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.

THE PROPWATCHER'S GUIDE

From the EAA Chapter 729 Newsletter

Every year people are seriously injured or killed by walking into aircraft propellers.

As a pilot, you are the key person in preventing these accidents.

- — Always brief your passengers on the safe routes to and from the airplane, and stress that the area around the propeller is — DANGEROUS.
- — Emphasize that the greatest danger of the propeller is its being invisible when rotating.
- — Need assistance???? First shut your engine down and brief your assistants on their assigned task and emphasize that the area around the propeller is to be avoided.
- — NEVER ask an untrained person to handprop your aircraft.
- — NEVER ask an unqualified person to hold the brakes or operate the engine controls while you swing the propeller.

BRIEFING POINTS

BOARDING

- — Approach the airplane on the passenger entrance side ONLY.
- — Walk behind the wing from outboard of the wingtip toward the entry door.
  **Except when the engines are stopped and the cabin entry door is forward of the wing.
- — NEVER walk under the wing, except to enter the cabin door.
- — Always stay clear of the propeller(s) whether the engine(s) is running or not.

EXITING

- — Walk directly behind the wing toward the wingtip when leaving the airplane.
  **Except when the cabin exit door is forward of the wing. WAIT until the propeller has stopped rotating and always avoid the propeller area.
- — DO NOT WALK UNDER THE WING.
- — Walk to the wingtip before changing your exit path.
- — Avoid the area of the engine and propeller of any aircraft whether the engine(s) is running or not.

LOADING

- — When practical, the airplane engine(s) should be shut down for loading or discharging passengers or cargo.
- — Paths to and from the airplane should be the same as listed above.

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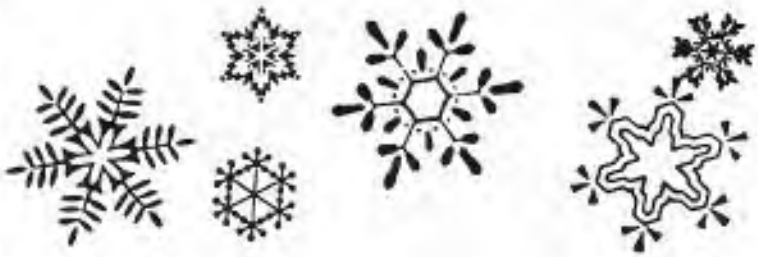


Designees and Subscribers:

Fall and Winter find many EAAers working diligently in their workshops. Each trip to the shop should include the consideration of the safety for the days or evenings work. Give tools and equipment a safety check before use. Is there a fire hazard? Is ventilation adequate? Think about it, a few moments for safety can save hours, days or years of future pain. THERE I ALWAYS TIME TO DO IT THE SAFE WAY.

This month sees the Winter Holidays bringing with them the Joy and Fellowship of friends and family. May your holidays be happy and the new year bring you and yours peace, prosperity and find you CAVU (Ceiling and Visibility Unlimited) in all endeavors.

Chuck Larsen, Editor

LETTERS 'N SHOP TALK

NUTS, BOLTS, COTTERS 'N THINGS

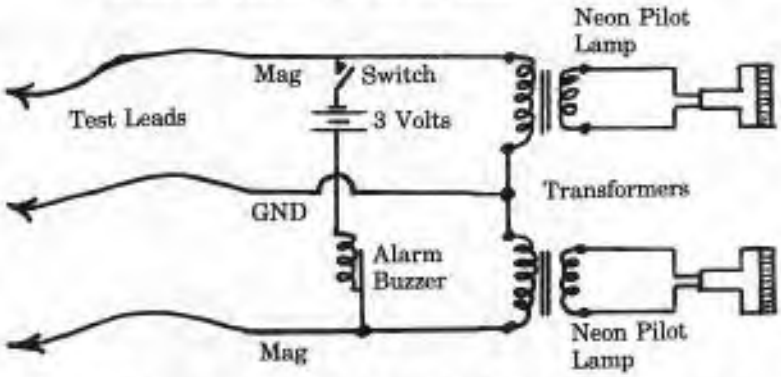
By Marsh Collins, Designee 632, as published in THE HANGAR FLYER, Santa Ana, California Chapter 92's Newsletter

One misunderstanding I keep running into is when to cotter or safety wire. It's not some rule the bureaucrats came up with — there's a reason for each. How many times have I seen a castellated nut securely cottered to a stud, which can promptly unwind from the casting.

The sole purpose of elastic stop nuts, cotters and safety wire is to prevent one threaded part from turning against the other. Drain plugs, etc. are not in question — they get wired. Elastic stop nuts are no-no's where the bolt is subject to turning (used as a hinge pin, pivot, etc.) or where heat is a factor (around engines, hot parts, etc.), and sometimes where tension adjustment is important. A cotter only prevents the nut from turning on the bolt. Drilled studs ALWAYS call for safety wire, usually wiring two or more together with a twist-usually 4 turns per inch min. between fasteners. Groups of bolts into a threaded body (propeller hub or engine accessory mounts, etc.) always call for drilled-lock washers, usually star washers on engine plates and accessories, but the best rule is — if in doubt — wire it.

MAGNETO TIMING LIGHT PROVIDES VISUAL & AURAL INDICATIONS

From the EAA Chapter 40 Newsletter



1 Utility Box (Radio Schaak CAT #270-627) 1.79
1 Switch
1 Battery Box (Various — to fit)
2 1½ Volt Batteries (Size A, C, or D)
1 Alarm Buzzer (Radio Schaak #273-004) ..... .99
2 Neon Pilot Lamps (Radio Schaak #272-338) 1.69
2 Transformers, Triad #5-17X 3.05/ea. 6.10
18' Test Lead @ .06/ft. 1.08
3 Insulated Alligator Clibs .35/ea. 1.05

ACCIDENT WRECKAGE

From the June, 1982 FAA CHATTERBOX

In the event of an aircraft accident, the wreckage should only be disturbed to the extent necessary to rescue injured persons. **If fatalities are involved, bodies may also be removed.** Any fire should be extinguished. Every effort to take pictures of the site prior to disturbing the wreckage should be made.

Authorization should be obtained from the NTSB or FAA prior to moving aircraft wreckage if life threatening circumstances do not exist or if the wreckage is blocking public roads or other throughfares.

Any questions concerning this information should be directed to the FAA facility involved.

AN INEXPENSIVE PANEL CHRONOMETER

From the Frederick, Maryland Chapter 524 Newsletter

A look at some current catalogs provides the information that an aircraft clock for a standard 2 1/4 inch opening can cost anywhere between $40 and $160. On the other hand, for just a few dollars and half an hour at your tool bench, you can have a neat little instrument on your panel which gives you the hour, minute and more.

The basic item required is one of those little LCD time pieces being sold by many firms as stick-on clocks, with a price of $7 to $13. See footnote.

The other item required is a piece of alloy sheet 2 3/8 in. square, the corners chamfered off 1/4 in. a hole of 1 3/8 in. diameter in the center and the four corner holes for mounting screws on a 2 5/8 in. diameter pitch circle. Optimum thickness for the plate is 0.040 in. Both sides of the sheet, or mounting plate, should be sprayed with metal primer, and the face with whatever color is selected for finishing.

The clock, made by Sun Hill Industries of Hong Kong, has a back which is normally pried off with a coin, by twisting it in the groove, about 0.050 in. thick, between the front and back of the clock. When the back has been taken off, it is inserted in the large hole in the mounting plate. Yes, it is the back which is inserted. Then, the (rest of the) clock is rotated to its correct orientation relative to the back, and then pressed into it athwart the mounting plate. If the mounting plate is of the thickness recommended above, there will be room for a knife to prise the two elements of the clock apart for battery replacement. Meanwhile the clock is rotated in the large hole till it is square with the moutning plate. A little adhesive tape at the rear of the mounting plate will resist any tendency for the clock to rotate from its correct orientation. It is also well to put other pieces of tape on the rear side of the plate at the corners are protection for the face of the panel.

This leads up to the fact that the clock is mounted on the front of the panel and not behind it. The reason for this is that the removal of the clock for occasional adjustment or battery replacement should be kept a simple operation. Ideally, four regular nuts, say 8-32 thread, (not locknuts) should be bonded on the rear side of the panel, so that the four mounting screws are easily removed. Phillips screws are recommended because there is less tendency for the screwdriver to slip and damage the panel.

Incidentally, the total weight of this instrument is well under one ounce.

The footnote referred to above relates to the higher priced LCD units, which have additional functions, including that of a stop watch. Access to the back is necessary for timing individual flights, and generally resetting the stop watch function. Therefore it is preferable to hinge the mounting face on one of its sides and have a fastening device at the other side.

TAIL WHEELS

From the Peach Ridge EAA Chapter 704 Newsletter

Lubrication of the wheel bearing and fork brushing should be checked often. The poor tailwheel is constantly being dragged through the dirt, blasted by sand blown up by the prop and all the while having to turn faster than the mains due to its smaller diameter. Checking of the springs, clips, tire pressure and shimmy damper will keep things rolling straight.

TECHNICAL TOPICS

DESIGNED TO CRASH

by Lt. Col. Robert W. Sweginnis,
USAF Directorate of Aerospace Safety
Excerpts from an article published in the October, 1981
edition of the U.S. Air Force FLYING SAFETY Magazine

Despite advances in system and flight safety techniques and enforcement, flying remains an intrinsically hazardous operation. Human error, be it pilot, maintenance technician, designer, or whomever, can and will continue to haunt us. So why not plan for the inevitable?

Why not recognize, while the design is still transitioning from between the ears to the drawing board, that things will go wrong? The big iron bird will take to running through the weeds, with the pilot and other folks, all passengers in that somewhat undefined event called a crash.

We have come a long way since Lt. Selfridge became the first of a long list of statistics; 40 G cockpits, restraint systems for crew, passengers, and cargo, and crash helmets. But losses remain. Many are avoidable.

The Crash Survival Investigators School at the University of Arizona has identified five factors which control the chances of crew/passenger survival during a crash. The acronym for these factors is CREEP.

C — container
R — restraint
E — environment
E — energy absorption
P — post-crash factors

The first four factors relate to the dynamic situation of the crash itself, the initial and subsequent impacts and deceleration forces until the aircraft comes to a halt. The last factor relates to what happens to the occupants after the metal stops sliding. A brief explanation of each of these factors follows.

CONTAINER

In order to survive a crash, it is first necessary to provide livable space for the occupants. If this space is crushed or punctured, the chances of survival fall drastically. It didn't take long for the founders of the flying services to realize that a 40 G cockpit was a highly desirable feature. Lindy had all the heavy stuff in front of him (engine and fuel) so that if he had to make a very sudden stop he wouldn't become the book mark in an aluminum and steel book. Today we can predict how and where the aircraft structure will fail during survivable crashes. Crew, passengers and critical systems can be located to maximize survival.

NO CONTAINER

RESTRAINT

After we provide the travelers with their living space, they should be kept from:

1. Banging against the sides of this space or objects within it.
2. Having other objects (e.g., cargo, equipment) bang into them.

The strength of all restraints should be sufficient to prevent injury at the force levels which can be expected during the most severe, but survivable crash.

NO RESTRAINT

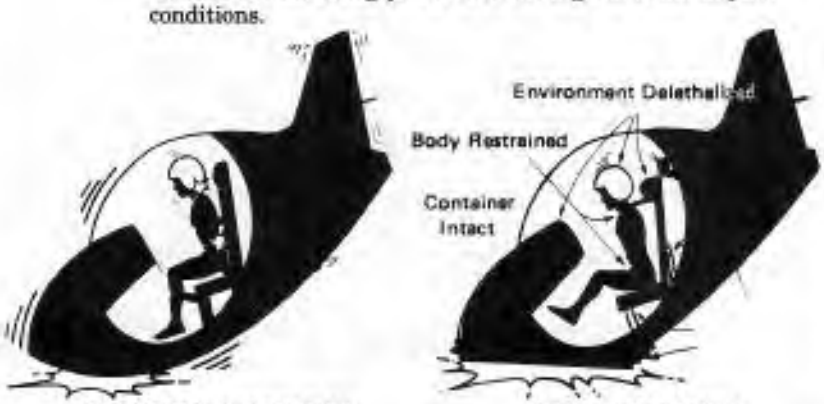
ENVIRONMENT

We have not built a box around our occupant and glued him to it. However, we can't expect to fully restrain the motion of head and limbs. The volume through which the unrestrained extremeties can be expected to move must be delethalized as much as possible. Either move the obstructions or pad them. In addition, energy absorbing devices can be used to attenuate the "G" forces transmitted from the airframe to the restraint systems. Since the body is not rigidly attached to the airframe, the acceleration forces experienced by the body may be either amplified or attenuated. A soft, deep seat cushion (elastic) can greatly amplify vertical "G" forces. Similarly, a deep seat cushion that deforms only at higher than normal loads (energy absorbing) can greatly reduce the deceleration forces experienced by the body.

LETHAL ENVIRONMENT

ENERGY ABSORPTION

Did you ever jump off the porch steps stiff legged and flat footed? Quite a jolt. Just as flexing our legs and feet cushion a landing from a jump, flexing (but not breaking) structure can cushion crash loads. If energy absorbing structure exists between you and the impact, your chances of survival are increased. This crushable structure not only reduces the decelerative forces it would experience, but it also tends to protect your container from being penetrated during the same impact conditions.



NO ENERGY ABSORPTION — ENERGY ABSORBED

POST-CRASH FACTORS

Fire, injuries, confusion escape routes, aircraft damage, visibility. Fire is the most important of the post-crash factors, over 75 percent of otherwise survivable aircraft accident deaths have been attributed to post-crash fire. Not only can fire kill directly through heat and toxic fumes, but it initiates and compounds the severity of all the other factors. Control of fire, therefore, is a key issue in aircrew survival. Until someone comes up with a fuel that won't burn in the open air (and people are working on it), the most effective means of preventing fire is to contain all fuels and flammable fluids. Intelligent designs can place lines and containers in the least vulnerable locations so that a structure which is expected to collapse or fail during a crash will not cause spillage. Fuel tanks, however, are so large that they most often cannot be "hidden" within the structure.

Because of the high energy exchanges occurring during the crash, only fuel tanks which can withstand extensive deformation without rupture and tearing can be expected to maintain their integrity. When these "crashworthy" tanks fail, the breach tends to be small and nonpropagating. When noncrashworthy tanks fail, they tend to rupture and release large volumes of fuel in a highly volatile mist or cloud. Ignition sources during or just after the crash sequence can initiate an intense flash fire or fireball which provides sufficient heat energy to ignite materials which then sustain the fire.

The US Army has sponsored the development of fuel systems which are capable of withstanding high impact forces without significant fuel spillage. These systems utilize tough tear and penetration resistant fuel tanks, self-sealing breakaway fuel lines, and other design features which eliminate or minimize leak producing damage to the fuel system. The FAA has also successfully tested a full-scale DC-7 crashworthy fuel system. The tests indicated that fuel systems incorporating crash actuated valves and crash-resistant bladder material were effective in minimizing the hazard of post-crash fire in survivable crashes.

Such crash testing and crashworthiness design programs are a part of a program supported by all the services and, in fact, the entire aviation community to design more survivable aircraft. Aircraft will continue to crash, but the better we design them, the better we can maximize crew and passenger survival.

POST CRASH FACTORS

EXPERIMENTAL AIRCRAFT ASSOCIATION

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