known as S.W.A.G. (**s**cientific **wild a**__**g**uess). I selected a Champion RF-11YC. While in K-Mart, I spotted a Bosh platinum plug, DR8BPX. The cross reference chart showed it had the same heat range as the Champion. Now I had two plugs to compare. About this time, Gene Zabler from Racine Wi., received an Electroair electronic ignition system which came with Bosh DR8BPX plugs. Not bad for a S.W.A.G.!

Some modifications must be made to the gasket end of the plugs. Automobile plugs have a tapered end, while aircraft engines use a flat copper washer. The best way to use the copper gasket would be to machine a shoulder on the end of the plug. Another way would be to use the gasket over the tapered end, but caution must be observed when tightening, as the taper in the plug will expand the gasket and the plug will make contact with the cylinder head. I have used the plugs both ways. To tighten the plug use a 3/8" drive ratchet wrench and torque to about 15 pounds.

The next step was selection of plug wires. First I tried shielded wires with regular spark plug boots, but take-off radio static was too great.

I rejected carbon core resistor wire because I believed the high resistance might cause arcing inside the mags, especially at high altitudes.

The wires I selected have a steel conductor wire spirally wrapped around a carbon core and are for a 2.5 liter GM 4 cylinder engine. The theory is to induce resistance when electricity passes though the wires and suppresses the static. I can hear some static after transmitting, and when trying to listen to faint ATIS's. If it gets too annoying I just shut the mag off until I'm finished listening to the broadcast.

Flight Testing: - The initial test, with just two new plugs, required me to lower my idle speed by 75 RPM.

The first flight was to confirm the wires would not cause arcing or cross-firing. Departing Waukesha airport, I climbed to 17,000 ft. At full throttle and mixture leaned to peak EGT, I shut off the left mag so only the auto plugs were firing. To my surprise the engine ran very smoothly. There was no unsquelchable radio noise and no cross-firing!

Most flights, after that, were at normal altitudes and power settings between 65 and 75% power.

After twelve hours of plug use and while conducting a high power test at 2,500' the engine began to run rough. The roughness was on the auto plug mag. After landing I tested both plugs and determined the Champion plug had failed. There was no physical damage or signs of fouling. My only explanation was that excessive heat caused the failure. The Champion plug was replaced with another Bosh plug. I flew the Eze for forty more hours before replacing the remaining two plugs and wires. I flew the rest of the summer with no problems.

In late 1992, after 100 hrs. of flying, the engine was pulled for overhaul. On tear down, all parts were inspected and found to be normal. Pistons showed no signs of detonation or preignition. The magneto was inspected closely for signs of carbon tracking; none was found!

The engine was reinstalled with original automotive plugs and wires to continue testing. The only difference was high compression pistons were exchanged for stock pistons.

Normal flying was conducted all through the '93 flying season. One hundred hours have been flown this year. The plugs were pulled, cleaned, gapped and reinstalled.

Summary: - I have flown 200 hours with the same set of spark plugs. They have given good reliable performance with little maintenance. I have found the engine to start easier in both warm and cold temperatures.

If there is any one concern about using these plugs, it is the high temperature environment in which they must operate. Most our aircraft operate at100-275 degrees F above that of an automobile engine!

My original intention was to use the plugs for 200 hours only and replace them. Since they have proven so reliable I will continue to use them to see just how long they really last!