EAA® Technical Counselor News

DEC. 1988/JAN. 1989 Printing: Times Printing Editor: Ben Owen Assistant Editor: Ann Ruby

STEVE HILL'S CHRISTIAN EAGLE II

Technical Counselor Bob Sloe reports that the aircraft has excellent workmanship and is ready to cover. They did a general inspection prior to the cover of the airplane. Steve lives in Liberty, Kentucky.

DEKE HOLMAN'S CHRISTIAN EAGLE

D. K. "Deke" Holman from Napa, California has completed a Christian Eagle II after 6-1/2 years of work. Deke did everything except the Imron paint. The finish of Imron was done by Pete Gnaldinger of Glide, Oregon. Deke flew the time off in Roseburg, Oregon and then brought it home about the 8th of June. Deke is very active with Verne Jobst as an airshow coordinator at the EAA Oshkosh convention, a former airline pilot and current Technical Counselor.

Safety

SKYSEEKER MARK II ULTRALIGHT WING FABRIC FAILURE IN CANADA

At approximately 1500 hours, the left wing fabric of a Skyseeker ultralight was torn and trailing. The aircraft spiraled to the ground and was substantially damaged. Both occupants were severly injured. The aircraft was first assembled in March 1984. The accident occurred September 28, 1986. The fabric was deteriorated as almost no effort was required to tear samples of the faded fabric. Conclusions were:

1. The fabric had photodegraded to exposure to direct sunlight with 2-1/2 years from construction to crash.

2. The noticeable fading of the upper surface of the fabric in comparison with the lower surface provides a clue to changes in the fabric itself which may be indicative of much reduced fabric strength.

3. Loss of fabric strength is particularly dangerous in aircraft having a single surface wing cover; owners and operators would be well advised to check fabric strength periodically.

4. The use of "Ripstop" polyesters by manufacturers might preclude fabric failure accidents.

FAA REPORT OF ACCIDENT TO A QUICKIE TRI-Q

The FAA reports of an accident to a Quickie TRI-Q showed that the experimental aircraft had a full castoring nosewheel. The nosewheel developed a shimmy during take-off and again upon landing. During the landing, the nosewheel shimmy became worse. The pilot lifted the nosewheel off of the runway. The nosewheel rotated and struck the propeller. The nosewheel could swivel through a 360 degree and in the full forward position, the propeller would strike the wheel.

SEAHAWKER ACCIDENT REPORT

The builder and owner taxied out for initial first take-off, commenced to oscillate in all three axes but particularly longitudinally, right from take-off. During the 4-1/2 mile flight to the crash site, other witnesses described an apparently unstable flight, and noted that the engine was cutting in and out. Witnesses also stated that the rudder had detached from the fin and was trailing behind the aircraft and that one wing appeared to be folding, while others had observed pieces falling off the aircraft just before it crashed. It was last seen to dive uncontrollably into the ground from an altitude of 50 to 100 feet hitting left wings first, 45 degrees nose-down.

The aircraft was also seen to strike the tailskid hard on the ground which was believed to have caused the cracking of the rudder hinges. Some of the findings include design improvements which have been identified by the manufacturer which had not been incorporated in the crashed aircraft. Structural failure of the rudder hinges initiated by a tailskid strike on the runway resulted in a loss of the rudder and less directional control in flight. Poor construction techniques in the bonding of parts to the composite structure resulted in progressive structural failure in the right upper wing degrading both lateral and directional control. Longitudinal control was at best marginal because the center of gravity was too far aft. Upward deformation of the right upper wing had occurred in flight. The normal flexing resulted in a rear panel of the wing being torn off prior to impact with the ground. The wing flexing produced large shear forces between the top and bottom skins of the right upper wing leading edge which may have resulted in their unbonding and opening of the leading edge in flight.

QUICKIE II ACCIDENT REPORT

From the Canadian Counsel

A Quickie II lost a wing in flight. Some of the findings in the report include: wing foam core incorrectly constructed, bubbles to a size of 3 inches X 2 inches, one ply had a kink in it, the wing was damaged trying to adjust washout, heavy use of filler on one wing and misalignment of plies of fiberglass.

Full reports on the Canadian mishaps are available from the EAA Canadian Counsel, 2348 Garnet Street, Regina, Sask, Canada S4T 3A2.

SERVICE DIFFICULTY/ACCIDENTS

Vari Eze wing attachment fitting screws were not installed when the amateur built aircraft was constructed.

Vari Eze main gear failed at attach fittings while making touch and go landings. The submitter suggests installation of the heavier fittings like those installed in later model Vari Eze airplanes. Two hundred ninety hours total time on the aircraft.

Vari Viggen - main landing gear bolts backed out. The builders solution was to reassemble with "locktite".

Starduster Maule 8 inch pnuematic tailwheel wouldn't turn to the right and wouldn't return. The locking mechanism took very little pressure to unlock to the right but was extremely hard to unlock to the left. The problem could be intermittent since the ground handling checked OK after installation.

Pitts S1. Prior to landing, the pilot reported inability to move elevator control nose up past neutral. He found the elevator nose up travel limit jam nut had come loose and through vibration, the bolt had moved to limit travel at neutral. The pilot was able to unscrew the bolt and restore full travel. The submitter recommends replacing the existing jam nuts with drilled and safetied nuts.

Pitts S2B. During recovery from a snap roll maneuver, the aileron drive bell crank in the lower right wing broke. This caused loss of control of both upper and lower right ailerons. An emergency landing was accomplished as the aircraft was right over the runway doing an airshow routine. The submitter states that a weld broke on the bell crank. The aircraft had 6 G's positive and 4 G's negative on the G meter.

Steen Skybolt. Dive and the upper wing fabric and ribs failed. It was found that there was no dope inboard of the seventh rib on both upper wings. No evidence of first coat dope penetration and no glue to bond the fabric to the wing. He made a forced landing in a parking area. The top wing had four feet spaces in the prop blast area with no rib stitching and no glueing of the fabric to the center box on the top wing leading edge.

RotorWay Executive. The drive belt from the engine to the transmission is located in the area of the oil reservoir and a bearing that is greased every 50 hours. An oily substance was found on the drive belt which caused the belt to slip.

A Rotax 503 had the carburetor attach bolt come loose and it was recommended they be safety wired.

AIRCRAFT BOLT PROBLEM

Some homebuilders have attempted to use Grade 8 bolts manufactured in accordance with the Society of Automotive Engineers Standard No. J429K in place of the more expensive AN or MS bolts.

According to information received from the Industrial Fastener Institute there may be millions of mismarked Grade 8 fasteners. The Institute completed a testing of 57 bolts and nuts drawn from 300 samples collected from 9 sources. Each of these sources of supply were located in cities along the major oceans and lakes bordering the continental United States. Findings include:

1) Eleven bolts of the 50 examined met the chemical composition requirements and mechanical/performance requirements of the Grade 8 identification symbols present on the head of each of the 50 bolts examined.

2) Thirty-nine bolts of the 50 examined were improperly marked and by chemical composition found to be of grade designation 8.2 and not grade designation 8 as they were marked.

3) Manufacturer's markings included on the 39 improperly marked bolts were KS, FM, NF, RT, H and MS. Many others contained no manufacturer's marks.

4) All seven nuts examined were within specification limits for metallurgical content and met proof load testing requirements. Five of the seven nuts examined were incorrectly marked or marked in a method that would not identify performance capability as required by national standards.

In addition, the Aerospace Corporation in a release on February 22, 1988, describes widespread potential problems that exist within the USAF/SD Contractors and Subcontractors hardware due to the possible procurement and use of counterfeit and substandard mechanical fasteners. This particularly applies to Grade 8 and other high tensile type mechanical fasteners. These fasteners may fail in high stress applications or at elevated temperatures above 500 degrees F. This applies particularly to Grade 8 but also includes type 431 stainless steel. Typical failure modes are soft spots under the bolt heads, cracks in the thread roots and fractures between the head recess and the head/shank fillet.

In addition, another alert shows that a Lee Aerospace Product NAS bolt could be considered suspect due to a quality assurance product audit of NAS bolts revealed that only limited testing was performed. The head marking for Lee Aerospace is LA. Manufacturer's part number is 140, 160, 180 KSI A-286 NAS bolts.

In addition, we hear from our sources in the FAA that some 10-32 nuts which are cadmium plated are very, very brittle. These include both the self-locking and splithead types. This was a batch problem.

It is suggested that you be careful when purchasing bolts and that you are aware of your sources of supply. Going to the extreme of having critical bolts tested, may be an excellent idea.

CRANKSHAFT FAILURE ANALYSIS TO ZENITH 250 HOMEBUILT IN CANADA

The Lycoming O-320 engine crankshaft fractured in two sections at the No. 4 rod journal. It was reported that the engine had been bought with accumulated total time since new of 2221.4 hours. At the time of purchase, the crankshaft journals were found to be under limits, and the crankshaft was chrome plated to bring journal dimension within limits. The crankshaft failed 153 hours after the chrome plating and installation in the aircraft.

Post fracture wear was extensive in the fillet area immediately adjacent to the origins. Conclusions were:
1. The crankshaft failed as a result of fatigue initiating in the forward fillet radius of the No. 4 connecting rod journal.

2. Metallurgical examination showed that the chrome layer extended into the fillet of the crankshaft. The inherent microcracks in chrome plate likely resulted in the multiple fatigue cracks initiating in the fillet, the highest stressed area.

3. Chrome plating is not authorized as a repair method by the crankshaft manufacturer.

AEROQUIP 601 HOSE

Most of you are familiar with the recall on the 601 hose. If you would like the full general aviation alert notice, write to Information Services at EAA Headquarters for a copy.

EDITORS NOTE:
In a telephone conversation with Herb Anderson, I find that the hose they recommend is Aeroquip 303 because they have always had good results with this.

HOLLOW SHAFT ENGINES AND AEROBATICS

On 3/2/87, a Pitts S-1S had the crankshaft separate from the engine with the prop. An old crack was apparent in the shaft and the Lycoming was an O-360-A4M rebuilt from a wreck.

Curtiss Pitts, designer of the Pitts series of aircraft, always recommended that solid shaft engines be used on single seat, aerobatic aircraft due to the stress loads on the crankshaft from multiple snaps. A hollow shaft, of course, is used with constant speed propellers and the weight of the constant speed propeller may further aggravate this condition. The constant speed weighs about twice what the average metal prop weighs and of course, the wood prop is the lightest of all but you have to be quick if you're hand starting with a wooden propeller.For smaller, lighter aerobatic aircraft the hollow shaft engine is the best way to go for crankshaft longevity.

Bud Shanks reports on Carl Frederick's Zenith CH200. First flight was 6/20/88, building time ten years. Good building job.

Technical Tips

SHEET METAL CONSTRUCTION
By R. E. Schreder, Technical Counselor from Bryan, Ohio

One of the toughest problems encountered in metal homebuilding projects is bending accurate aluminum channels for spars. It took me 50 years and thousands of unusable pieces to learn the secret of getting perfect results. Here is the procedure:

1. Mark the brake clamping lines on a sample piece of aluminum.
2. Set the brake clamping foot at the proper set back behind the folding axis for the alloy and thickness of metal to be bent.
3. Clamp the sample in the brake and bend both legs.
4. Measure the width of the 2 flanges and the overall channel width.
5. Add the corrections necessary to produce the exact dimensions desired.
6. Make a new sample to the corrected width and mark the new bend lines to give desired flange dimension.
7. Bend this sample and measure overall width.
8. If this width is not perfect, repeat steps 5, 6 and 7. If it is right on, proceed to 9.
9. Make a new sample, same as step 6.
10. Bend one flange.
11. Turn sample blank around and reclamp brake on second bend line.
12. Cut 3 short wooden blocks to fit between 1st flange and the edge of the clamp. Be sure to sand the end of each block to fit the flange bend radius.
13. Install the blocks to check for a tight fit.
14. Remove the blocks and bend the sample.
15. If the sample is slightly off, shorten or lengthen the blocks by the same amount of the error.
16. When the sample is exactly the right size, you are ready to start bending good parts.
17. Number your blocks 1, 2, & 3.
18. Mark your blanks for the first bend at each end and the center.
19. Switch piece for the second bend, install the blocks and clamp in the brake. Blocks should fit snugly.
20. Remove blocks and bend second flange.
21. Check overall width of channel at ends and center. All 3 should be the same. If not, proceed to 22.
22. Slight adjustments can be made by sanding or adding a piece of tape to the end of any of the blocks if necessary.

The above procedure has enabled me to bend channels that are uniform in width from end to end on an 8 foot bending brake.

Three or four blocks can be used according to length of the spar. My brake is eight feet long but longer spars can be made up by joining several sections together with six-inch sections glued and riveted inside at each joint.

Bending these short splice channels to fit exactly inside the long ones is too difficult. The simple solution is to use a piece of the spar channel, split it down the center on a band saw and then file for a perfect fit.

This view of the back side of the rear spar shows a splice joint and one of the regular aileron push-pull tube guide blocks bolted in place.

Wood spacing blocks with radiused edges to fit inside first bend flange. Back edge goes against front edge of brake shoe clamp.

Measuring 3/16 inch setback of clamping edge on 8-foot brake to bend .040 2024-T3 alclad aluminum channel.

Blocks removed and ready to make second bend.

Blocks removed and second bend has been made.

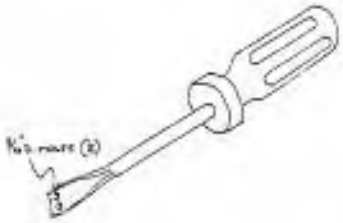
Finished channel resting on brake leaf.

INSTRUMENT CHECKS

It is quite possible for a person to do his own confirmation of the validity of their instrument ratings. Simple ones like temperature bulbs respond well to tests using boiling water and ice water at normal atmospheric pressures to set 212 degrees F and 32 degrees F.

JACK HICKEY, TECHNICAL COUNSELOR 478 FROM PANAMA CITY, FLORIDA AND HIS SAFETY WIRE TOOL

All it is is a small screwdriver with two 1/16 inch holes placed about 1/16 inch apart. I like it better than the automatic job I have, and believe that it works better.



Technical Counselor Jack Hickey on left and builder Jack Squires on right. Jack Hickey currently lives in Panama City, Florida but visited Jack Squires' workshop in Saskatuan, Canada. Jack Squires is building a Spitfire in memory of his uncle who flew Spitfires during the war.

This view shows Jack Squires' jig for jigging the airplane up, made of square tubing.

This view of the left side shows an additional longitudinal member presumably for the hinged on door. The workmanship is above average and the material used is the same. Russian plywood is available in Canada and it looks very good.

NEVADA RV-4

Technical Counselor Lowell Ridge of Sparks, Nevada says he has been following Ron Sutton's RV-4 and "the workmanship is A-1!" The plane is built from a kit and will use a 180 HP Lycoming. The project was started in September 1987. Ron built a Wittman Tailwind in 1972 and owns a Heli-Arc business. He says he has as much fun building the jigs as he does building the airplane. The RV-4 fiberglass wing, elevator and rudder tips are replaced with aluminum and the tips look very nice.

The hint that Ron Lowell has is when removing pop rivets, use a small automatic center punch and push the steel mandrel out. It is now easy to drill out the remainder of the pop rivet.

This stand was built to hold the mount and engine until the fuselage is finished. This may also be the cleanest shop I have seen pictures of in quite a while.

This shows the wing in the jig and the extensive use of rugs etc. to keep it from getting scratched.

This shows the bottom of the rudder. To keep from scratching aluminum, use of a lot of rugs, and in this case, tape to keep from scratching around the rivet holes when it is held together with clecos.

MONI NOTES

Another builder made several test strips from scrap and bonded them per the Boeing specification method and per the Monnett method, put them outside in the weather, even put them in a bucket of water for a long period — some of the Monnett ones can be pulled apart fairly easily; the anodized ones are tight and strong. The reason, Boeing has a great deal of success in bonding. He had his wings anodized per Boeing specification BAC5555 at the Panel-Air Corporation in Costa Mesa, California. The cost was $400.00 but he feels it was well worth it.

The original plastic main landing wheel on another Moni had broken and the builder reports: He skidded on the air cleaner and lost about 2 inches on his prop tips. He replaced the wheel with a mag. go-kart wheel manufactured by Almtec of Palo Alto, California. Bearings are the same size of the original but they are wider spaced at the hub. He also replaced the tire with a Lamb 11.400-5 6-ply, $25.00 from Wicks or Aircraft Spruce. It fits perfectly after removing a small portion of the inside angle of the gear legs with a 1/2 round file, giving additional prop clearance and better foot print on the runway. The brake has to be repositioned. It all works much better than the original.

Engines

VAPOR LOCK
Author Unknown

Vapor lock occurs fairly frequently in cars, because the fuel lines and carburetor are exposed to engine heat, and when idling, the fuel can get hot enough to boil and fill the lines with vapor. The fuel pump can't pump enough vapor to keep the engine running, so it stops.

Vapor lock is less common in aircraft, particularly those with up-draft cooling, where the fuel pump, lines and carburetor are in the cold air stream.

There is a situation, however, where you can experience vapor lock. If you run one tank dry before switching tanks, the fuel line from the selector valve to the engine will be filled with air and fuel vapors. Then when you switch tanks, the fuel pump will have to exhaust the air and vapors from the line before fuel flow is reestablished and you get an engine restart. Fuel pumps do not pump air and vapors efficiently, so it will take a period of time. You can get some idea by measuring how long it takes your booster pump to get fuel to the engine the first time you fill your tanks. My experience is that it takes several minutes. Auto fuel is much worse, because it has twice the vapor pressure of aviation fuels and fills the lines with more vapors. The moral is that you shouldn't run a tank dry unless you have plenty of altitude, and then check to see if you are within gliding distance of an airport. It is also suggested that you exercise similar precautions when switching tanks.

STORING ENGINES
By Ben Owen

We have all seen many methods to store aircraft engines involving internal oiling, etc. However, there is a boat supply item that might well be used in preserving aircraft engines. The boat supply stores have an oil "fogger" which is simply a spray can of light oil that you spray into the intake. What you do is start the engine up and warm it up and then set it at idle speed. The fogger is then slowly discharged into the intake and the engine will gradually bog down and die from the oil. This coats the cylinders and in particular, the upper cylinder walls with this light oil. The light oil helps a great deal also in coating valves and guides. It is intended as a winter storage system for boats and probably should not be relied on for more than the equivalent of one winter season. However, it is one method that might be considered for an engine that will not be flown over winter.

A SUGGESTION FOR AN IGNITION SWITCH

By Art Bianconi, 983 Madison Avenue, Plainfield, New Jersey 07060

Back when you and I were a little younger(?), cars didn't have alternators just DC generators and the six volt battery. Solid state devices hadn't reached car radios yet. There was a need to provide alternating current to drive the radio circuits. The way Bill Lear solved the problem was by providing a vibrator within the radio. This vibrator oscillated some contacts thereby creating a pulsating DC current. To radio, this looks just like alternating current. Viola, Benny Goodman while you drive!

However, when you cranked the starter with the radio on, it tended to weld the vibrator contacts thereby ruining the vibrator. You soon learned that you'd better turn off the radio **before** engaging the starter. Habits die hard however and since car drivers don't use check lists, something needed to be devised to prevent the inevitable destruction of all those vibrators. The way Robert Bosche solved it (Bosche is the Delco-Remy of Germany) was to provide a separate accessory lug on the starter switch which automatically interrupts the current to the radio each time the starter is engaged. Volkswagen likes the idea so much, they even wired the headlights the same way. Now, on all VW products, not only does the radio juice get squelched, so does the juice to the heavy consumers: the headlights. Thus more current is made available to the starter when it needs it and deep cycling of the battery is minimized. The starter switch does this all automatically and there's the additional bonus that the high wattage consumers automatically get turned off when the key is removed from the panel. Presto! No more dead batteries from forgetting to turn out the lights!

The point of all this is that there's no need to use any fancy avionics relays or complex wiring (and the added weight) to prevent transients from spiking your radios and you need never again worry about whether or not you remembered to kill your master and avionics switches when you last parked your bird.

Most any ignition switch from a Volkswagen will work and the wiring diagrams can be easily had from any Chilton manual or from the dealer himself. While there are probably ignition switches from older Porches, Mercedes-Benz's, BMW's, etc. that will do the job, I don't recommend using these more expensive types. They cost many times more, are often the exact same part but with different part numbers and you get to pay two or three times more for no better performance. Bear in mind, however, that if you do elect to go this route, you will have to provide separate magneto switches for grounding out the mags.

TWO STROKE PLUGS

Jim Lewis, a Moni builder, had the heads off his 22 HP KFM and noted the spark plugs didn't reach clear through the plug hole. He knew from his motorcycle racing days that two-stroke engines need all the spark they can get to fire efficiently. He selected a range a little on the cool side. After cleaning off the bottom 1/8 inch of threads in the head which were encrusted with carbon (with the spark thread chaser he bought for $7.00), he tested the spark plug without the gasket to be sure that the longer plug would not bottom out on the piston. He selected a NGK plug a B7HS which he was used for two years successfully. He has found that his KFM starts easier and his cylinder head temperatures are about 50 degrees lower. He has made the engine package a tad wider, and cut a 1-1/2 inch X 4 inch long tear-drop shaped hole right over each of the plugs. They stick out about 3/4 inch but they don't look bad. Now he can replace the plugs without moving the cowling - an added little feature that he likes.

SLEEVE THE FUEL LINES

An Australian Moni builder reports that a builder's suggestion to sleeve the fuel lines to keep cool is mandatory in Australia, and plastic fuel lines forward of the firewall are not allowed. The department had also advised them not to use 100LL on Rotax engines as ultralights are seizing up on it.

Operations

PARACHUTES

Taken from EAA Chapter 723 Newsletter, Camarillo, CA, Vol. VIII, Edition 2. By is Nate Rambo.

A group of us were hangar flying the other day. Member Speed Merchand turned the subject to emergency parachutes and their TSO ratings. He was interested in a 'chute certified to TSO 23B. It was light in weight and comfortable. The question was, "What does the certification mean?". For some reason or another, I had just gotten the answer to the question for myself the week before. Like a real authority on the matter, I wipped a note from my wallet and produced the answer. The TSO rating specifies the maximum allowable weight of the occupant and the maximum opening speed as follows:

TSO 23A	198#	130 Kts
TSO 23B	254#	150 Kts
TSO 23C	254#	175 Kts

WING TIP VORTICES
From The KR Newsletter

While buzzing along in his KR in formation with another aircraft, suddenly with no warning, his aircraft banked violently to the left approximately 30 degrees, no reason apparent to the pilot. He settled back and it happened again. Suddenly, it happened a third time! He called a FSS and stated a control problem and requested a straight in. After looking over the aircraft and finding nothing wrong, he took off again and the light suddenly dawned! Due to the close proximity of the two aircraft and the very close side by side formation, the wing tip vortice was causing the loss of control.

EDITORS NOTE: If the wing tip vortice in the KR can cause another KR to appear to lose control. . . you can imagine what the vortices from a transport aircraft can do. If you have forgotten when taking off following a transport, the worse situation is a light crosswind when the vortice wants to stay down the runway. You should break ground before their lift off point, climb out steeply or remove yourself from their flight path by turning upwind. When landing, you land before the point at which they touched down and you should be OK. You might want to review the procedure for a light aircraft following a transport aircraft in the commercial publications. I recall distinctively flying very tight formation on another propeller driven military airplane and I could actually see the wing tip vortice and if you flew into it with violent shaking and rolling, you will certainly remember it.

FILING FLIGHT PLANS
From Air Force Source

The following may give you some thoughts about flight plans, both VFR and IFR.

Search and rescue folks at Scott Air Force Base told us that in 1986, it took an average of 21 hours for word to get to them about an aircraft missing on a flight for which no plan had been filed. Then, after Scott Air Force Base scrambled, it took an average of 32 hours to find the aircraft. Therefore, from the time someone got worried enough to inquire to the initiation of a search and rescue, it took 53 hours before the aircraft was found. If VFR flight plans were filed, this was not much better. They are usually notified 11 hours after the time of the last known position of an overdue aircraft, which typically was when the pilot opened his VFR flight plan. The aircraft was usually found about 10 hours thereafter or a total of 21 hours from initiation of his flight plan to when the aircraft was found. First of all, FAA checks with its flight service and control specialists to see if they know of anything about the aircraft. Then, the agency requests ramp checks at the filed departure and destination airports, as well as fields along the proposed route of flight. Most reports of overdue aircraft are traced to pilots who simply forgot to close their flight plans.

Instrument flights are monitored closely by ATC rank-and-filers, the focus of FAA's initial search can be substantially narrowed. It took an average of one hour in 1986 for Scott search and rescue to get word of a missing IFR aircraft.

WINTER SURVIVAL

Canadians have a requirement that when flying over sparsely settled areas the following be carried:

1. Food - 10,000 calories per person, not subject to heat or cold and stored in a waterproof container. It has to be labeled and inspected every 6 months.
2. Cooking utensils.
3. Matches in a waterproof container.
4. Stove and fuel supply if north of the tree line.
5. Portable compass.
6. 2-1/2 pound axe with handle 28 inches or more.
7. Flexible saw blade or equivalent.
8. Snare wire of 30 feet and instructions for use.
9. Fishing equipment including still fishing bait.
10. Gill net, maximum 2 inches mesh.
11. Mosquito netting.
12. Insect repellant sufficient for all, where insects are hazardous.
13. Tent or engine and wing covers — international orange or other high visibility color sufficient to accomodate all persons when north of the tree line.
14. Winter sleeping bags when the weather is expected to go to 7 degrees C or less.
15. 2 pairs of snow shoes if snow is likely to be 12 inches deep or more.
16. A signalling mirror.
17. At least 3 flares.
18. Sharp jackknife or hunting knife of good quality.
19. A survival instruction manual.
20. Conspicuity panel.

TOLEDO SE5A

This aircraft is being built by Marion Robles of Lakeland, Florida. Technical Counselor Larry Russell reports the aircraft is now rigged for display with non aircraft hardware and will be corrected before flight. Russ has not yet decided for sure as to what engine he will have for the aircraft. Note the rebel flag for the tail!

Report From Sweden

Technical Counselor Hugo Erickson of Sweden visits Hans Bjorkquist's PA-22 restoration.

Hugo sends his tip on: to drill holes in tight corners, scarf the drill bit with a piece of welding rod.

Hugo's Avid Flyer. He reports changing from skis to wheels, taking 10 to 15 minutes for 2 people.

CUT OUT AND TAPE IN THE LID OF YOUR TOOL BOX???

COMPARISON OF WRENCH SIZES

mm	inch	=	mm	mm	inch	=	mm	mm	inch	=	mm	mm	inch	=	mm
4			4.0		9/32		7.14		1/2		12.7	19	3/4		19.05
4.5			4.5	8			7.94	13			13.0	20			20.0
	3/16		4.76		11/32		8.73	14			14.0		13/16		20.63
5			5.0	9			9.0		9/16		14.29	21			21.0
5.5			5.5		3/8		9.32	15			15.0	22			22.0
6			6.0	10			10.0	16			16.0		7/8		22.22
	1/4		6.35	11			11.0	17			17.0	23			23.0
6.5			6.5		7/16		11.11		11/16		17.46		15/16		23.81
7			7.0	12			12.0	18			18.0	24			24.0
													1 in.		25.4

EAA® TECHNICAL COUNSELOR NEWS

WITTMAN AIRFIELD *OSHKOSH, WISCONSIN 54903-3086*

BULK RATE
U.S. POSTAGE
PAID
PERMIT NO. 1
RANDOM LAKE, WIS.
53075