



EAA TECHNICAL COUNSELOR NEWS

AUGUST/SEPTEMBER 1986

PAUL POBEREZY: PUBLISHER,

BEN OWEN & ANN RUBY: EDITORS



Technical Counselor Leonard Milholland of Brookshire, Texas has visited Ray Ward's project. This first picture shows Ray in front of his Lycoming IO-540, (new engine).



The fuselage has been stretched 18 inches to accommodate the large engine and it was necessary to place the battery at the leading edge of the horizontal stabilizer in the aft fuselage.



The tailwheel spring is round, like a 185 Cessna, and is faired into the fuselage.

Technical Counselor Leonard Milholland comments that the aircraft is a BD-4 very highly modified. It has a metal wing with flush rivets on an extended spar from the fuselage that goes out one more rib to give greater strength. It has two 32 gallon tanks in each wing, the wing, however, is the same



size as the BD-4. The landing gear is tubular, from a 172 Cessna, and the fuselage box accommodates the 172 gear castings. The seats are made from aluminum tube and weigh six lbs. without the covers. The rear seat will be a cloth sling with laces that can be adjusted for different height passengers. The trim will be a button on the stick, electrically operated. Congratulations to Ray Ward of Houston, Texas for a beautiful airplane.

Editorial

This month, we have a guest Editorial by EAA Chapter 302 Newsletter Editor, Marcia Sullivan, in Conroe, Texas.

THE BIG "I"

There are still some misguided individuals who believe that "love makes the world go round." Sorry, but 'taint so! From the Rotunda of the United Nations to the bedroom, it's COMMUNICATION.

I have a Bachelor's Degree in Communications from Rutgers University. Nevertheless, most two year olds can probably do a better job of communicating than I can. At that age, most communication begins with "I", such as I want, I love, I hate - then they go to school and are taught not to start sentences with "I". They are taught to be tactful (untruthful) and civilized (manipulative). Later on, they may go to college and learn an even more advanced and esoteric form of this communication. By then, they have forgotten how to use "I" language, which is a way of talking that leaves very little room for misunderstanding.

Second-guessing and mind-reading is both frustrating and unreliable, but that's how most individuals and organizations communicate and interact, from board meetings to bedrooms. The more populated and complex the social structure becomes, the more difficult the interpretation of what's really going on becomes. There is a simpler way. Try using these five ground rules:

1. Say what you mean.
2. Be clear.
3. Believe what you hear.
4. Trust that you're both on the same side.
5. Listen carefully.

This is a challenge, folks. Go out and use these rules for a few days. You might begin in the cockpit with a mike in your hand. Or maybe at the next meeting.

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.

FIBERGLASS FUEL TANKS

The problem with fiberglass fuel tanks made with polyester resin has interested me, particularly since I recently lost the plastic tip from the float needle on my car due to use of fuel with Methanol. The float needle tip just disintegrated. I had planned to build wing tanks from Kevlar similar to Darry Capps. I am using West Epoxy, which works very well with either Kevlar or fiberglass. I wrote to the Gougeon Brothers and asked for words of wisdom about using the West Epoxy and Kevlar for tanks. I will quote from the February 19, 1986 letter from Jan Gougeon, "In general, gasoline by itself shouldn't be a problem. It doesn't look as though Toluene would be a problem either. A 100% Toluene test showed a reduction in strength in WEST SYSTEM Epoxy, but the small amount in gasoline shouldn't be a problem."

"The bad news is when Methanol is added to gasoline. Although it doesn't appear that anything is emitted from WEST SYSTEM Epoxy into gasoline containing Methanol, the epoxy loses a significant amount of strength. I don't know if FAA will allow this to happen to aviation fuel, but our chemist thinks Methanol will be used more as time goes on. We have used our products for fuel tanks in our boats for many years with good success."

From the above, it still looks like the additives, particularly

Methanol, could be a problem. Since the Gougeon brothers (WEST), have extensive experience in the boat business and with epoxy, I have the utmost faith in their products and their engineering skills. They have always been most helpful in helping with problems and answering questions. NOTE: Methanol is **wood alcohol**. Ethanol or grain alcohol does not cause as severe a problem, as far as EAA knows now.

BUILDER'S TIPS

From the Cozy Newsletter, 13, April '86, Co-Z Development Corp., 2046 N. 63rd Place, Mesa, AZ 85205.

When mass balancing flying surfaces, if the designer's method won't quite give you enough weight, call and ask him if you can use the alternate method recommended for the Cozy: In normal installations, a 3/8 inch steel rod is imbedded in the leading edge of the Cozy aileron. When that proves insufficient, Cozy recommends substituting a section of 3/8 inch OD aluminum tubing for a section of the steel rod. The tubing can be filled with lead shot and epoxy to increase the weight in the nose of the aileron.

Technical Tips

HELPFUL TIPS

From EAA Chapter 439 Newsletter, SMOKE OIL, Michigamme, Michigan.

1. The life of a file can be lengthened by putting chalk on the lands every time it is put to use. The chalk acts as a lubricant and the imbedded fillings can be easily removed with a wire brush.

2. Straight and true holes can be made with a hand drill by using a jig made by drilling the desired size holes through channel iron on a drill press. The jig can be held or clamped to the work and then the hand drill used. (See figure 1)

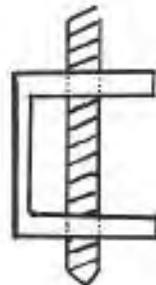


FIGURE 1



Dirt dauber nest on the pitot tube.

Leonard Milholland, Technical Counselor from Brookshire, Texas, parked his Junior Ace outside for a short while after he had flown it. Later that afternoon, he was to take his grandson for a ride. He **always** runs a pre-flight before **every** flight, so it sure paid off this time! "I am sure I could have made it back to the airport OK, but a good pre-flight saved me from finding out. I had been flying the Junior Ace for the past 10 years. I have a habit of flipping the pitot cover on every pre-flight, mainly to check to see if the steel pin hasn't rusted. A dirt dauber had locked my cover in just a few hours. I broke the nest open, and there were five spiders (food) and an egg inside. Dirt daubers look just like a wasp, of course, only they are black. I pay my grandson .25 cents each for every one he kills, and he has earned \$30.00 so far. But with a five to one spider count, which is better? Kill the dirt daubers and be up to your knees in spiders?"

SILICONE AIRCRAFT FINISH ADHESION

Most of us are aware that any product containing silicone should not be used any place where you want epoxy, glue or paint to adhere. Silicone will just stop most subjects from adhering, and there is no way to clean it off.

I checked with Joe Percz, President of USATCO (U.S. Air Tool Company, Inc.) in Long Island, New York, telephone 1-(800)-645-8180. Their company makes quite a few air tools for aircraft use and his comments are that lubricating oils don't have silicone added, that there is no point to this and it is an unnecessary expense. He says that some greases might have it, but he feels that most of them that do have it are going to claim "silicone added" as silicone is an expensive item to add. He suggests that you use Marvel Mystery Oil or Three-In-One Oil for your tools. Any oil is better than no oil as the lack of lubrication adversely affects rotating and moving parts and the lack of lubrication also lets moisture get at the metal to deteriorate it. His comment - "look on the outside of the container as practically every manufacturer using silicone will put this on the label due to the high expense of adding it."

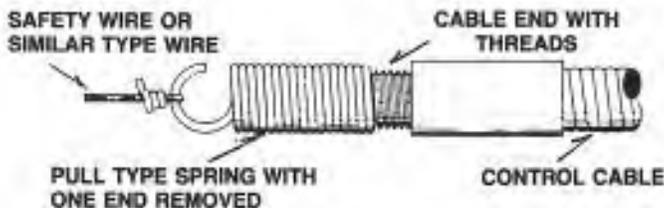
RESTORER'S NOTEBOOK

From EAA Antique/Classic Chapter 7 Newsletter, Runway 7.

Those *# + !*#! Cable Replacements!

To remove and replace a trim tab cable on an Aeronca Chief without removing the pulleys, remove one end of a pulltype spring - the proper size to fit the threaded end of a control cable. By screwing the spring on to the threaded end of a control cable and attaching safety wire to the spring, you can remove and replace the trim tab cable.

The only problem was that the large swaged part of the cable had to be forced, slightly, through some of the brackets that were over the top of the pulleys.



Here's an idea that has worked for me. When using an old cable to pull a new one through, get a piece of shrink tubing close to the cable size. Use the shrink tubing to connect the two cables together, and pull the new one through.

It made all of the bends around the pulleys and fit through the fairleads. These two methods could also be used to pull cables out of their hiding places for closer inspection when needed.



"I found the clamps and this tool to be vital to me while building my aircraft. I have dimensioned everything. This combination allows you to align your parts with one hand and clamp it with the other."

Respectfully yours,
Jacob T. Lewis, Jr.
Technical Counselor #1776

RIVETING HINT

From Technical Counselor 77, Steven Yuhasz, North Tonawanda, New York.

When riveting aluminum assembly (wing, fuselage, etc.) and you have a lot of continuous riveting to do, insert all rivets in assembly (AN 426's or AN 470 rivets) and coat all rivets with Carter's Rubber Cement to hold in place. After rivets are driven and developed head is satisfactory, remove Carter's rubber cement by rubbing off with a cloth.

NICKEL CADMIUM BATTERIES

By Ben Owen

The nickel cadmium battery is being used on many of our aircraft — powering starters, radios, etc. Several features unique to this battery include the fact that the electrolyte does not actually enter into the operation of the battery as it does in the lead acid battery. The specific gravity of the electrolyte does not change in nickel cadmium batteries. The battery also has more power to weight than lead acid battery.

One of the nice features of these batteries is their fast recharge (due to low impedance). This feature also allows the battery to put out more power quickly. Cold temperature doesn't severely affect the output of nickel cadmium batteries, which is a good feature in cold weather.

Some of the features regarding discharge of the battery include the fact that the capacity of the battery can only be determined by a full discharge at a known rate over a known time. This is part of the routine maintenance procedure for this type of battery, and is a shop operation. As negative elements in the battery accept capacity more efficiently than positive elements, full discharge is part of routine servicing of this type battery. In fact, full discharge, and then shorting

out to a completely dead situation and letting cool for a minimum of three hours before recharging, is the typical way of servicing the battery in the shop.

When fast charging, the battery can accept more than 90% of its capacity in 20 minutes, a very useful feature. The water should never be replaced until a full charge is completed (providing it is not seriously down on water). In the event the battery is taken out of the aircraft, you can keep up the charge by providing a slow maintenance charge every 10 to 15 days. This should take 1-3 hours, depending on charge rate.

If you notice that one cell is lower than others for some reason, servicing would include full discharge, letting it cool and recharging. If you have the equipment, discharge again at a measured rate to see if capacity is completely up. Nickel cadmium batteries can be recycled in this manner up to three times in one sitting, in the event they appear to be loosing their full capacity.

If you use the battery excessively or start too often, possibly one or more cells may damage or weaken the substance between the plates due to overheating in the charge phase. This lowers the resistance in those particular cells and then these cells are able to take on more of the excess charge causing heat, etc. This is erroneously called "thermal runaway". Actually, even if the battery goes into this condition, you can easily stop the process by switching the battery switch to "off", as "thermal runaway", (a misnomer), **can only occur while the battery is being charged.**

Most executive aircraft using nickel cadmium batteries are required to have a heat monitor or sensor that senses when the battery reaches 140 to 160 degrees F.

Like all electrical items, it pays to check the connections, particularly the ground connection, for corrosion from time to time. It is a good idea to use the manufacturer's recommended service intervals as a guide and establish a log and record on these service intervals, that work best for you, so you will be sure service on your nickel cadmium battery is maintaining it in an almost fully charged condition.

When charging these batteries, charge up to the level "overcharge" to bring both positive and negative plates up to 100% capacity. During overcharge, hydrogen and oxygen gases are harmlessly released into the atmosphere through special vented plugs. Again, follow the manufacturer's recommendations on service for good results.

Visit Report

Following are just some of the many visit reports received at Headquarters. Technical Counselor D. Neil Rettinger of Osceola, Indiana, is following three different projects, as the following indicates.

Modified Taylor Monoplane that Neil had intended to see before completion, but it simply was completed before he had a chance! (It went together in three months.) The owner, designer and builder is John Jones, Elkhart, Indiana, who has previously designed and built four ultralights dubbed the Unflyer 1, 2, 3, and 4. He is also very energetic and prolific! Neil had the honor and privilege to fly the modified Taylor. It is responsive and light on the controls. Landings are much more easily accomplished using the wheel rather than three point. Span increased 6 feet, length increased 3-1/2 feet from the Taylor plans. Spruce spar caps 3/32nd inch spruce D-section forward of the main spar foam and composite ribs. Stress for +6 g to a -5 g. Dacron covered.





Milt Hatfield taxi's out as test pilot on Dr. Snyder's Arup. This aircraft was designed in the 1930's. There is an article on it in the March 1969 issue of SPORT AVIATION. He has constructed an ultralight version of it powered with a 266 Rotax. They were all out to his place for a chapter meeting in May when he flew for them. Few people were aware of Milt's new



airplane until the chapter meeting. Not that Milt was hiding it, but rather he didn't promote it!

Looking rather like a model on climb out, the aircraft was out on its successful second flight of May 29, 1986.



Also in Elkhart, Marty King's Minimax wing shows the lightening technique used in the tip area.

Here, battens are being used to shape the canopy top. The



builder has been a prolific RC modeler, and his experience is evident in quality of the workmanship. It probably also accounts for having his Minimax ready for cover after starting of February 14, 1986.

COUNSELOR NO. 1180, ALEX STROJNIK OF TEMPE, ARIZONA, visited a Motorglider built by Tom Sweeney of Draper, Utah. Engine and Horsepower: KFM - 30 HP. Reduction. His comments: "Final inspection, proof-load testing the wing, horizontal tail, engine installation: cooling channels will need experimentation. Building and load testing most satisfactory. Propeller???"

COUNSELOR NO. 1038, GLENN TUTTLE OF BOUNTIFUL, UTAH, checked out Ron Furden's Cuby in West Valley City, Utah. "I looked at fuselage welded clusters, reviewed welding technique and gave demonstration. Rather than reducing flame size, he is welding on the side of the flame. Should use smaller tip, also." Powered by Continental C-85-12F.

JAMES A. HOAK, COUNSELOR NO. 412 IN STOCKBRIDGE, GEORGIA inspected a Kitfox belonging to L. Glynn Acree of Roswell, Georgia. He states: "Inspected kit as received from supplier. No major problems noted. Discussed treating tubing internally. Powered by Dragon 50 HP. Has EAA Aircraft and Engine logs, and I advised builder to obtain Sport Aircraft Builders Handbook."

ROBERT HALEY OF MARLBOROUGH, CONNECTICUT, COUNSELOR NO. 64, went to Coventry, Connecticut to look at Randal Hershberger's Q-2 powered by a Revmaster DQ2100 cc 64 HP. The fuselage is 40% complete, main wing and wing controls completed, canard cores cut out - preparing for assembly, following plans except for modified main conventional landing gear. Good Workmanship.

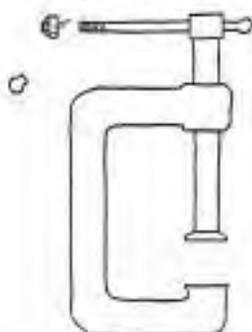
HAROLD E. KNAUTS, COUNSELOR NO. 1829 OF IDAHO FALLS, IDAHO talked about a First Strike Supercat being built by Orris Eyler of Pocatello, Idaho. Uses Rotax 337 37 HP engine. They discussed latest plans revisions and construction materials.

TED TRAVIS, COUNSELOR NO. 1291 IN FLUSHING, MICHIGAN, inspected Joe Brancik' Corben "C" Model Baby Ace in Milford, Michigan. Uses Continental A-65. "I believe finished aircraft will be nice looking Corben "Baby Ace". Not covered yet, not able to check hardware usage. Needs allen stops."

"C" CLAMP MODIFICATION

From Bob Nelson, Technical Counselor 1616, Chapter 106 in Boston, Mass.

When "C" Clamping up close to a bulkhead or former the slide handle can be a nuisance for those of us with only two hands. Cut off the end of the handle and remove it. Tighten "C" clamp with fingers and snug it with the slide in half turns. Thread the slide for a lock nut to restore its captive feature.



PURSuing THE CULPRIT

Bob Schuck, EAA Chapter 289 in Sioux Falls, South Dakota, wrote the following:

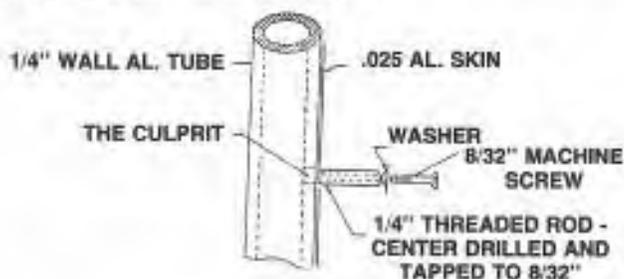
Call it a slight inconvenience, a setback, stumbling block, or just bad luck, but for now, let me refer to it as an irritating experience! A few weeks ago, I was attaching the skin on my T-18 to the windshield frame. This frame is constructed from 1/4 inch thick by 1 inch diameter aluminum tube. As the drawing indicates, an 8/32 inch screw was to be used to attach the skin. After drilling a pilot hole, I started the tap. The first hole tapped went without a hitch, so my confidence soared as the second tap was under way. My cool suddenly turned to ?*%#! as I looked at a broken tap peeking from the hole. The ?*%#! didn't help much, but it did seem appropriate at the time. I was suddenly reminded of Kari Malden's commercial on TV - "What will you do? **What WILL you do?**"

My first half hour of problem solving was unsuccessful. The typical problem solving sequence went something like this: No, that won't look right - damn, too much time - double

damn - too expensive to replace the part - more damns, etc.

Just how do you deal with a tap broken off in aluminum? To complicate matters, this one was broken off flush with the outside surface. After several futile attempts to back it out, I finally took a pin punch and pushed it through to the inside. The hole was then drilled for a 1/4 inch x 24 tap and threaded. Next, the threaded 1/4 inch rod was drilled down through the center. This was a little tricky. Three attempts were made before the hole was centered. After tapping the 8/32 inch threads, the sandwich shown on the drawing was ready for assembly. A little thread lock was placed on the 1/4 inch rod and the entire assembly was fed into the hole.

This ho-hum solution didn't make me ecstatic, but it was satisfactory. A superficial inspection indicates a normal installation, but that little exercise cost me four and one half hours! **BOY, ISN'T THIS BUILDING FUN?!**



SPRING CLEANING

From Chapter 2, Fort Wayne, Indiana, Newsletter, May 1986

When doing your "spring cleaning" of your bird, think of the Islands. No, I don't mean Don Ho. . . think pineapples!! Proteolytic enzymes will often aid in getting particularly tenacious bug remains (which are mostly protein) off the leading edges of wings and tail surfaces (without damaging the paint) and that's just what can be found in pineapples. Go over bug spots with a big hunk of pineapple, allowing several seconds for enzymes to work. The fibers in the pineapple make a good gentle abrasive, so rub back and forth to dislodge the bug remains. Follow with a moist cloth wipe. Since the pineapple juice is acidic, you may want to moisten the followup cloth with a mild soap, such as Ivory liquid.

Safety

MECHANICAL CAUSE ACCIDENTS

06/14/85 Polliwagen - On its first flight had a hard landing. Substantial damage with serious injury. The builder had fabricated the nose gear too long and also the elevator had insufficient enough travel to flare properly for landing even with full flaps. Landed on its nose gear and pilot lost control.

08/26/85 This is a Coot Amphibian - a red rag used as an inlet cover was left in the inlet and sucked into the carburetor, causing engine slow down and stoppage. The aircraft was destroyed with minor injuries to the pilot.

07/11/85 Bensen Gyrocopter - Had the throttle cable sheath holder loosened and developed no throttle response, losing power in the pattern. Demolished with no injury.

08/16/85 This Falcon XP light aircraft using an Orion 3-blade propeller had a blade separation from the 1 piece propeller. Air pockets were found in the hub due to the forming process. There was no accident involved. This is a service difficulty.

08/26/85 Stolp Starduster - Horizontal landing gear brace separated at the weld due to poor penetration. There was no accident involved. This is a service difficulty.

09/27/85 This service difficulty on an Acro Sport II with an IO-320 engine had the oil pressure transducer nipple break causing loss of engine oil in flight. Post-flight inspection showed oil pressure transducer fitting broken. In replacing of the broken item, a shorter assembly was made so as to lessen the moment on any vibration that might occur.

BULLETIN BOARD

ERRORS AND ADMISSIONS

Dear Ben: Having just finished the April/May 1986 Technical Counselor News, I thought I'd call several "underwear on-tanglements" to your attention that should be corrected in the next edition.

ENGINES, P. 3 & 4 - In the illustration you cite of a BMEP of 150 psi on a piston of 4 inch bore and are of 12 sq. inches, the total pressure on the piston remains 150 psi, not 1800 lbs. as stated. The total force becomes a product of the area and the pressure, which is 1800 lbs. Pressure is force per unit area, while force is simply force.

HYDROPLANING COMMENT, P. 6 - The braking speed for 100 psi would be the square root of 225, which is 15 mph, not 45 mph. Frankly, these figures leave the impression that the cited equation is a little too simplistic.

FUELS, P. 6 - in "Dripping Auto Gas", the second sentence states, "as much as a capful of fuel draining out". The question is, how much is a capful?

SPITFIRE DEVELOPMENT, P. 6 - The article states, "They developed some problem with yaws." I doubt the Spitfire had this problem, as Webster defines "yaws" as an infectious tropical skin disease caused by a spirochete. Perhaps the British designers spent too much time in India.

Otherwise, very interesting letter.

kindest regards, Joseph W. Hillebrand, EAA
No. 70878 Technical Counselor No. 999
26429 S. New Town Drive, Sun Lakes, AZ 85248

EDITOR'S COMMENT: The entire braking formula is (the square root of pressure) X 9, not the square root of (pressure X 9). This error was corrected in the June/July issue.

NYDIA MEYERS PASSING

Nydia Meyers was the widow of Al Meyers, the designer of the Meyers OTW and other Meyers aircraft. She was also the donor of the last built Meyers OTW biplane, Serial No. 101 to the EAA Aviation Foundation.

From Michigan State Organization, Douglas C. Robertson, President.

The unexpected death of Mrs. Al Meyers is a sad loss to the aviation community and others who knew her. Up to the time of her death, she was actively promoting a fly-in scheduled for July 4, 1986 at the Tocumseh, Al Meyers Airport. Without her support and involvement, the airport would have been abandoned years ago. After the death of Allen Meyers, she worked relentlessly to maintain the airport and her husband's memory.

The fly-in was still held as scheduled, and many EAA members attended for their enjoyment, and as a tribute to a fine lady.

Mrs. Meyers was an airplane enthusiast and held a private and commercial pilot's license. She was active in numerous aircraft and professional societies. Nydia and her husband formed the Meyers Foundation to support scientific research and development - airplane design as well as medical endeavors. Dr. Nydia Meyers held a bachelor of science degree from the University of Michigan School of Medicine, Department of Genetics. Her articles were published in more than forty scientific journals. Flying had been her hobby since her college days.



EAA TECHNICAL COUNSELOR NEWS

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