EAA® Technical Counselor News

DECEMBER/JANUARY, 1987

BEAUTIFUL GREAT LAKES

This beautiful Great Lakes was built by Tom Green of 6273 Pleasant Hill Drive, Rt. #2, West Bend, WI 53095. It was test flown September 13, 1986, by Technical Counselor #832, Bernie Holloway, 611 Maxon Street, Waupun, WI 53963. He reports, "Flies great! Needs very little rigging adjustment. Very stable little airplane - quick!" Tom Green is an industrial designer, and when you see a close up, the airplane looks just as nice as the snapshot. He has wheel pants for it. Congratulations, Tom!

BABY GREAT LAKES

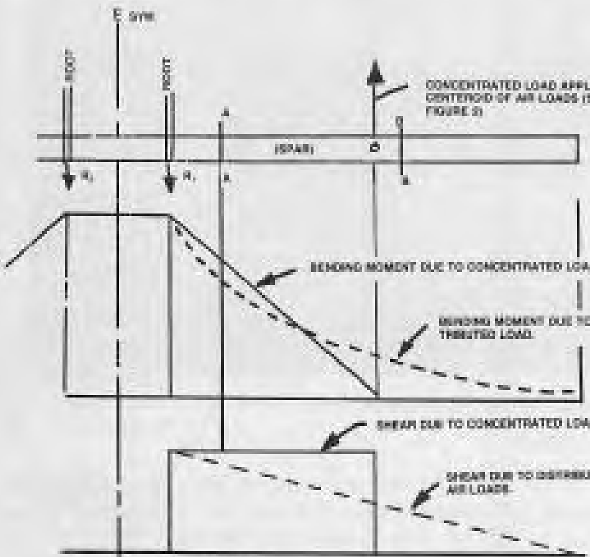
Technical Counselor, Bernie Holloway, has assisted the builder Tom Green with the weight and balance. If you take a good look at the picture, you will see the unique feature of the Baby Great Lakes, and this is that the upper wing is set on at a higher angle of incidence than the lower wing. The upper wing is at about a 5-1/2 degree angle to the upper longeron, which is the datum line. The Baby Great Lakes is known to be a very stable airplane, possibly more so than a Pitts, and flies about like a Pitts. Bernie Holloway has, for years, been associated with Baby Great Lakes builders, and built one himself in 1971, which took two years and one month to build. He wrote the construction manual for that airplane, and revised it in 1986 with Paul Kepner, another Baby Lakes builder and retired aerospace engineer. Bernie also has built a full size Great Lakes, which he started in 1972 and finished in 1979, and it is seen at Oshkosh every year. He states, "The Great Lakes is a tough airplane to build for a homebuilder because of the production prints. They assume that there will be jigs, stamping equipment and machines for precision bending. The finished product is worth the effort though!" The Great Lakes has an O-290-2 Lycoming of 135 HP, weighs only 1,042 lbs. empty, and he gets very good performance out of it. Probably as good as the 1300 lb. factory ones with 150 or 160 HP in them. He cruises his Great Lakes at 112 to 115 MPH and it does well with a 74-52 Sensenich steel prop.

Design

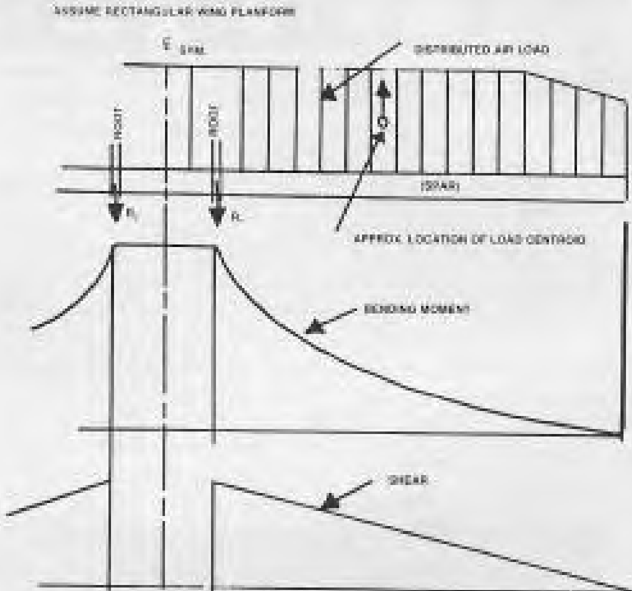
DESIGN NOTES FROM LADISLAO PAZMANY

NOTE: There was a simplified static loading test letter in the LIGHT PLANE WORLD, June 1986, page 6, written by Mr. Norman Bang. We asked for Paz's opinion on this, and got the following information . . . - Editor.

"Using a single concentrated load for testing could be a mistake because:
1) The only point where bending and shear are the same as induced by a distributed load is at the root.
2) At a section A-A, the bending moment due to a concentrated load is higher than the bending moment due to distributed load. Therefore, the caps will be overloaded.
3) At a section B-B, there is no bending or shear. If the caps and web are tapered, there may be a weak spot and since it is not tested, how do we know it is any good?
4) You can see that the shear immediately inboard of the concentrated load could be as much as twice the shear due to distributed load, and that may fail the shear web, because there is too much load.
The write-up in the magazine indicates a premature failure of the cover cap (in tension?). This is rather unique. The failure was at about half of the design load? 425 lbs. in lieu of 800 lbs. Something is very **fishy.** Hard to believe that "too dry wood" will fail at 50 percent or less of calculated load. I did not know that you have to irrigate wood spars to keep them wet so they can take the load?



(FIGURE 1)



(FIGURE 2)

Anyway, to design ANY light airplane to 3g load (I assume limit load) is (may I say) criminal. In my book, I would design to +6g (LIMIT) and it does not need to be an aerobatic airplane. I like to see the +6g's just to avoid this type of surprise.

I may add that it seems that the spar cap failed at approximately the root, and that is the ONLY point where a distributed air load or a concentrated test load yield same bending moments and shear. So by great coincidence, we may say that this test is valid to simulate loads at this critical section. Hope I did not make it too complicated.

Mr. Bang indicates in his letter that the "spar gets converted to a D spar for greatly increased strength" - well, it all depends on what the D box is made from. If it is a thin sheet of plywood, it will add next to nothing to the bending strength of the spar. The purpose of the D box is to provide TORSIONAL STRENGTH or RIGIDITY, and normally, it is not even considered as part of the bending material.

On the other hand, if the D box is made up of heavy plywood, say 3/8 inch or so, then it may add SOME strength to the bending.

Ladislao Pazmany, Pazmany Aircraft

KEN MAGGART AND HIS "SIDEKICK"

Ken Maggart of 807 - 78th Street, Tampa, FL 33619, is building this original design "Sidekick" and progress is being followed by Technical Counselor #1855, Michael P. Kennedy, 1205 Vistaview Lane, Valrico, FL 33594. The airplane is all metal pop riveted with stainless steel rivets and good workmanship throughout. This is a single seat airplane with a full canopy.

BD-4 FUEL FLOW PROBLEM

From James L. Miller, Technical Counselor #529, 4733 Harvard, Kansas City, MO 64133, who looked at a BD-4 for a builder in Missouri, and came up with these suggestions.

The BD-4 Aircraft has apparently earned a reputation for fuel flow problems. One insurance company reports that 100 percent of the BD-4 aircraft that they have insured have been damaged as a result of fuel flow problems. Consequently, this insurance company will not insure a BD-4 with the original design fuel system. After being refused insurance, a local builder sought assistance in evaluating his fuel system. This article is the result of that evaluation.

The BD-4 utilizes fiberglass wing cells for fuel tanks, with the majority of the fuel space being located behind the tubular spar. Feed lines from each tank port join together near the fuel selector valve that is located below the instrument panel. The fuel selector valve has 3 positions: Right tank, left tank and off.

This arrangement appears prone to experience fuel flow problems with anything less than a full fuel load, because one port can be uncovered during high angle of attack operations. The uncovered port then allows air to enter the line, near the selector valve, and reach the carburetor or fuel pump, resulting in complete power loss.

Secondly, the lack of a "both" position at the fuel selector valve subjects the aircraft to total loss of fuel flow in a slightly uncoordinated or climbing turn, if fuel is being drawn from the tank in the lower wing.

The obvious solution for the fuel selector valve is to modify it to provide a "both tanks" position, or, alternately, to obtain a valve incorporating this provision. It is also important to placard the aircraft for use of the "both tanks" position during takeoff and landing operations.

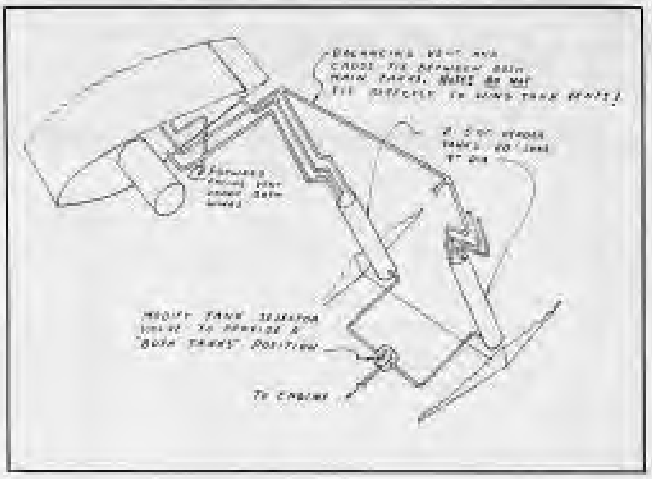
On the specific aircraft that was the basis of this article, the unported tank outlets that occur during high or low angle of attack operations were accommodated by installing a pair of 5 quart header tanks behind the rear seat. Each wing tank port feeds directly into the associated header tank via an individual 3/8 inch minimum diameter line. Each tank port is protected by a finger strainer. A balancing line to each header tank was installed. This is absolutely necessary to avoid an air locked condition and insure rapid refill of the header tank when normal aircraft attitude is resumed. The normal main tank vents must not be directly connected to this balancing line.

The header tanks were constructed of 20 inch lengths of 4 inch diameter 6061-T6 tube with .050 inch walls. The tanks were located vertically, just aft of the rear seat with the lower end secured to the aircraft's lower skin via the drain valve fitting. The upper end was secured to the seatback frame. Fuel is fed to the selector valve at a point one inch above the bottom of each tank. This provides a sump for water collection and removal. The general arrangement is as shown in the drawing. Total empty weight addition was approximately 4 lbs. for both the header tanks and the additional lines.

The positive aspects of these changes are that the header tanks not only add 2-1/2 gallons of additional fuel, but also allow reliable use of almost all fuel on board. Take off acceleration forces will tend to insure that the header tanks are full. Also, full header tanks will provide at least 10 to 15 minutes of usable fuel after almost every drop of fuel is used from the wing tanks.

The changes described appear to overcome the problems inherent with the original BD-4 system. It is suggested that equivalent changes be considered mandatory modifications for all BD-4 aircraft.

Jim Miller, Kansas City, MO



COCKPIT CONTROLS STANDARDIZED FOR NEW AIRCRAFT

From ON APPROACH, October 1986

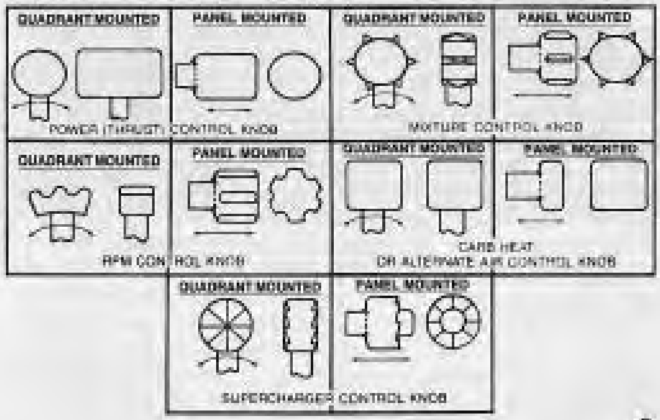
A final rule requiring standardization of aerodynamic, powerplant, fuel systems and auxiliary cockpit controls in all FAR Part 23 aircraft certified after August 11, 1986, has been adopted by the FAA.

"When a pilot operates airplanes with more than one cockpit design," the agency said, "the pilot's effectiveness is less than it would be were all of these operations in a single cockpit design." This is true, regardless of pilot experience and training level, the FAA said.

The agency said the action is being taken to "minimize accidents caused by random location, operation and arrangement of cockpit controls." It will, spokesmen noted, establish a level of safety for cockpit controls for small airplane consistent with that established for larger airplanes.

The illustration shows the shape and direction of movement of power controls for new productions aircraft.

EDITOR'S NOTE: It is very important to realize that on amateur built aircraft full throttle should always be forward, full rich always forward, and low propeller pitch, on controllable pitch props always to a forward position. We have had an accident recently that apparently was caused by the builder building the aircraft with full rich mixture to the aft position rather than forward, as he liked it there. It appears that the buyer, trained on the opposite arrangement, in this case pushed the throttle and mixture forward, and unfortunately the forward position was the lean position.



Engines

POSA CARB COMMENTS

We've had some comments on the Posa Carburetor from the June/July 86 Technical Counselor Newsletter, Page 2, by Jim Langley, and a note in the same issue on setting the Posa carburetor from the Dragonflyer, and an article in September 1985 by Gene Darst that started the whole thing. Gene reports that: "I read the article by Jim Langley in the June/July issue, and did know about the bulletin on the set screw; the plastic insert fix was my own idea, and of course, Rex Taylor issued a fix about 3 years ago for this particular problem." Possibly, a little history is in order. One of our 1986 EAA/Avco Lycoming Outstanding Safety Award entries was from Technical Counselor Neil Sidders of Rt. 5, Box 357-A, Monroe, LA 71203. Neil submitted a one piece main jet for use in Posa throttle body injectors.

The photo shows Neil's Sonerai II with VW and Posa carburetor airborne over Louisiana. His injector was manufactured prior to Rex Taylor's acquiring the rights to the Posa. When the first plate was tightened, the slide would not move. Milling .0005 inch from the face plate cured this. The next thing he discovered was a misalignment between the needle and the main jet of 1/16th of an inch. The needle missed the hole in the jet completely. He used a mill vise to correct this, and bored the injector body out to .500 inch for the main jet. The main jet was made from a length of 1/2 inch diameter brass rod, duplicating the general dimensions of the original main jet. The .500 inch dimension for the bore in the injector body was necessary in his injector to correct for the error in manufacture. This also allows for a larger size fitting for the holes. The injector was reassembled and installed only to find that none of the metering rods would run well enough to fly the plane. Close inspection revealed that the taper in the needles was not consistent, and all were rough and cut. (Neil learned years ago while racing super stock and modified production drag cars the importance of fit and finish of fuel metering components. Later, after graduating to fuel injection on the dragster, he gained some truly valuable tuning experience.) At this point, he threw away all the needles, reached over to the welding bug, pulled out a 1/8 inch brass rod and started from scratch. With a gravity feed system there won't be much velocity, so he tried to make up for it with volume. This is the reason for the step in the main jet bore, and for the 5/16 inch hose to the injector. A lot of fuel must be available right at the metering point.

When making his needles, he elected to ground the taper rather than mill them, simply because the ground finish is perfectly smooth, and for good fuel delivery, this is essential. The 1835 cc to 1855 cc engine requires a taper of .0165 inch to .017 inch per inch. He has a .020 inch per inch in his 2180, but he thinks .022 inch per inch would have been better. The needle is easy to make and involves only simple machine tool knowledge. If you don't know a machinist, try the local vocational school. They are usually glad to help.

The first step is to cut a piece of 1/8 inch brass rod, 2-7/8 inch long and deburr the ends. Using a tool maker's vise, clamp the rod in the jaws in such a way that almost half the diameter of the rod is above the top of the jaws. (.050 inch out.) Indicate the rod straight within .0005 inch. Now, put the vise on a sine plate set at .017 inch per inch. (.085 shim on a 5 inch sine plate.) Using a fairly soft grinding wheel (I used a Norton 32A 46-I8VBE) grind the taper 2 inches long, plus or minus .005 inch. **DON'T RUSH IT!** After grinding the taper, remove the vise from the sine plate and grind the flat for the set screw. I use a notch so that if the set screw ever came loose, the needle wouldn't fall out and cause the engine to quit. Next, remove the needle from the vise and with a very fine file, radius the tip from the flat over to the opposite side, as on the drawing. Polish the radius with a stone and lightly break all sharp corners.

The needle will work quite well with the original main jet, so it isn't necessary to build the jet to utilize the needle. Install the needle just as if you were using the needles supplied with your injector. The engine will usually start and run at about eight turns out. If black smoke shows at idle, go down one turn at a time until it cleans up, then come back out one turn. With the airplane tied down, get in and do a full throttle run-up. The engine should turn no less than 3,000 RPM static and the EGT should not exceed 1,200 degrees F. If you don't have an EGT gauge, shut the engine down and GO GET ONE! Make sure to install the probe 1 inch to 1-1/2 inch from the port, unless otherwise specified by the gauge manufacturer.

When the mixture is right, my EGT reads 1,100 degrees F on a full throttle climb out with 375 degrees F on the heads. When level and at about half throttle, my EGT reads 1,200 degrees F, the cylinder head temperature is stable at 340 degrees F, and I have 3,200 RPM for an indicated airspeed of 130 to 135 MPH.

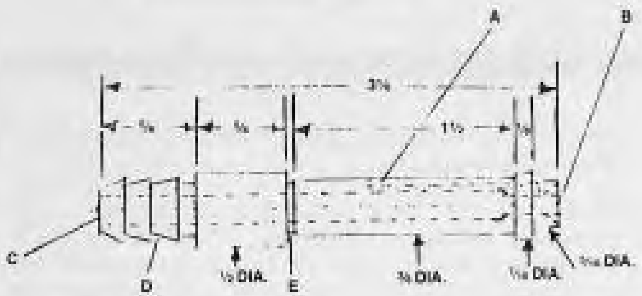
My airspeed indicator checks to be fairly accurate, but I have found that by playing with the static port location and size, I can make it indicate over 200 MPH at cruise! (Moral: Don't believe all the performance figures you read.)

One additional hint is to use Loc-Tite #242 on the mixture screw rather than to rely on the vinyl sleeve to maintain sufficient drag to prevent the needle from turning. I took the vinyl sleeve out of mine completely and have had no problems in nearly 100 hours of operation.

In closing, what I offer is a main jet that requires no maintenance or inspection, and a needle that provides a range of operation that allows full throttle climb out that is just slightly rich so that stair stepping is not necessary for cooling and the mixture leans out at cruise settings. In addition, the engine will idle at about 800 RPM, without loading up, yet is still rich enough to accelerate without hesitation and it does so without an idle mixture port.

Neil Sidders, Technical Counselor #1784
Rt. 5, Box 357-A, Monroe, LA 71203

One Piece Main Jet for 32mm Posa



A Key seat 1/16" deep x 3/32" wide x 1" long.

B Duplicate bell mouth as on original main jet. Maintain relation with A.

C Main jet orifice is reamed 1/8" x 1/8" long at outlet. Remainder is drilled 5/64".

D Barb fitting for 3/16" hose.

E Groove for snap ring 1/32" wide 5/16" diameter.

Comments from Rex Taylor, President of NASAD, c/o HAPI, Eloy Municipal Airport, RR #1, Box 1000, Eloy, AZ 85231, telephone (602) 466-9244, regarding Neil's one piece main jet for the Posa carburetor follow - edited for brevity:

Rex reports, "I don't see any negative aspects of doing what Neil Sidders has done, and indeed as he says, the one piece main jet that he's got is an improvement over the four piece assembly. There are some real problems in trying to retro-fit it in the Posa carburetors, however. Since the carburetors are built in a dye cast housing, the piece of the vinyl tubing allows the female side of the metering orifice to line up with the male needle.

"If you were to go to Neil's one-piece female orifice assembly, you'd have to very carefully set up the alignment on the carburetor and jig bore a hole precisely in line with the male needle to capture his one piece female orifice. Even then, I suspect that it would'nt be a thing that would be repetitive, time after time, because I am well aware of the tolerances involved on these things and the many things that have to be kept under control if the carburetor is going to work.

"The most glaring safety problem that we have with Posa carburetors is a two-fold one. The first problem is that people believe that because it is a non-certified carburetor, it requires no periodic maintenance and they simply won't replace the parts that we have told them repeatedly in various publications - SPORT AVIATION included - that need to be inspected and repaired on a timely basis. Probably all the plastic parts need to be replaced every year or two, and we're talking about $2.00 or $3.00 worth of parts. The builders simply won't do that.

"I believe one of the best services we could do for the homebuilder is to establish some sort of a means of disseminating the equivalent of AD's on non-certified parts and assemblies that find their way into homebuilts so that people can be made aware that these things do require service, maintenance, adjustment or whatever to assure safe operation.

"The other big thing that causes lots of problems relating to Posa carburetors, which is believed by the largest part of Posa users now, is that the Posa is immune to carburetor icing. Nothing could be further from the truth.

"A Posa carburetor is not particularly bad about carburetor icing in itself; as a matter of fact, it is probably less prone to carburetor icing than a Venturi type carburetor. But we take a Posa, put it on an intake manifold on a Volkswagon engine that hangs entirely below the engine, super cool the manifold, and the result is manifold ice immediately behind the Posa. John Monnett as been able to avoid this for the most part because he's sucking heated air out of the inside of his cowling for intake air. Ken Rand did the same. I know several Sonerai builders that I have talked to have experienced icing and made some dead stick landings because of it. One builder called me recently and had just made three forced landings in a row - every time he turned from base to final, the engine quit. A few minutes later, it would fire up and run just fine. He couldn't figure out what was wrong. Carburetor ice! He went ahead and put a carburetor heat box and heat muff on it, got some heated air to the carburetor, and his problem was solved."

PAZMANY PL-2 BY EDWARD BOOTH

Builder is Edward Boothe, Electronics Instructor, Airborne Navigation Equipment, Keesler AFB, Biloxi, MS 39534. The unique features of Edward's PL-2 include the lack of tip tanks; the airplane being converted to wet wings, which he believes is the only PL-I or PL-2 that's ever had the tanks removed. He says a significant improvement in handling and an increase in airspeed are very obvious. Edward is, of course, heavily into electronics, and if you will look closely, you will see a long ADF antenna, which runs from out of the cockpit almost to the tail on the bottom of the airplane.

JU87B STUKA

This .7 scale JU87B Stuka dive bomber is being built by Richard H. Kurzenberger, Technical Counselor #937, Chapter 533, 217 Sing Sing Rd., Horseheads, NY 14845. Dick states that the aircraft uses a Lycoming GO-435-C2 of 260 HP, and is 85 percent complete.

Safety Notes

MECHANICAL CAUSE ACCIDENTS

DATE **TYPE/CAUSE**

10/25/86 Cassutt - Had a forced landing following engine failure. Investigation revealed a broken piston pin, a piston and the cylinder head for #4 cylinder. Substantial damage to airplane. Pilot got out of airplane via the canopy and walked to where he could find assistance, but was later hospitilized with a broken back.

08/12/84 Cassutt - This aircraft had just been purchased by the pilot and was demolished while attempting an emergency landing on ranch property after an engine failure. Pilot was critical and not expected to live and the aircraft was demolished. Engine lost oil pressure and smoke poured from the exhaust and vibrated, shook severely and quit. Investigation revealed the #1 connecting rod had separated into small components with the two separted/failed ends showing elongation. The #1 rod cap and components initially examined at the engine tear down showed evidence of lack of oil, or starvation, and overheating. The #1 rod cap bolts were compared to the #2 rod bolts and it was demonstrated that the #1 bolts had stretched and showed evidence of necking prior to separation. The necking and stretching are typical of an overstressed separation.

10-11-84 Cougar - This aircaft had been worked on by the constructor for 20 years. FAA investigation revealed poor construction techniques and the engine had internal corrosion, apparently due to not being worked on or looked at over a long period of time. Some of the numerous manufacturing defects included turnbuckles improperly safety wired, structural tube welding containing slags and holes, rivets inserted and bent over other than bucked properly, elevator trim cable held in place by safety wire, aircraft painted with non aircraft paint, and of course, the signs of corrosion on top of the cylinder wall. Airplane contacted the ground in an inverted left wing nose down impact and was destroyed. Pilot was fatally injured.

12/22/84 Incident (Minor accident) Hatz Biplane - On landing, the weld attaching the gear leg to the axle failed, and the right wheel and axle departed. Aircraft slid and damaged the wing tip. No personal injury.

09/14/85 BD-5 - Accident occurred due to an apparent power loss on takeoff. The aircraft took off and climbed to about 50 feet where it rolled left and impacted the ground inverted. Fatal to 1, demolished. Log book entries made by the pilot/builder indicated he encountered cooling problems with the Johnson outboard engine installation. Post-crash disassembly revealed scoring and dark bluing of #1 and #2 cylinder walls, indicating overheating, and possibility of seizing of the engine. Pilot had equipped himself with a portable tape recorder and was narrating the flight as he took off. Witnesses indicated they felt he took an exceptionally long ground roll. His narrative continued, as he broke gound "that he liked to climb out at 85, the speed which he reported to be indicating at the time. While he was talking "about 85," you could hear a slight reduction in the engine RPM's, and he then reported that the speed had reduced to 80. Within just a few seconds time, the engine RPM's could be heard to gradually (over a 3-4 second time period) reduce to something near an idle speed before the crash stopped the recording. There were no further comments from the pilot during this period. Prior to takeoff, the pilot had made a comment regarding a sticking throttle.

07/24/84 Quickie - This aircraft took off and had a slow climb and lost power. There was substantial damage in the ensuing landing, and minor injury. It was found that one cylinder head gasket was leaking, which reduced the power to the engine.

03/02/85 Pitts Special - Was involved in aerobatics and engaged in an intentional spin when the engine quit. The aircraft had no starter and the engine could not be started; it landed hard with substantial damage and no injury. Investigation revealed that there was no compression in cylinders #1 and #3.

09/03/85 Pitts S1S - The rudder cable broke on final approach and pilot lost control on landing roll out. This 1/8th inch 2,000 pound tensile strength stainless steel rudder cable failed approximately 2 feet from the rudder connection. When viewed under 10x magnification, it appeared the cable had been previously chaffed or cut through over approximately 1/2 of its circumference. The remaining portion of the cable appears to have failed in an instantaneous tensile overload. The cable chaffed on the fuselage where the cable passes through the fuselage to the rudder horns.

02/19/85 This XTC Amphibian had an engine lose power as the choke cable slid out of position in flight and slowed the airplane down due to an over rich mixture. The pilot flew into the trees. Substantial damage, but no injury.

(date?) VariEze - This aircraft was fitted with the early lighter landing gear which collapsed on landing with substantial damage and no injury to the two parties on board.

STARDUSTER TOO PROBLEM

We had a problem with a Starduster Too when a party leaned on the ailerons on the ground and found they went to the locked position. Please see the photgraph. The service difficulty states, "The ailerons locked in the full deflect position due to absence of a suitable stop at the control surface. This condition was found quite by accident. The submitter stated that maneuvers such as tail slides, hammerhead stalls and wind turbulence might bring about this condition. The Stolp Starduster Corporation, Bill Clouse, President, has taken quick action on this and sent a drawing out for control surface stops on the aircraft. If you have a Starduster Too builder or flier in your area, you should have them contact Stolp Starduster Corporation, 4301 Twining, Riverside, CA 92509, telephone (714) 686-7943.

EDITORS NOTE:

Some calls to Headquarters recently have asked if, with a CFI endorsement, an amateur built aircraft can be used to build up solo time. It can be, as the attached documents.

March 5, 1978
(letter still applies)

Dear Mr. Wright:

This is in response to your letter concerning your desire to solo the Baby Ace Model D airplane as a student pilot.

It will not be necessary for you to petition for exemption from the Federal Aviation Regulations. The requirements for student pilot solo flight have remained essentially unchanged throughout the years to the extent that they do not prohibit such solo flight in single-place aircraft. Effective November 1, 1973, the rule was amended to require, among other things, that student pilot solo endorsements be renewed every 90 days. During the drafting of the revised rule, we fully intended that this solo endorsement could only be made after a certified flight instructor had given flight instruction in the make and model aircraft and found him competent for solo flight. However, we recognized that if the term "flight instruction" was used, this would preclude a student pilot from soloing a single-place aircraft. In the final rule, the term "instruction" was used with the intent that it include flight instruction in make and model aircraft, except where authorization to solo single-place aircraft was sought.

Therefore, as long as a student has received the ground and flight instruction required by Section 61.87(c) for the category of aircraft involved and holds current endorsements in accordance with Section 61.87(d), the student pilot may operate a single-place aircraft in solo flight if:

1) The student has received the instruction a qualified instructor finds necessary for the make and model of aircraft in which the solo flight will be made.

2) The flight instructor finds that the student is competent to make a safe solo flight in that aircraft, and

3) The flight instructor so endorses the student pilot certificate or pilot logbook, as appropriate.

We trust this information will clear up any misunderstanding that may have existed. We wish you the best of luck in your progress toward private pilot certification.

Sincerely, George D. Boswell, Chief,
Dept. of Transportation, FAA

Builder Ed Hasch of 1202 Surrey Court, Algonquin, IL 60102, is being assisted by Technical Counselor #1208, Richard Brooks of 565 Ginger Trail, Lake Zurich, IL 60047 on this Sonerai LTS. Richard reports, "Assisted with obtaining materials for fabric cover and checked on progress of cover job. Workmanship is very good!" Aircraft is being covered by Dacron in a new process supplied by Cooper Aviation.

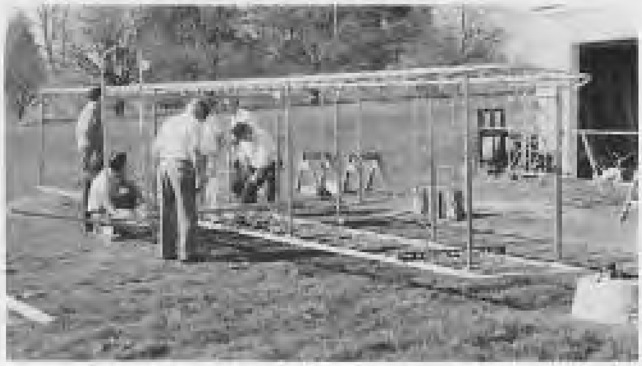
WELDING NOTE

High strength, heat treated parts will require a high strength welding rod.

These are:

1) 4130, Cms 32
2) Ox-weld 71B
3) 502

However, these are **only** for parts that will be heat treated after welding. For welding the average 4130 assembly as in gas welding, use Ox-weld #1 or #7 rod. Do not use these rods if the welding is done in TIG welding (heliarc). TIG welding requires a specialized rod that has a more refined metal that is produced in a vacuum furnace and is designed for this purpose. Ox-weld 65 is such an alloy. It is low in carbon, sulfur and silicone, and is degassed. This rod is readily obtainable. It is also available under different names and manufacturing companies, but the 65 is a cross reference number to use when asking for an equivalent type of welding rod. Ox-weld 32 of Cms 32 is also acceptable, but Aero Space uses the Ox-weld 65 for welds that will not be heat treated to more than a stress relieving temperature. When 4130 is welded by the TIG method, the weld developes a brittle area adjacent to the weld boundary called the "affected zone". This would cause a weld failure if the weld is not a thick combination of metal joining. It is very important to heat 4130 steel after TIG welding by heating the weld joint with an acetylene torch, bringing the weld in the adjacent area to a dull red, (1,000 degrees F) and let it cool slowly in still air. As 4130 will harden in the air, keep breezes from cooling the metal.



1911 WRIGHT GLIDER PROJECT

1986 is the 75th anniversary of Orville Wright's 1911, 9-minute, 45-second soaring flight over the sand dunes of Kitty Hawk, NC in the 1911 Glider #5. To mark the occasion, the National Soaring Museum of Harris Hill, Elmira, NY called for area volunteers to help build the world's only known full scale replica of the #5. The original was destroyed in a clumsy restoration attempt in the mid 1940's. The project group of about 30 dedicated aero enthusiasts was formed around Paul Schweizer, brother Ernest Schweizer, and Richard Kurzenberger, who is President of the Malcolm Winnick Chapter #533 of EAA.

Chapter #533 turned out in force, along with others from the Harris Hill Soaring Corporation, the Southern Tier (NY) Pilot's Association, and Schweizer Aircraft Corporation, to build the Museum its 1911 Glider #5.

The intricate wing warping, vertical and horizontal rudder control systems were documented and duplicated. This is the only known full scale replica in the world, with a span of 32 feet and length of 31 feet, weight of 170 lbs. plus the 12 lb. counter weight.

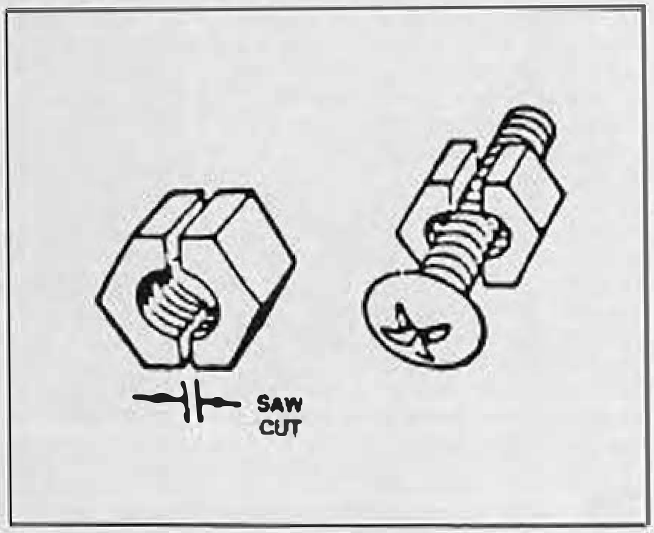
Technical Tips

TOOL TIPS

From the Virginian Pilot, October 2, 1988.

OBJECT: To cut off a bolt or screw that has the threads turned close to the head.

METHOD: Get a nut that matches the thread size and diameter and saw it in half. Put the two halves over the bolt or screw and hold the whole thing in a vise. Then, hacksaw off your bolt. This way, you don't damage the threads with the vise jaws.



PERPENDICULAR HOLE DRILLING

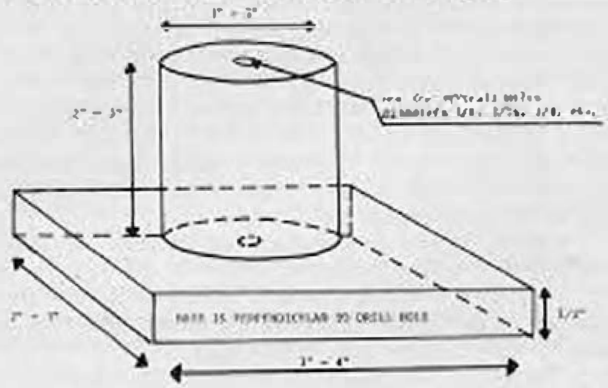
From Charles C. Wagner, Smithy Polloktown, Newton Mearns, Glasgow, Scotland.

I read with interest the various tips published on how to drill holes perpendicularly.

The problem was largely solved for me by a friend who lent me a device for this purpose. This is a steel jig, drilled with the appropriate hole size, then faced, (both operations in a lathe), with a sufficiently large base to give a steady rest.

The jig is placed over the hole position, either by measurement or by location onto a pre-drilled pilot indentation with a locator of the same diameter, which is then withdrawn once the jig is clamped or held in position. The hole can then be drilled perpendicularly. I use a long drill, which is flexible enough, in smaller diameters, to take up inaccuracy in the hand held drill.

Hey, presto! No problem, when you know how.



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