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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Volume 14, Number 9 September 1983

STRAP DUPLICATOR

By Schuyler R. Shipley, Secretary EAA Chapter 491, P.O. Box 865, Buellton, CA 93427

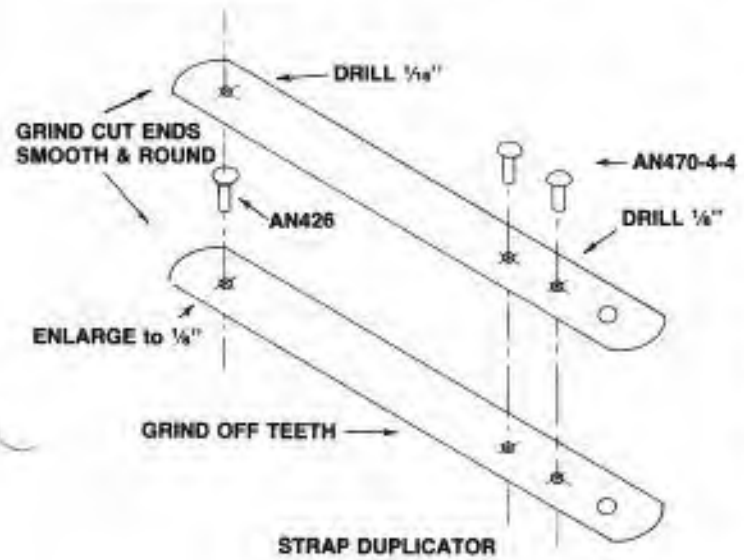
A strap duplicator is a small device used to transfer hole alignment when lap-joining sheet metal. While they are not expensive ($6-7), here's how you can make one from an old hacksaw blade in ten minutes.

1. Grind the teeth smooth and cut the blade in two. Smooth and round the cut ends to match the factory ends.
2. Clamp the halves together and drill two ⅛" holes half an inch apart near the factory end. Rivet together with AN470-4-4 rivets. (Do not use the blade mounting holes, they are oversize and usually misaligned.
3. Near the cut end drill a ⅛" hole. Enlarge the hole in the bottom strap to ⅛" and insert a loose ⅛" flathead rivet (AN426-4) between the straps with the shank extending out through the hole.

To use, slip the duplicator over the edge of the sheet to be fitted. Insert the extending rivet shank into the existing hole and drill or centerpunch the new sheet through the top strap.

For 3/32" holes use an AN426-3 rivet in the duplicator. It will self-center in the ⅛" hole.

If a long reach is needed, the tool can be made from two full-length saw blades.



STRAP DUPLICATOR

Designees and Subscribers,

What words describe our annual Convention - OSHKOSH? The answer, none! There are no words or even photos that can adequately describe OSHKOSH. The only way to fully appreciate OSHKOSH is by experiencing it. OSHKOSH '83 reflected EAA's thirty-year reputation for quality aviation activity as each day's events unfolded for those attending.

As always, the airplanes were the big attraction but many other events including the opening of the new EAA Aviation Center, the airshows, the exhibits, workshops, forums and renewed EAA friendships made 1983 a year to remember for everyone.

The hundreds of volunteers who worked hours, days and even the entire event are to be commended for their dedication and labor in support of EAA, the EAA Aviation Foundation and our annual Convention. A special word of thanks to those who participated in our Designee activities and the Technical Information Center. The presentations in the Designee Forums were very enjoyable and enlightening for all. Your participation will bear fruit as you return to your homes to disseminate to others what you have learned. Thanks again to those taking part in OSHKOSH '83.

Chuck Larsen, Designee Director

HANDY-DANDY COMPOSITE BUILDER TIPS

From the Redding, California Chapter 157 Newsletter

Note from a composite builder (who shall remain anonymous): When using 5-minute epoxy, it is best to replace the caps on mixtures A and B correctly; otherwise Cap A may bond itself to Jar B (and vice versa) and become difficult to remove! Hint from another composite builders assistant: the "hot" wire is not misnamed; treat it with respect!

LETTERS 'N SHOP TALK

EAA - FAA RELATIONS

From the Anchorage, Alaska, EAA Chapter 232 Newsletter

EAA Designees, Chapter Officers and members should strive to establish a positive, ongoing relationship with personnel in area FAA and NTSB offices. They should be made aware of qualified, interested EAAers in the area that might answer any questions or support their work relative to aircraft licensed as Experimental Amateur Built. In the case of an experimental aircraft accident, this positive communications link may prove invaluable from both the "official" and the enthusiasts standpoint.

GAS TANK STRAPPING AT NO COST

From PROP-WASH, Washington D.C. EAA Chapter 4's Newsletter

Most gasoline tanks are held in place by steel strapping. Should you need some of this material go to the nearest lumber yard. There, in the trash pile or just lying about, you will find ¾ to 1 inch strap material used by the mill to secure the pallets of lumber or plywood. This material is about .025 thickness, plated to resist corrosion and has a high tensile strength. It is not easy to drill unless a high speed drill is used. Use of a suitable metal punch is better. Cut to length, a right-angle fitting can be riveted to each end which is then bolted to the fuel tank support channel. The strap must be installed over a non-abrasive cushion! If you don't want to buy a rubber channel made for fuel tank strapping the use of 1" wide felt weatherstripping works just as well if taped in place on the strapping.

WRONG MATERIALS - COMPRESSION STRUTS

Dear Chuck,

I ran into something I thought might be of interest. A friend purchased a partly finished Stits "Playboy" some years ago. While looking at the wing struts, I noticed the ends were somewhat off center, this led to further examination. They were made of 1 inch thick x .049" tubing instead of the 1.250" x .035" streamline tubing called for. They contained about the same amount of material, but would be much weaker in compression.

A new set was made from 1.141" x .049" tubing, which figures to be as strong as the original specs, though somewhat heavier, since the original was not available.

Apparently the original builder did not understand the relationship between the length and the strength of compression struts. This could lead to disaster.

Yours sincerely,
M. L. (Mickey) McLaughlin
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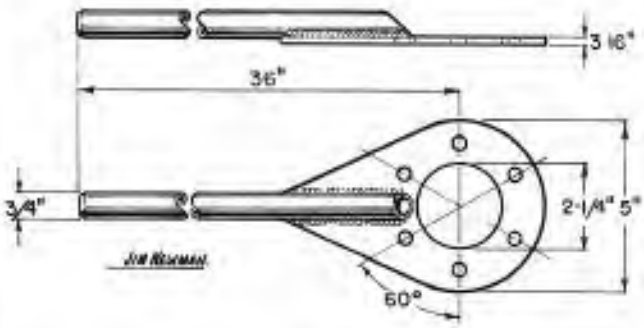
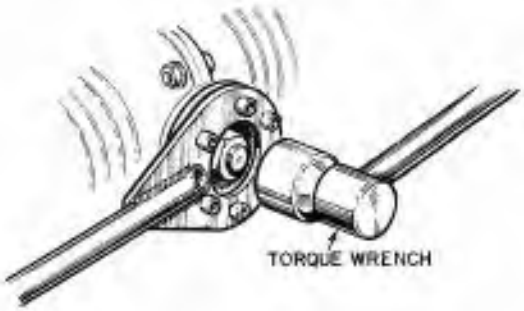
PROPELLER HUB WRENCH

By Jim Newman, EAA 109981, Chapter 104, Northwest Indiana

I found difficulty in tightening the propeller hub nut on our Rectimo VW, the center hole in the propeller being too small to allow the passage of the socket wrench thus precluding the use of the propeller as a means of preventing the crankshaft from rotating. To work around the problem, I designed this simple tool which was beautifully made up by good friend Gene Johnson from materials found around the shop. Although the handle was made from round stock, flat stock would work just as well. The center hole is just large enough to accommodate the socket wrench and the plate was drilled using the propeller hub as the template initially, since the drive bushings in the hub should fit snugly so that the load is not taken by only two or three of them. Before attempting work on the propeller or hub, be sure the magneto "P" lead **really** grounds out the magneto or, remove the spark plug leads from the plugs.





NOW YOU KNOW

By Nick D'Apuzzo, From EAA Chapter 78 of Philadelphia, Pennsylvania's Newsletter

How many times have you heard people who should know better refer to a Balance Tab as a Servo Tab? Just so you won't make that same mistake, the following definitions should help to keep you straight.

BALANCE TAB: A balance tab decreases the force which must be exerted by the pilot to move and hold a primary surface in any given attitude. it is similar in appearance to the controllable trim tab and is hinged in approximately the same position. The essential difference between the two is that when connected to the airplane structure, the primary surface is moved in any direction, the tab rotates in the opposite direction. As the air stream acts on the tab, it assists the pilot in moving the primary surface to the desired position and holding it there. When the control surface and balance tab will return to the neutral position because of the action of the air stream.

SERVO TAB: A servo tab is used to assist in moving a large primary airfoil and holding it in the desired position. In appearance and location, it is similar to the balance tab, but is controlled from the cockpit by a linkage to the primary control mechanism. The tab linkage is connected parallel to the primary surface linkage, which has a spring-loaded cartridge incorporated in it. When the control in the cockpit is moved, the spring compresses, permitting the primary surface to remain stationary for a time while the servo tab moves at once. Because of the action of the air stream, this tab moves the primary surface. Whenever the pilot releases the control, the entire system will return to the neutral position.

NOTE: The terms "primary surface" and "primary airfoil" are used interchangeably.

TECHNICAL TOPICS

CONFESSIONS OF A HOMEBUILDER — MEASURING

by Jim Davis, EAA 108319, Editor of STICK 'N RUDDER Alexandria, Virginia Chapter 186's Newsletter

There are many thousands of high-priced kits in the hands of aircraft builders. Yet there are remarkably few master craftsmen around: that man who understands immediately the nature of the problem and its solution **plus** having the dexterity and concentration to execute perfectly. The rest of us come stumbling along. "But I thought . . ., Hell, he didn't say anything about that in the instructions . . ., How am I supposed to . . ., Golly, throw it away, it doesn't even fit . . ., This looks awful, where'd I go wrong?"

And now the advent of composite aircraft designs can cut the time of construction by years. It also eliminates the need for a builder to be a master woodworker, welder, machinist, etc. These two characteristics are attracting many hundreds who want to fly — to build their own. All kinds of less skilled dreamers are getting into the act. This exercise is for them.

A few weeks ago we were sitting and talking with an old friend, who happened to be a master craftsman by profession, a pattern maker in a big industrial foundry for 40 years. We were thinking about the fine points of making measurements, laying out dimensions for plane parts. Asked him how he goes about making measurements, etc. at home in his basement. His answer was that he never did. When he expanded on this, we realied that he used and maintained his skills at precision wood and metal work like tennis or golf professionals who play competitively for a living. You never play under poor conditions, with poor equipment — or for fun with friends. It ruins your ultimate skill!

Measuring is an advanced life discipline. He never does it unless his equipment is perfect, his lighting and bench are clean, uncluttered and everything stable around him. It's very serious. Never at home on domestic projects. Let the ham-handed plumber and electrician solve these problems.

This all was a shock. Most of us need to mark off dimensions and scribe lines all the time, but now it appeared that personality, carelessness, impatience might be the source of dimensional problems. Measuring may be a procedure, a technique which should be approached with a professional attitude. No more of this slapping material and yardstick down on the first available flat space. How is the light? Is a pencil O.K.? Should a steel scribe be used? We've had many small disappointments with dimensions being not quite right; the neat fit slightly askew; no threat to safety or strength of assembly — but slightly askew. No one else will ever see it, but it bothers us, inside.

Long ago we learned to roll the pencil as the line is drawn; to hold it at the same angle during line making; to watch out for parallax; to look straight down at rule markings; to think about shadows on the work and the rule; to never start measuring at the end of a measuring tape or stick, to start in at the first big inch mark for example. This is all junior high school shop stuff, but useful.

The thing no one seems to have taught us was how to tell which dimensions are critical, super critical or not. One senses that some measurements in a plane's construction are very important, others are almost cosmetic; but which? It isn't always clear, so one ends up being cautious, but not supercritical of each measurement. How many times should we read each paragraph of designer Rutan's instructions for building his Vari-Eze. How do we know when we understand it well enough to execute the work. We've been fooled many times, remade numerous pieces, and finally taken to underlining and numbering every action verb in each paragraph. This makes a definite list of actions to be taken, less buried in the print. (**Get** a sharp knife, heavy shears and decimal tape together; **unroll, measure** and **cut** bidirectional glass cloth into eight pieces . . .)

If one takes pains to watch his mind at work, it becomes clear that a homebuilder's day is made up of numerous little "Pert" problems: arranging a logical sequence of actions. He may decide at breakfast time that he wants to cut out a handle for the flight control stick before noon — and cheerfully goes into his shop. But priorities arise and his mind begins to sort them out. The sequence of actions slowly gets arranged. If something is omitted, he stumbles. First, where's the material? What happened to the measuring tape? What is the diameter of the stick? Where did I put that hard pencil? Have I got any fine sandpaper or will I need to go to the store now. On and on. Eventually the handle is finished — about 4:00 p.m. It's a smart homebuilder who clearly focuses up on the classic three parts to every shop task: the makeready, the execution and the cleanup, and lean not to jump from one to the next until the first is completed. That makeready step can be a biggy. Clean off the shop table, get plenty of light, rustle up all the tools and no cheap solutions, locate the materials, pipe down the wife and kids so he can think, read the instructions a number of times, marking them up, looking for hidden meanings, "watch outs", etc. . . .

Everything seems to be a series of approximations and measuring is one of them. I remember in surveying class, accurate taping of distances was done by pulling on a spring-loaded tape; making three measurements or readings and averaging, checking the temperature in case compensation was needed. Same way in laying out plane parts. Keep asking the questions, how critical is this dimension? Why or why not? Have I checked the drawing enough? Am I sure? Then let's move . . .

CALCULATING YOUR PROPELLER

From the January, 1983 EAA Chapter 411 Newsletter

Here's how to figure the speed of an aircraft if it has a propeller of proper length and pitch and knowing these figures plus the rpm.

Known — Pitch — 52 in. Rpm — 2300

52 in. x 2300 = inches advance per minute

$\frac{\text{Inches per minute}}{12 \times 5280}$ = miles per minute

Miles per minute x 60 = miles per hour

$\frac{52 \times 2300 \times 60}{12 \times 5280} = 113.2$ mph

$\frac{50 \times 2400 \times 60}{12 \times 5280} = 113.6$ mph

If your airplane goes faster than its prop pitch and rpm figure indicate it should, the prop is longer than necessary and you will save fuel by shortening it some. You may also get better take-off performance. If your airplane goes slower than its prop pitch and rpm figure indicate it should, the propeller diameter is too small. (From the early edition of "Little Mag", Chapter magazine of Chapter 10, Tulsa, Oklahoma.)

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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LET'S NOT CONFUSE THE HORSES

From the Columbus, Ohio Chapter 443 Newsletter

The old days saw big, draggy biplanes being powered fairly successfully with 90 or 100 "horses". Today's 100 HP engine would hardly taxi one of those heavy, early birds. Why the difference? Are today's horses smaller? Not really, but we do have horses of a slightly different breed.

Horsepower (the rate of doing work) is comprised of two variable inputs as expressed in the formula:

$$HP = \frac{\text{torque} \times \text{RPM} \times 6.28}{33{,}000}$$

Now, the old 100 horse biplanes. RPMs were very low, perhaps 1500 or so. It follows then, that the factor which permitted its ponderous flight was torque — pure, raw torque. A more modern engine might also claim 100 "horses" but achieve it with twice the RPMs, thus betraying its much lower torque by comparison.

Obviously, the old biplane needed the huge torque to swing the 8' prop required to support flight. A light, sleek homebuilt with a 100 HP might need only half that prop diameter, but might also achieve twice the speed of the old plane with its higher engine RPMs.

When we talked about horsepower, we must consider the job the horses are expected to do. Is it a heavy, draggy job for a draft horse, or is it a light, fast job for a thoroughbred? Our homebuilts are not all light and sleek, and deserve a lot of thought in powerplant selection. The type of horses employed must be appropriate for the job. Whether draft horses or thoroughbred, such horses are never seen in the same harness.

EXPERIMENTAL AIRCRAFT ASSOCIATION

DESIGNEE NEWSLETTER

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