DESIGNEE NEWSLETTER

THE PUBLICATION OF THE EAA DESIGNEE PROGRAM

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The DESIGNEE NEWSLETTER is a forum for the exchange of information and ideas of interest to aircraft and ultralight builders, restorers, and flyers. The sources of the materials published are EAA Designees, readers, Chapter newsletters, and other publications. Readers are encouraged to submit manuscripts, drawings, and black/white photos for consideration. Every effort is made to select accurate materials of interest to a majority of readers. Opinions expressed and responsibility for accuracy rests entirely with the contributor. All materials submitted become the property of EAA - no remuneration will be made. Materials should be sent to Chuck Larsen, EAA Designee Director.

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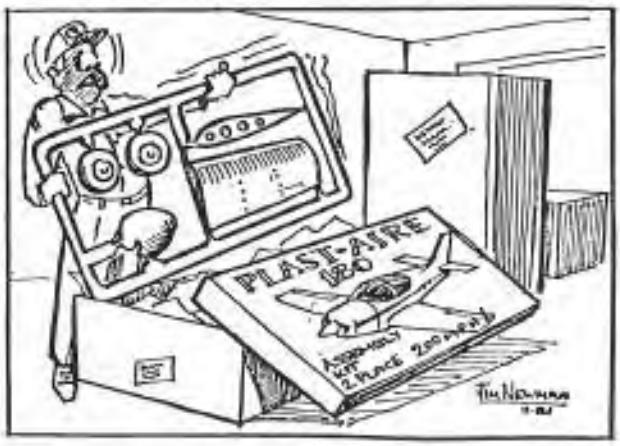
WORLD'S GREATEST AVIATION EVENT
WITTMAN FIELD, OSHKOSH, WISCONSIN
JULY 28 - AUGUST 4, 1984

PLAN TO ATTEND THE CHAPTER SUPER SPECTACULAR AT

MONDAY, JULY 30, 9:00 A.M.
FORUM TENT #3 AT
OSHKOSH '84

Meet and hear EAA Founder and President, Paul Poberezny; EAA Aviation Foundation President, Tom Poberezny and key staff members. They will present a program explaining the full range of EAA endeavors and how Chapters and members can actively participate in them.

This program should be top priority for Chapter Officers and Members attending OSHKOSH '84. Put it on your Convention schedule.



DESIGNEES AND SUBSCRIBERS,

All areas of the EAA Aviation Center at Wittman Airfield are humming with preparations for OSHKOSH '84. Convention Site Supervisor, Vern Lichtenberg reports all is going well with preparations but he can always use more volunteers between now and opening day, July 28th. If you arrive early stop in the Maintenance Office to volunteer your time and talents. The Aviation Center's Museum has undergone many changes in the last year with the "Tribute to Aviation Publications" and the "Sikorsky S-38 Exhibit" planned for opening before the Convention. Plan to visit the Museum during your Convention visit.

THE 1984 DESIGNEE FORUM will feature EAA Designee Director, Chuck Larsen; SPORT AVIATION Feature Editor, Tony Bingelis; Lee Ballentine of the FAA offices in Minneapolis/St. Paul and you, the builders and Designees of EAA in a round-table discussion of Designee and builder activity. Put the Designee Forum on your list of "things to do at OSHKOSH".

EAA DESIGNEE FORUM
Tuesday, July 31
1:15 — 2:30 P.M.
Forum Tent #8

The TECHNICAL INFORMATION CENTER will again be located on the flightline just inside the North Homebuilt Gate. This gate is located midway between the main gate to the flightline and the Warbirds Gate. This Designee facility provides an ideal place to gather to exchange information and answer questions from your fellow EAAers. It's going to be a great Convention. Come, participate and enjoy OSHKOSH '84.

Chuck Larsen, Designee Director

WITTMAN AIRFIELD
JULY 28-AUG. 4

LETTERS 'N SHOP TALK

HOW TO FLATTEN TUBING ENDS

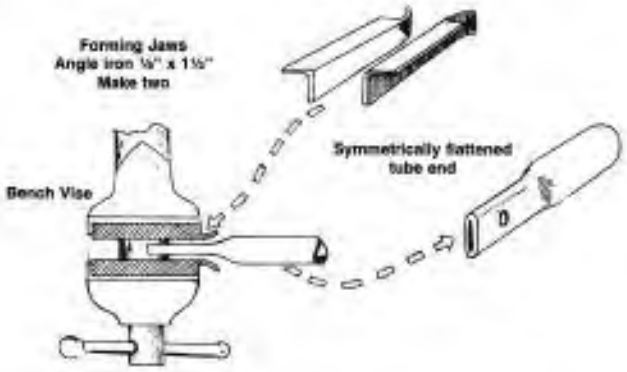
From DATUM LINE, Chapter 104's Newsletter

Here is something for the antique and biplane enthusiasts. Flattening the tube ends for struts and other applications is a very simple process. The tubes get flattened . . . but in some cases the results are very poor.

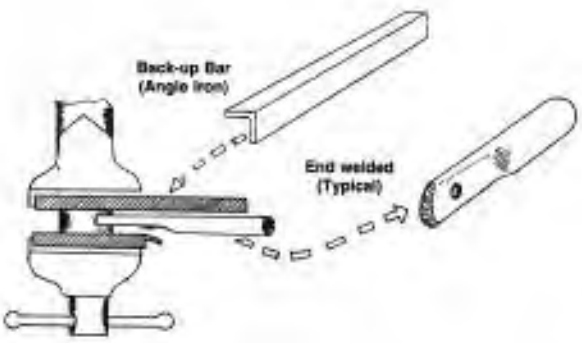
The biggest defects are in the sharp mark-off creases left by the jaws of the vise during the forming operation and cracks due to trying to cold work the tubing.

PROCEDURE

Insert forming jaws in the vise.
Heat the tubing cherry red.
Insert tube end and squeeze in the vise.
Trim and weld end as desired.
Reheat tubing end to cherry red condition.
Allow tubing to cool in still air.
Drill end as needed. Tube is ready for use.



Sometimes it is necessary to flatten the tube end asymmetrically due to structural clearance requirements or design. This is just as simple an operation. In this case it is necessary to replace one of the forming jaws with a longer piece of angle iron which serves as a back-up during the squeezing process. This is illustrated in the following drawing.



Procedure in flattening tubing from one side (asymmetrically) is the same as described for the symmetrical flattening. If you try to do this work without heating the tubing to a cherry red condition . . . it will crack along the edges.

USING CARBURETOR HEAT

From Aviation Monthly

During the summer months, carburetor heat will become increasingly important as outside air temperature and humidity increase. Remember that carburetor icing is most serious when the temperature and dew point approach 68 F. When using carburetor heat remember these important points:

When the weather is warm, use full, not partial, carb heat.
Do not use carb heat on takeoffs unless absolutely necessary, since it reduces engine power.
During glides with reduced power settings, use full carb heat and open the throttle periodically to provide warm air for the carb heater.
Do not fly with the carb heat continously on, since this decreases engine power and increasee engine operating temperature.
Have your carburetor heater checked periodically for leaks, especially if your cabin heater draws heat from the carb heater.
Follow the manufacturer's recommendations.

OIL FILTER FILL-UP

From the Flint, Michigan EAA Chapter 77 Newsletter

After putting a fresh oil filter on an engine, it can take an uncomfortably long period of time for oil pressure to build on start-up, as the new filter fills with oil. During this time, it is possible (if not particularly likely) for oil starvation to cause internal engine damage, since the filter is mounted in series with — and immediately downstream of — the engine oil pump. You can avoid oil starvation, however, by taking the precautionary step of filling (or partially filling) your new oil filter with oil before installing it on your engine. (This step is, in fact, now mandatory under the terms of Continental Service Bulletin M81-11, Revision 1.) Another good idea: don't run your engine up past 1,000 rpm until oil pressure has stabilized. This will minimize the the chance of any lubrication loss occurring while pressure is building in the filter — and in the system.

BUILDERS TIPS

From Ken Morris, EAA Designee 675

Old engine pushrods make excellent ¼" ID bushing stock on welded aircraft tailfeather hinges, pulley brackets, etc.

Need a small hole punch for making gaskets? Take two pieces of 1" x 3" x ⅛" strap iron and weld them together on the end leaving a 1/16" gap between the pieces. Drill holes the sizes you need through both pieces of strap metal. Grind the shank end of the appropriate size drill to a sharp, flat end. Slide the gasket material into the gap between the straps and drive the drill bit through for sharp, clean gasket hole cuts.

MATERIALS SUBSTITUTION

From George Molitor, Designee 1221, EAA 161584

Something to ponder. When rebuilding — or — building any type of aircraft, you sometimes feel that a part would be better if it were made from heavier material. Example — replacing an extruded angle of .060 thickness with one — say .090 or .125. Better check with the manufacturing specs. WHY? Should be better if it is stronger, NOT ALWAYS! Aircraft design is such that flexing in certain stress areas is dependent on specific strength factors of components. So, if you make an attach point too strong — you put too much load on the mating component — thus defeating the purpose originally designed into the unit. Good idea to get a second and third opinion.

TECHNICAL TOPICS

BACK TO BASICS . . . PROPELLERS

By T.P. Sands, EAA 137060, From the EAA Chapter 64 FLYING WIRE

If someone asks you, "What is the pitch of your propeller?" you would probably reply that your prop is stamped "7656" or "7146" and that you assume that in the first case the prop is 76 inches in length and has a pitch of 56 inches. In the second case," the length is 71 inches and the pitch is 46 inches. But just what is "pitch"?

Machine screws are usually described by the diameter of the screw and the threads per inch. For example, a ¼-28 screw is ¼ diameter and has 28 threads per inch. If we turn this screw into a nut or threaded plate, we find that 28 turns of the screw will advance the screw into the nut one inch. The PITCH of that screw is, therefore, 1/28th inches. While we are thinking about machine screws, also note that the threads spiral around the screw at an angle. This angle is called the "pitch angle", or simply, "pitch". Now we see that in dealing with machine screws, "pitch" has two meanings — **inches** advanced per revolution and angle that the threads make with the axis of the screw.

A propeller is an "air screw" and also has "pitch angle" and "pitch inches". Look at a prop from the end and note that each blade is at an angle with the axis of rotation. Also note that this angle increases as we move from the tip toward the hub. It is obvious why this is necessary — because each section of the blade further from the center of the prop. goes further through the air per revolution.

Comparing a propeller with the machine screw, we should conclude that the pitch in inches describes how far the propeller, and therefore the plane, will advance through the air in one revolution, right? **Wrong.** Even if the air was rigid like the nut or plate we turned the machine screw into, a so-called 55 inch pitch prop. would not move the plane 55 inches per revolution of the prop! It might be more, or less.

A 55 inch pitch prop. is designed so that it has a 55 inch pitch at only one station (radius from the center of the prop) and will have a greater pitch, perhaps 58 or so, at the tip and lesser pitch, perhaps 40 or so, 18 inches from the prop center. The nominal pitch of 55 will probably be at ¾ or ⅔ of the blade length.

If the propeller was 100% efficient, it would advance into the air **in front of it** 55 inches at the station having a pitch of 55 inches, 58 inches at that station, 40 inches at that station, etc. The reason for this is that the air flowing into the prop has different velocities from the center out to the tip. An inspection of a propeller will show that the cross section of the blade is an airfoil, just like the wing on your plane. The back side is flat, or nearly flat, like the under side of your wing, and the front of the blade is cambered like the top side of your wing. As the propeller turns, the plane is pulled forward because of the low pressure on the front of the blade and high pressure on the back side. Since the propeller is a rotating wing, the angle of attack of each section of the prop. is just as important as the angle of attack of your wing. For any given airfoil, there is one angle of attack which is most efficient (most lift per unit of drag).

The propeller designer, knowing the design speed of the airplane, the RPM of the prop for takeoff and cruise, designs the prop with a pitch angle at the various stations to give the best angle of attack to the relative wind. With these pitch angles, the pitch in inches works out as described above.

If you want to measure the pitch of your prop. you must have a method that will measure the pitch angle within at least 0.1 degree (6 minutes of arc), and measure accurately the station radius, usually ¾ the blade length. One degree error in measuring the **pitch angle** at a radius of 30 inches will cause an error of over 3 **pitch inches.**

PRINCIPLES OF GRAVITY FEED FUEL SYSTEM

By Leon Ridenour, EAA 75534, D/N 1339, From the Knoxville, Tennessee EAA Chapter 17 Newsletter, THE MOUNTAIN LAND FLYER

1. Locate the first tank near the center of gravity.
2. Filler neck cap must fit tightly, yet admit enough air into the tank to displace the fuel used.
3. A removable finger type strainer should be in the sump, located at the lowest part of the tank.
4. A fuel shut-off should be located as close to the tank as possible, yet accessible to the operator.
5. A sediment bowl must be provided at the lowerst point of the fuel system.
6. The sediment bowl must have an easily accessible drain valve.
7. The entire system should not leak when subjected to a load six (6) times the force of gravity.

The quest for safety from fire hazards extends to the gasoline tanks. A tank set between the front and rear wing spars is in about the safest, most protected place possible. A wing tank with its lower surface open to view is safer than one enclosed within the wings skin, because inspection is easier, and fumes cannot collect inside the wing. Tank filler necks must be arranged so that overflow will not go inside the plane but will drip clear and evaporate into the air. If fuel lines are of hard or stiff materials, they will suffer more from vibration than ones which are soft enough to absorb vibration and flexible enough not to develop internal strains with expansion, contraction, and airframe flexing. One might suggest that one of the fuelproof plastics would make fine gasoline lines, but here there is a great danger of pinching at bends or collapse under fuel pump suction.

NOTE: The FAA has fire extinguisher requirements for both the type of extinguisher to be used and number of extinguishers for each type of aircraft; personal or commercial. Check the FAR's for your aircraft. Tests conducted at the FAA indicate that Halogenated agent extinguishers are far superior to those now in use. They are capable of extinguishing gasoline filled seat fires. This was not always true using dry chemical and carbon dioxide agents.

EAA THE DESIGNEE AND THEE

By Marsh Collins, Designee 632, EAA 38026 as printed in the Chapter 92 "Hangarflyer"

Some years ago the EAA recognized the need for policing and coaching within the homebuilding movement, and began what is called the "Designee Program". A Designee is a homebuilder who is recommended by his fellow builders, because of his experience, background and demonstrated building proficiency to be appointed a "Designee" by EAA Headquarters. He is designated to help the individual members on their request, make periodic inspections (at the builders request) of their project, and to assure that the materials and workmanship are of "aircraft quality". He has no "police" powers — he can't force a builder to change a condition he considers unsafe, but the FAA inspector looks over his reports of inspections and takes them into consideration when certifying the airplane before flight.

Let's clear up one point. Homebuilt aircraft do get inspected by the FAA at critical points during construction and before being certificated for flight. The news media often refer to "homemade" airplanes in a manner conjuring up a "Rube Goldberg" contraption, where in reality the manufacturers of store-bought airplanes can't afford a small portion of the TLC the homebuilder puts into his bird. Thus, over the years, the FAA and the EAA have developed a solid mutual respect and working relationship, with the result being many sources of help and good advice for the builder. He's never alone — unless he insists on it.

The next step after the urge to fly is the urge to own your own airplane — and the ultimate step to many is to build your own. It takes an individualist to take to flying as a sport, and an individualist's individualist to want to build his own. There are many plans on the market, but seldom do two planes from the same plans end up looking (or flying) the same. Each builder puts himself into his airplane. It's a personal creation, and there is a pride beyond description to the builder who looks down on the world from an airplane that is the product of his own skill, sweat and perserverance.

These builders are not highly skilled artisans . . . not to begin with, at least. Many had to be shown how to use the simplest hand tools to begin with. But the EAA is the clearinghouse of cooperation — of sharing knowledge, skills and help. Experienced builders regularly assist the novices — nothing highly formal and organized generally, but the day-by-day show-and-tell of two people interested in the same thing — one who needs the know-how and the other who has some to share.

It isn't only the novice who needs the help. Often the experienced builder finds himself in a corner. With anything as complex as an airplane, even the "simple" ones often pose knotty problems. Types of construction include steel tube, wood, sheet aluminum, fabric covering, fiberglass, etc. and no one can be master of all of them.

DESIGNEE VISITS

One of the important services provided by our DESIGNEES is visiting aircraft building/restoration projects to discuss and offer suggestions about them. The DESIGNEES in the following listing are to be commended for their efforts in helping to make sport aviation a safer activity by providing this service. Comments for publication are selected for the purpose of providing guidance or assistance to builders and the DESIGNEES visiting them. DESIGNEES are requested to note problems or procedures observed in their project visits in the comment's section of the Designee Visit Report.

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Gene Darst #290
Beaumont, Texas
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*Polliwagen

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Francis M. McRae #410
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*Piel

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*Christavia

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*Acro Sport Scamp
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*Barney Oldfield Baby Lakes

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EXPERIMENTAL AIRCRAFT ASSOCIATION

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