EAA TECHNICAL COUNSELOR NEWS

OCTOBER/NOVEMBER, 1986 PAUL POBEREZNY: PUBLISHER, BEN OWEN & ANN RUBY: EDITORS

Winner in the 1986 EAA World of Flight Photo Contest, by Don Baker for his "Oshkosh Bound". The photograph depicts the adventure many of us undertake annually on our flight to the annual EAA Convention. The contest will be on again for 1987, and we would like to encourage your entries. Our photo contest, by the way stems from an idea submitted by Ben Owen to Tom Poberezny, and is run by the EAA Marketing and Communications staff. Canon Photography and others provide the excellent prizes for the contest.

Composite Corner

NOTICE

This section is for information on composite aircraft, although, as you will see, not necessarily just the "fiberglass" components of those aircraft.

EPOXY GLUES

I wrote to the Wyerhaeuser Company at the suggestion of Dr. River of the Forest Products Laboratory, 1 Gifford Pinchot Drive, Madison, WI 53705, some while back and I thought his answering letter would be of interest. Of course, Weyerhaeuser is principally a manufacturer of plywood.
Editor

Dear Ben:

We have not worked with epoxies for several years, since it is too costly for our high-volume products. The publications Bryan River passed on to you would be the latest.

I have attached a copy of a letter I sent to Bryan in 1981, giving the formulations for the fast cure (FCE) and slow cure (SCE) mentioned in the publication.

I am sure that you are aware that the term "epoxy" is so broad that some care must be used in determining which ones are good wood adhesives and which ones are not. The FCE and SCE were the two most durable we examined. Most of the others were considerably poorer in exterior durability.

Sincerely, Dick Caster
Weyerhaeuser Company
Tacoma, WA 98477

Mr. Bryan River
USDA Forest Service
Forest Products Lab.
P.O. Box 5130
Madison, WI 53705

Dear Bryan:

Here are the two epoxy formulations you requested. They come out of work we did under a joint program with Dow back in 1968-1969. We never followed up since we had no interest in epoxies for wood gluing.

1428-7 Slow Cure Epoxy (SCE)

Chemical	Weight %
Dow epoxy resin 10228	84
Cabot Corp. Cab-o-Sil M5	3
TET (Triethylene Tetramine)	13
	100

1428-12 Fast Cure Epoxy (FCE)

Component A	Weight %
Epoxy resin ERL 0500 (Union Carbide)	61
Lekutherm X-50 (Naftone, Inc.)	37
Asbestos RG 244 (Union Carbide)	2
	100

Component B	Weight %
EpiCure 861 (Celanese)	59
TETA (Triethylene Tetramine)	41
	100

MIX	Weight %
Part A	71
Part B	29
	100

Both SCE and FCE were applied to primed wood surfaces. Both wood surfaces were primed with a 2 percent polyethleneimine (Dow 600) water solution and allowed to dry prior to epoxy addition. This is a required step. I only tried this on Douglas-fir and southern pine.

Formula	Spread Rate	Open Assembly Time	Closed Assembly Time
SCE	0.3 kg/m²	40 sec.	- 15 min.
FCE	0.3 kg/m²	20 sec.	90 sec.

Formula	Clamp Pressure	Time Under Pressure
SCE	138 kPa	+ 6 hours
FCE	138 kPa	+ 2.5 hours

I have forgotten pot life times, but epoxies are mass sensitive, so mix up small batches. Also, when pot life is over, "strong" exotherm occurs, so work in hood.

Sincerely, Dick Caster

FILLING AND FAIRING FIBERGLASS FINISHES

I hope you have been following the comments on the use of filling materials on composite structures. This basically is not a recommended procedure until the base epoxy and fiberglass matrix has dried and has been thoroughly inspected. An hour after this procedure, the use of Microballoons or Microspheres for filling is a good idea. The following, from the Gougeon Catalog will define the difference between and uses for Microballoons and Microspheres.

WEST SYSTEM 407 Filler Microballoons

407 Microballoons are microscopically small, hollow, brown colored phenolic spheres which are very rigid with good compressive strength. 407 Microballoons are used primarily to make inexpensive filling and fairing putties which are easy to sand or carve. When mixed with resin, they produce a low density material which is a reasonably good engineering material on a strength-to-weight basis. They are used as a thickening additive for bonding veneers. They can also be used in structural applications where the light weight can be beneficial. One 9 oz. bag of 407 Microballoons requires 2.2 lbs. of resin and hardener mixture for a creamy consistency or 1.4 lbs. for a paste consistency.

WEST SYSTEM 409 Filler - Microspheres

409 Microspheres are white inorganic hollow spheres which are very low in density. They are used as a thickening additive to make filling and fairing putties of lighter weight than 407 Microballoons but with less load bearing strength. 409 Microspheres drag slightly more than 407 Microballoons and will not hold a feather edge; however, a small addition of 406 Colodial Silica will reduce the drag. As well as being used for a filling and fairing putty and for filleting, 409 Microspheres are commonly used in laminating adhesives. They reduce the density of the mixture while increasing the resin viscocity, thus providing the gap-filling qualities needed for laminating. One 6 oz. bag of 409 Microspheres requires 2.9 lbs. of resin and hardener mixture for a creamy consistency of 1.8 lbs. for a paste consistency.

WORKING WITH PLEXIGLASS

From the Tale-Dragger Newsletter, EAA Chapter 292, Willamette Valley, Oregon.

Here are some tips on working with plexiglass that I have picked at Oshkosh workshops over the years.

1) If you purchase a canopy and it has a protective coating that has hardened on - use kerosene or naptha oil to soften and dissolve the coating.

2) Cut plexiglass with fine tooth circular or jig saw blades - a small Dremel saw works well; or use fiberglass impregnated cut-off type disks. SUPPORT THE PLEXIGLASS FIRMLY.

3) After cutting, round the cut edge with sandpaper (a table-type belt sander works good) and then SCRAPE with a flat-ground metal edge, such as a ground off hack-saw blade or binding strap (i.e. a HARD steel) until edge is CLEAR with no white raw cut areas.

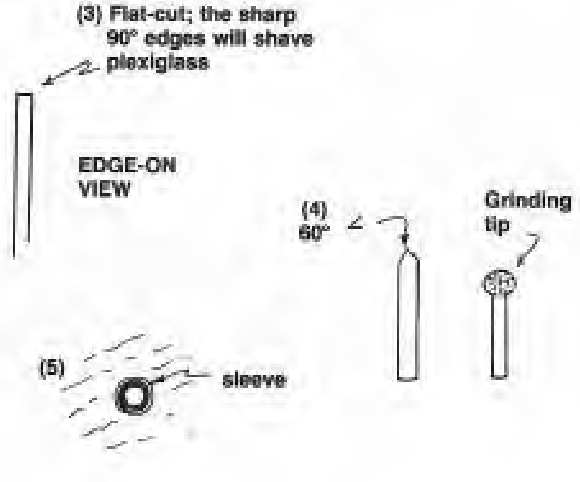
4) Drill holes using either a drill bit ground to 60 degree angle with FLAT 90 degree faces (not cutting face) or with a rounded grinding tip. The idea is to let the tool melt its way through the plexiglass by friction - do not use force.

5) Drill holes oversize and insert a sleeve, such as a piece of windshield washer hose, to cushion screws. Use self-locking nuts so you won't tend to overtighten. (Figure 3)

6) Use Silicone sealer to seal and bed edges of plexiglass - it flexes with the plexiglass.

7) Repair scratches by scraping with a razor blade to taper, then sand in a cross pattern with 600 grit paper. Then smooth with a product like Micro-mesh to completely clear the repair.

8) Form plexiglass by heating to between 275 degrees and 325 degrees and letting it sag over a form of wood, plaster or metal.



AIR FILTER INSTALLATION

From the Glasair News.

Shown here is a schematic of a carbureted engine air filter sytem used by one of our builders. The round, automotive filter element is installed in a fiberglass housing, mounted to the firewall. Inlet air is taken from the aft engine baffle. An extra flapper valve that can select between ram and filtered air is installed in the carb box directly under the carburetor.

With this arrangement, the filter must be shut off to select carb heat. The builder who suggested this filter system reports that the rpm drops about a needle width when the filtered air is selected.

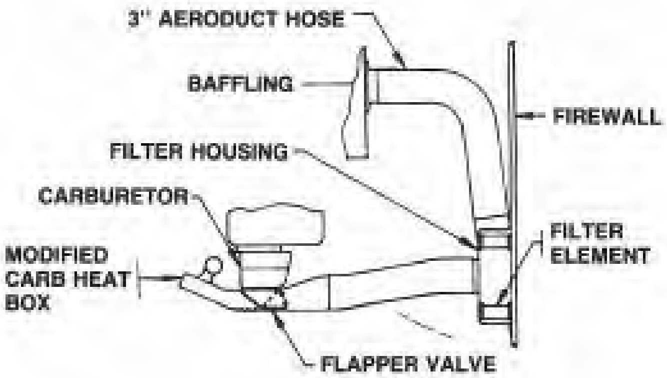
The filter housing was laid up in the bottom of a 3 gallon resin bucket, released, trimmed, and then turned over onto a sheet of waxed glass for application of the flange all around.

The 3 inch tubes were laminated by wrapping mylar tape over cardboard shipping tubes and the flange on the rear of the baffle was laid up over a foam mold.

Stoddard-Hamilton wants to caution builders about the installation of air filter systems. The filter housing and tubes must be properly designed to avoid air separation, which could cause the improper fuel mixture.

Stoddard-Hamilton is working on an air filter option which will be thoroughly tested before being made available.

For builders who design their own filter system, the filter housing should be sufficiently large and the flapper plate sufficiently thick to avoid problems. The installation detailed above cannot be recommended because Stoddard-Hamilton has not tested it, however.



BD-5 MOLDED CONTROL HANDLE NOTE

Dear Ben,

The new newsletter is great! A note of warning: If anyone is trying to use those BD-5 molded control handles, they break. One of our members (Chapter 635) had an incident a few months ago on a first flight. Fortunately, he got it down with only a few dents and scratches. The problem is that the metal tang doesn't run all the way through the grip. The grip breaks off and doesn't leave much to grab.

Odbert H. Cornwell
EAA #27879
Technical Counselor *387
Deland, Florida

SILKSCREENED INSTRUMENT PANEL MARKINGS

From the Glasair News.

Neosho Graphics of Neosho, Missouri, will paint your instrument panel and silkscreen the panel markings to create a professional, durable, custom installation. Their workmanship is highly recommended by one of our builders. Contact Neosho Graphics at (417) 851-0677 for more information.

Design

EJECTOR COOLING

From the EAA Chapter 96 Newsletter, Torrance, California, January 1986.

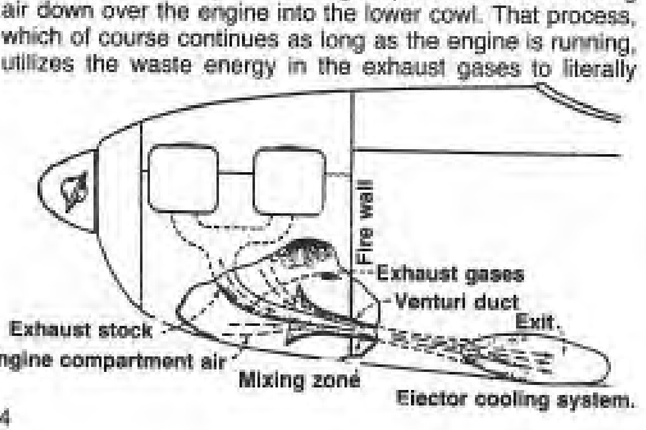
Here is some food for thought on ejector cooling that was passed to me some time ago. The source of the material is unknown. Cooling drag is the result of the energy loss incurred when air is forced past the cylinders of an air-cooled engine or past the coolant radiators of a liquid cooled engine. In the case of engines of the jet type, cooling air for the tail pipe and afterburner pipe is ducted from the compressor; as such, cooling of a jet does not directly increase the drag, since the effect is felt in a reduction of power available. By proper design of the ducting and utilization of normally wasted exhaust energy, it is possible to cool an air-cooled engine without producing drag. The normal way to accomplish this is to place a venturi-shaped duct around the exhaust stack at the rear of the cowling, with the exhaust stack ending at the venturi throat as shown in the accompanying drawing. The rear end of the duct is open to the atmosphere and the front end to the engine compartment. The high speed flow from the exhaust stack draws air along with it and out through the rear end of the duct, owing to viscosity effects, producing a low pressure area in the venturi throat that pulls additional air through from the engine compartment. By using a system such as this, no ram pressure is required to force air through the engine compartment, the energy required to move the cooling air being supplied by the normally wasted exhaust-gas energy. If the venturi ducts (known as ejectors) are properly designed, it is possible to obtain a certain amount of jet thrust or, expressed in another fashion, negative cooling drag.

The previous discussion is not entirely accurate where it says the "low pressure area in the venturi throat . . . pulls additional air through from the engine compartment." Pulling on air is like pushing on a rope, it is not possible.

What actually happens is that as the high velocity gas molecules leave the exhaust pipe, they impinge on air molecules in the venturi tube. That gives the air molecules a "push" in the general direction of the venturi tube exit and causes the air to flow out the tube exit along with the exhaust gas.

Assuming that the air in the tube was originally at atmospheric pressure, the air in the venture tube will now be at a lower pressure because some of it was ejected. The air in the lower engine compartment, sill being at atmospheric pressure, will be forced into the venturi tube.

As air exits from the lower cowling out the venturi tube, the pressure below the engine drops below atmospheric. Even assuming the air above the engine was at atmospheric pressure, i.e. no ram pressure, its pressure is now greater than the air below the engine. That higher pressure forces cooling air down over the engine into the lower cowl. That process, which of course continues as long as the engine is running, utilizes the waste energy in the exhaust gases to literally pump cooling air over the engine.



Ejector cooling system.

It is not necessary to place the exhaust pipe exit at the venturi throat, as shown in the figure, for the ejector to work. However, since pressure is lowest at that point, the exhaust gas sees a lower back pressure there. That could improve engine output and efficiency.

Another advantage of this system is that the ejector provides the greatest cooling air flow at full throttle when it is most needed. That need is particularly great during climb, when ram air pressure is low. Since the ejector compensates for the lack of sufficient ram velocity during climb, the engine cooling air inlet can be sized more for cruise than climb, allowing a smaller inlet.

With all these benefits, why are't ejector cooling systems more common? Probably because they require more design analysis and some cut and try to get it right. And even though they are mechanically simple, the lower cowl must be kept well sealed, not a simple task, especially for commercial light planes, which aren't well sealed to begin with.

CONSTRUCTION TIPS FROM GORDON WHITE

From the Chapter Chatter, EAA Chapter 78 in Delaware Valley, PA.

You've seen many trailing edges, I am sure, where the two skins are merely joined and riveted. This approach, though commendably light and simple, is dirty and ugly. (See figure

FIGURE 1 FIGURE 2 FIGURE 3
G.W.

1.) Figure 2 shows an alternate system that uses an aluminum angle with just enough rigidity to maintain its shape (.032 2024-T should be max.) The closed angle should be set to match the contour of the skins as they come together. It is not necessary for the angle to be positioned at the very edge of the skins, since the skins will have enough rigidity to extend beyond the attach point and meet at a "razor edge". This fact permits you to use a nice, healthy radius when you form the angle. The skins are blind riveted to the angle. It may be wise to stagger the rivets of the opposing side so that the tails do not interfere.

If you have need to open this assembly on occasion as in the case of a landing gear fairing, you can attach one skin with Tinnerman speednuts and PK screws. An even more accessible approach is to use a hinge in place of the angle. Removal of the hinge pin separates the two skins. Remember to secure the hinge pin against accidental removal. (see figure 3.)

CONFUSING AERODYNAMICS!

A letter from Reg Finch:

I am willing to bet that your first intuitive thoughts about aerodynamics were incorrect - mine were! We may have to go back a ways to when you were a kid, perhaps, and you speculated that the pressure on the front of a wing, for instance, would be high - just as it was when you stuck you hand out of the car window. And you may have wondered why leading edges of wings were round, instead of sharp. A sharp leading edge would cleave the air nicely, would it not? Then you might have found out that in fact, the pressure near the leading edge of the wing is relatively low, due to Bernoulli effect. This twanged a chord in your brain, no doubt. "The air speed up, therefore the pressure drops" so the theory goes. "Why does the air speed up?" you asked. "Because the air has to cover a greater distance on a highly curved surface, such as on the top of a wing, compared to a flat surface, such as the bottom of a wing" was the prompt answer. The reason the answer was so prompt was because you were not meant to ask the next logical question. So you bowed to your newly found aeronautical Guru, and filed this rather perplexing information in your memory banks, eager to pass it on to any other unsuspecting newcomer.

The next question you would have asked, if you had dared, would have been: "Why does the air have to travel a greater distance around a curved surface?" The answer with just a trace of impatience might have been: "Well, dumkopf, the geometric distance around a surface is greater and the air has to travel all the way around until it reaches the trailing edge (T.E.) and it can meet up with the parcel of air chugging around the bottom of the wing, everyone knows that!" Your alter ego has just been assasinated because you appeared to be the only one in the world that did not know that. Now, you reasoned: "Why does the air have to meet at the trailing edge? Or why does it meet at all?" You searched the eyes of the Guru. Dare you press? You look for a hint of great knowledge and patience. Does he carry a gun and would he use it if you pressed too hard? As if reading your mind, he smiled and said, "When the air separates at the leading edge, and we look at an air chunk going over the top and one going underneath the wing, they must meet somewhere or we would create a void in the atmosphere. Mother Nature, using the gentle persuasion of pressure, would not rest until either the parcels met or other air was moved in to fill the void. But the air does **not** have to meet **at** the trailing edge. (T.E.) The fibrillations are turning your mind to jelly, now. "As a matter of fact," he continues, "At speeds below the stall, the air does not meet at the T.E. at all, but at the aft stagnation point, as shown in the figure below.

VORTILONS FOR LONG-EZ

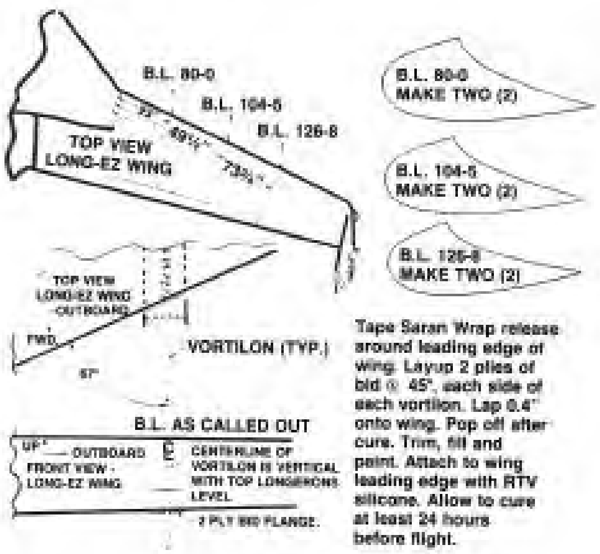
From the Canard Pusher newsletter.

Due to the wide variety of workmanship, flying characteristics can vary considerably from one airplane to another, even though they may have been built from the same plans. We have been confident up until now that Long-EZ's were pretty much immune from a main wing stall, if they were operated within the normal limitation of gross weight and CG. Recently, we were surprised to learn of a stock Long-EZ that experienced a main wing stall. Admittedly, this aircraft had been loaded to well over normal gross weight, but the fact that it occurred at all has led us to make the following change a **MANDATORY** one for all Long-EZ's, regardless of which canard is installed.

ALL LONG-EZ'S must have three vortilons installed as shown on the leading edge of each main wing. We have conducted rather extensive testing of vortilons and they definitely do add to the stall margin of a swept wing. They have always been required when using the new R1145MS canard, they are now required even if you have the original GU canard installed.

Probably the best way to install vortilons is to make them with a small flange on each side. Finish them through final paint (using your trim color is a neat idea) then glue them to the finished wing in the appropriate position using a small amount of clear RTV silicone.

We have included full scale patterns for each vortilon, as well as a plan view and front view showing the positions at which each vortilon should be installed. The main design requirements are that the vortilons are mounted so that they are vertical, relative to the aircraft in level flight, and that they are mounted parallel to B.L.O. or the centerline. They do NOT cant outboard or inboard. The vortilon itself should be made from a six ply BID solid glass layup. The flanges can be two plies of BID on each side of each vortilon.



VORTILONS - AERODYNAMIC BUGS

From the EAA Chapter 40 Newsletter, San Fernando Valley, CA.

Many people ask about vortilons when they see them on EZ's, but most people fail to realize that they are on all DC-9's. What do they do? First of all, they only work on swept wings, so if you want to, you can stop here. Vortilons block the wing spanwise flow at the leading edge by the vortilon-wing intersection, and also serve to produce a substantial increase in induced velocity and negative pressure coefficient at the inboard side of that intersection. The result is that the stall first occurs at the vortilon locations and the outer panels stall later. The spanwise flow along the leading edge of a swept wing produces a side force at the vortilon. The vortilon is really a highly swept lifting surface, with a lift sideways. A vortex results from this side force. The vortex is carried around the leading edge and over the top of the wing. The vortex mixes the boundary layer with freestream air and effectively interrupts the outboard flow of the boundary layer. In addition, the direction of the pylon trailing vortices, which become stronger as the angle of attack is increased, acts to increase the angle of attack at the tail and increases the pitch down movement of the airplane at the stall. In a nutshell, it improves the stall performance. For those who have T-tails, vortilons can keep you out of a deep stall.

So how come they took so long to appear on an airplane other than the DC-9? Because McDonnell-Douglas had a patent on the device. Seems that the DC-8 had very nice stall characteristics and these stall characteristics were desirable for the then new DC-9. Testing the DC-9 wing in the wind tunnel disclosed that there was a really violent stall until someone remarked that the only difference was that the DC-8 wing had engines and pylons. So, mounting nacelles and pylons onto the DC-9 wing, they got the nice pitch down stall they had wanted. Removing the nacelles and keeping the pylons resulted in the same desirable stall. Gradually cutting away the pylon, they found that only a small part of it was required to get the desired results. The pylons had leading edges that went over the top of the wing and produced the usual large loss in maximum lift. The leading edge of the pylon was cut back so that the stagnation point on the leading edge of the wing, the point of highest spanwise flow on a sweep wing, was ahead of the leading edge of the pylon until the stall angle was reached. Therefore, loss in wing maximum lift due to the pylons (now reduced to vortilons) is almost eliminated, but when the wing stall occurs at the truncated pylon, the vortex which reduces spanwise flow of the boundary layer, is produced. It is called a vortilon, vortex generating pylon.

Engines

REVMASTER ENGINE FUEL PUMP . . . ENGINE INSPECTED

EDITOR'S NOTE: For history on this, you may wish to review the article on this in the June/July issue of this newsletter.

Revmaster had an independent firm do some work on the fuel pump, attaching it to another engine, unfortunately not to the subject engine, where it failed.

The results are as follows:

Revmaster Aviation - RE: ENGINE SERIAL NUMBER 2536.

Recently, I was requested by your firm to conduct an independent investigation concerning engine stoppage caused by a failed fuel pump.

I personally opened the engine crate and removed engine S/N 2536, then conducted a preliminary inspection of the engine and fuel pump system, I noticed an excessive amount of Permatex coating the threads of both AN 4 tube fittings. This coating would not allow the installation of required fuel line and "B" nuts. I suspect rubber fuel lines were clamped onto the existing threads and any air leak on the suction side would create low fuel flow, etc.

Permatex had found its way into the fuel pump cavity, however, there appears to be insufficient quantity to cause any stoppage.

After inspecting and cleansing the fuel pump and related mechanical gear eccentric push rod, the assembly - including the oil pump - was installed on another engine in the dynomometer room. Upon start, fuel flow was noted as normal, no apparent hesitation or lack of fuel flow existed. After running 30 minutes at 3200 rpm, a flow check was made, at which time, it was determined that it lifted fuel 45 inches and was pumping at the rate of 20 ounces in 39 seconds.

This is approximately nominal 30 ounces per minute x 60 = 1800 ounces per hour. Whereas the engine, at full power, digests approximately 32 pounds of fuel per hour, divided by 6 = 5.2 gallons per hour, maximum power = 665.6 ounces. This is twice as much as what the engine uses as full throttle.

Various gasket thicknesses were tried to increase the distance between the pump and mount. This did not change the flow to any degree. It is my determination that the fuel pump works as it was designed.

In order to find the reason for the engine stoppage, I would need more information regarding the fuel system, such as a diagram of the fuel system itself, the boost pump, fuel tank and carb relationship, possible vapor lock areas and fuel line shielding, EGT reading during test run-up, mixture control connection and management capabilities, and the results of any other preliminary finding or reports.

Stephen Gambrell
Box 3631, Hesperia, CA 92345

OIL DIPSTICK MODIFICATION

From EAA Chapter 776, Bisbee, Arizona

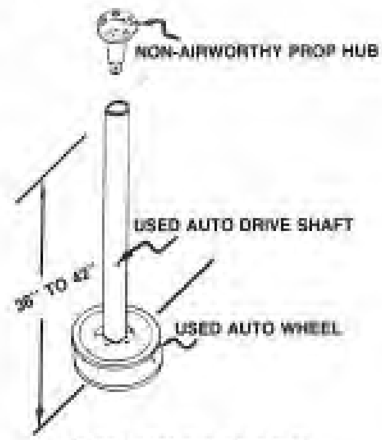
On VW derived engines, the oil dip stick is usually within reach through the cowl inlet, but there probably is not enough room under the cowl to remove it for inspection. To avoid having to remove the cowl or make little doors, make a dip stick with a piece of control cable in place of the solid metal stick. The cable bends and can easily be removed for inspection and replaced. Find the kind of dipstick that has a hollow handle so the cable can be threaded through and brazed some distance away from the point of flexing.

PORTABLE ENGINE REBUILD STAND

From Technical Counselor No. 478, Jack Hickey, Panama City, Florida.

Ben, here is a neat, portable engine rebuild stand I put together. It can be rolled out of the way when not in use, and takes up very little room. It is very inexpensive to build (mine cost nothing). I used two wheels, and filled them up with cement and it seems to be very stable. Height can be set for whatever is comfortable to the mechanic.

Jack Hickey



REMOVING CARBON

From New York City, NY Chapter 230's Newsletter.

Removing carbon from combustion chambers and piston tops is a lot easier than most people realize and, except for the investment of a little time, costs you nothing. You can usually tell when you have excessive buildups. If not visible through the spark plug holes, too much carbon will show up as a higher compression reading. I've witnessed pressure rises in excess of 35 psi over the previous readings on the same engine within 100 hours of operation. Rough running, especially rough idle and fouled plugs, are but a few of the tell-tale signs. Before you go yanking the cylinder heads, try this: Pull the cowling off completely. Have a 16 oz. glass of cold water nearby, as well as a squeeze bulb syringe or a basting bulb from your favorite lady's kitchen (A battery hydrometer with the float removed should also work.) Now, adjust the idle so that the engine runs around 1750 to 2000 rpm. (Make sure the tail is tied down and brakes set.) Restart the engine and allow it to run until it gets good and hot. When the cylinder head gauge is just getting into the red zone, take the bulb syringe and inject the entire contents of the water into the carburetor inlet (or fuel injector body). The engine will start to stumble and the idle speed will come down. Manipulate the throttle to keep the engine running and continue to inject water until all 16 oz. are used up. Readjust the idle setting. If you wish to know just how much carbon is being removed by the process, make up a bag from a foot square piece of cheesecloth and tie it to the mouth of the exhaust pipe. The weave is sufficiently loose to allow the exhaust to breathe, but fine enough to trap the carbon. Depending on age and engine size, you can expect to see as much as three tablespoons of flaky carbon. A word of caution. On engines with down draft carbs on top of the engine, there's the temptation to simply pour the water down. You can do this, but be aware that if you get impatient, you could pour too much, too fast and lock up the engine! I've used this procedure for over 25 years without damaging anything. It works.

ALCOHOL TESTING WITH RAIN GAUGE

From Herberg C. Liebmann, EAA 174811, Rt. 2, Box 210, Luxemburg, WI 54217.

I have before me your Field Information Bulletin No. 8501 Rev. 9/16/85.

I would like to offer a variation of the graduated cylinder method of testing for alcohol using a simple rain gauge.

Procure a tapered cylindrical rain gauge, from a garden supply of other store, which is calibrated in millimeters as well as inches, and proceed as follows:

1) Place water in the gauge to a depth of 10 millimeters. Note: Use care with this step as alcohol percentage is read from any increase in this volume at the end of the test.

2) Add 100 millimeters of the fuel to be tested, bringing the level to the 110 MM mark on the rain gauge.

3) Place piece of plastic bag or sheet over open top of gauge and shake vigorously.

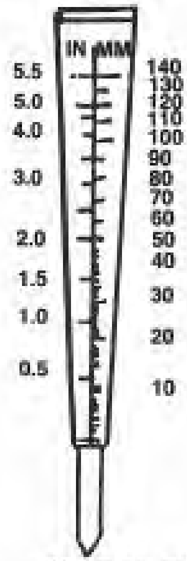
4) Allow mixture to settle for several minutes.

5) Read any increase of the water volume as percentage of alcohol extracted from the gas sample.

This test procedure eliminates any need to do a calculation of any kind as we use exactly 100 millimeters of rain gauge depth as our sample and any alcohol transfered to the water can be observed directly on the rain gauge scale and read directly as percentage to the nearest 1.2 percent.

Sincerely, Herbert C. Liebmann

Fill with water to 10 MM level
Add gas to 110 MM level
Shake vigorously - settle
Read increase of level in Millimeters as % of alcohol in gas sample.
Precision - ± ½% (½ graduation)



RAIN GAUGE CALIBRATED IN MILLIMETERS 0-140 MM

MORE ON FUEL TESTS FOR ALCOHOL

From EAA Chapter 610 "CHATTER", Medway, Ohio.

Jim Paine and Dick Alkire conducted the EAA Field Test for Alcohol on some local gasoline with the following results in percent by volume of alcohol:

Standard Oil Reg Unleaded, fall grade from FAI pump (Auto Gas)	0.9%
Standard Oil Reg Unleaded, winter grade from local station (Auto Gas)	2.5%
100 LL Avgas FAI pump	0.9%
80 Avgas FAI pump	0.9%
Super Amer Reg Unleaded	+7.0%
Marathon Reg Unleaded	0.5%

Based on EAA recommendation that this alcohol content not exceed 1%, the Autogas tank at New Carlisle now contains Marathon Reg Unleaded and will continue to do so to keep below the 1% figure.

Visit Report

RAYMOND W. OLIMSKI, TECHNICAL COUNSELOR No. 1416 OF WESTMINSTER, CALIFORNIA visited Leon Jones in Huntington Beach, California to check on his Q-2 using a Revmaster 75 HP engine. "Inspection of engine installation, electrical system and instrument panel."

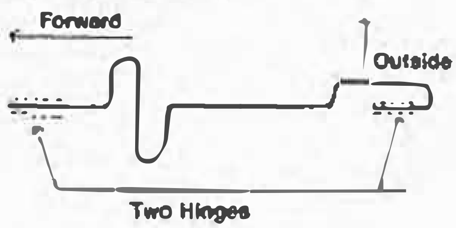
JOSEPH M. SMOKOVITZ OF TAYLOR, MICHIGAN, COUNSLEOR No. 1473, visited Francis A. Ahearn's Evans VP-II in Wyandotte, Michigan. Uses a Volkswagen 65 HP engine. "Builder has done very good quality of workmanship - aircraft is ready for cover. Found Nico-press swaging to be done incorrectly, and will follow-up to see it is re-done properly."

Technical Tips

CANOPY RELEASE FOR CH-100, 150, 180, CH-200 AND CRICKET

From Zenair News, March/April 1984

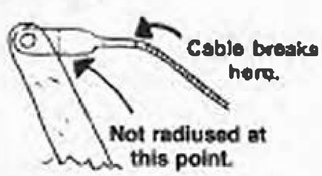
An external and quick action canopy release is easily made by replacing the 2 hinge pins or bolts with one wire. The wire is of the same diameter and bent for internal and external access. NOTE: The rear windows on a Beech Bonanza have the same type of latch system.



CONTROL HORN TIP

From Zenair News, Jan/Feb 1986

When you think your aircraft is ready, perform a very thorough safety inspection. One of the things the designer has seen is the control horns were not radiused correctly so that at full deflection, the cable end would bear on the horn and kink the cable, which will very soon result in cable strands breaking. Note diagram.



GENERAL BUILDING TIPS

From the Osprey Newsletter.

Bulging plywood panels are a result of applying plywood which is dryer than it would be if exposed to your prevailing climate Prevent bulge by getting the plywood out of its dry storage in the box under your bed and into the workshop a few weeks before sticking it on.

Bulges can sometimes be helped by shrinking the panel with an electric radiant heater; then seal it immediately with glass and epoxy.

Tools are half the battle. I tried to get along for a while without a saw and now find it a great time saver. A disk sander for shaping wood and aluminum parts is indispensable. A small Japanese back saw is excellent for long, clean, fast and easy cuts in plywood. A rubber bonded abrasive wheel on one side of your grinder makes it easy to turn out well polished (read fatique-crack proof) edges on steel fittings.

One other tidbit - the U.S. Forest Products Lab feels it may not be helpful to apply a paint on some types of wood preservative. Too superficial. Try instead to build so that no water will have a chance to soak into any wood fibers.

Regards. Gerry Clinton, 3535 Topping Rd., Madison, WI 53705

Experimental Aircraft Association

EAA TECHNICAL COUNSELOR NEWS

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