ACRO SPORT NEWS #9

& Project Schoolflight October 1984

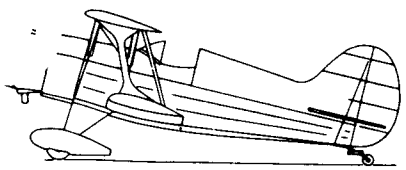
P.O. Box 462 Hales Corners, Wisconsin 53130

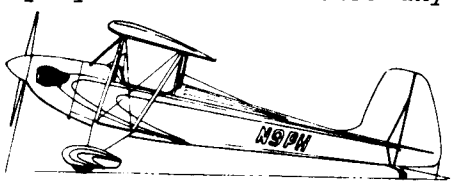
ACROSPORT ARTICLE

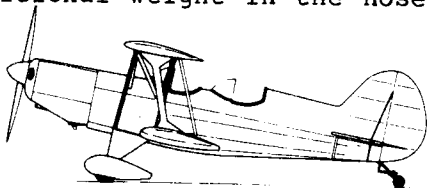
By: Paul H. Poberezny

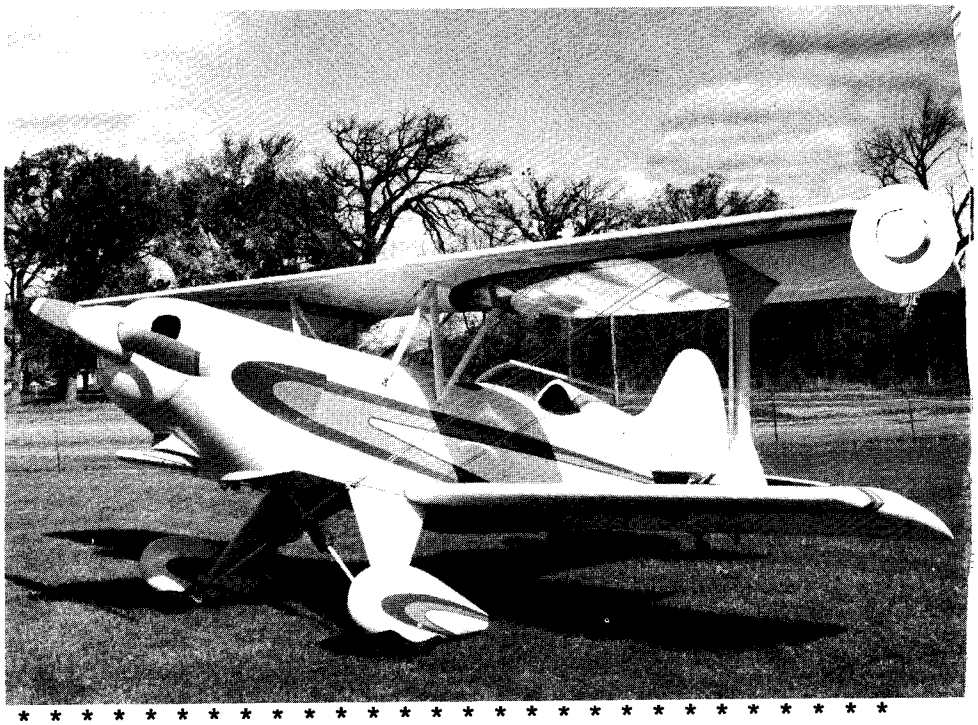
This year's Oshkosh event was by far one of the best we've had. The weather was outstanding, which I am sure contributed greatly to everyone's comfort and attitude. Several hundred forums were held on various subjects and were extremely well attended. The Acro Sport forum was also well attended, as were the many visits to the workshop tent where the Pixie was being constructed and the Acro II fuselage, tail group, and wings were on display. Bauken Noack answered many questions as he worked on the upper wing and center section. Next year we hope to have the airplane completely assembled with the powerplant hung on, so that those who are interested not only in the building of the Acro Sport, but other aircraft of similar construction, can obtain a wealth of information and learning. We had a great many industrial art teachers attend the forums and ask many questions regarding the construction of either the Pixie or the Acro - They were able to take with them encouragement and knowledge on how to get a project ted in their Industrial Art classes in their schools. It is not that we want to make plane mechanics out of young men and women, but through aviation - the learning process, working hands on, and the great many skills needed in building an airplane - these young people, in whatever endeavor they may seek, will have one great respect for quality and craftsmanship which in the end will certainly make our country richer.

As in any other design, some builders make changes, whether it be lengthening an engine mount, changing the turtle deck, or reshaping the fin and the rudder. This has been the name of the game since the days of the Wright Brothers. When changes are made to a basic prototype, it also brings many letters and questions as to why someone did this. Of course the best answer would be to contact the individual who made the changes and ask them the reason. For example, on the Acro II we have not made, nor felt any need to change any of its design or dimensions. We certainly have improved the drawings and made minor corrections on dimensions which seem to always plague every designer whether it be with big companies or small. The prototype Acro II has been flown aerobatically, not only at our Oshkosh event, but at other events, as well as normal flying. We have found the airplane with one or two people to be controllable throughout it's flight envelope and shows no bad characteristics, nose heaviness, or tail heaviness. I've always designed a bit of nose heaviness into all of the machines that I have been involved with, realizing that short coupled airplanes can easily be loaded with baggage or a heavier pilot to a tail heaviness condition. The prototype Acro II (which has some 350 hours on it at present) has shown itself to be well balanced even though we do not have a starter and generator on the engine. In fact adding a starter and generator is well within weight and balance limits and its flying characteristics. As most people do when adding more weight to the front, reroute the battery system to counteract any additional weight in the nose.









Due to the availability of lower horsepower VW engines, though not type certificated engines, interest in the little Pixie continues to grow. It certainly is a docile, fun-to-fly airplane. As most people do not fly farther then 100 miles from their home base, it certainly fits well into the ARV (Aircraft Recreational Vehicle) category.

Keep your questions and suggestions coming as they are sincerely appreciated.

RIGHT: The prototype Acro Sport II N9EA.

* *

HINTS & TIPS FOR ACRO SPORT & POBER PIXIE BUILDERS

I. In talking to Acro Sport II builder Glade Hoyal, he initially had directional stability very good at low speed taxi but which became very touchy at near takeoff speed. He then checked a little further and found out that he had toe in. When you're making takeoffs or wheel landings and the tail wheel is up, it's very easy for the wheel toed in that has the most weight on it to try to "tuck under" and ground loop the airplane. This is what Glade found true in his case, although he never had anything as serious as a ground loop. He rebent the axles by heating them and using a large pipe over them to bend them back with zero toe in or toe out. He found this made a big difference! If you feel you must go with toe in or toe out, toe out is generally accepted as the least dangerous of the two. At the Aviation Foundation, all of our aircraft are built with 0 toe in/toe out and straight up and down. This applies to Acro Sport I, Acro Sport II and Pixie aircraft.

II. On all three aircraft the wing aluminum leading edge is nailed to every rib and also to the cap strip over the top of the spars.

III. For those of you using a Posa or slide valve carburetor on a Volkswagen or Lycoming in your aircraft, the easiest way to adjust these carburetors has been found to be the use of an exhaust gas temperature gauge.

IV. The question has arisen from several builders recently regarding the landing gear shock strut tubes. The tubes that the shock strut chords go around have to be at 90° angles to one another. If you will take two pencils and a common rubber band and wrap them around each other as you would with a shock strut, you will see why this is so.

V. On the Acro Sport I and Acro Sport II there is a requirement for bending 1/4" aluminum. We do this here with a large vise with padded jaws and a big crescent wrench. However, if you have an inexpensive vise of small size, pressure exerted to bend 1/4" aluminum will very soon cause it to break as you normally don't have a need to put this kind of a force on a vise. Therefore, if your neighbor has a bigger vise, use his. It might also be added that here at the Foundation our Restoration Director also bends the tubing for tail surfaces around his knee. It a slow process but very effective. It's also very good exercise!

Some builders have complained about the fact that the elevator horn and the push/pull rods to actuate them are not at a 90° angle, stating that there should be some differential due to this. Due to the fact that it takes quite an extreme angle between the push rod and the elevator horn to cause any appreciable differential, this will not make any difference if built as the plans indicate. If you want to modify this to be closer to 90°, insure that you will have complete clearance of the elevator horn when it is actuated to its full travel.

VII. To bend the hinges for elevators and rudders, you can clamp a pipe in the vise and tack weld the strap that you intend to bend to it. If you heat it to a medium cherry and then bend it, when it cools you can hacksaw the tack weld off and reheat the fitting. When fitting it to the aircraft, hold it in place with a vise grip until it is tacked permanently.

VIII. For drag/anti-drag wire pullblocks in the wings surfaces, we have had some problems with the washers sinking in. Build these with the the edge grain out as the washer will usually not sink into edge grain. You can also face the pull blocks with 1/16" plywood if they are already in place.

IX. Acro Sport II plans do show that pants attaching brackets attach directly to the axle. It is best to match your particular installation, your brakes, etc. to your aircraft. On our prototype, pants attach brackets were attached to the front gear leg, down low. This may be necessary with certain installations. However, the majority should find it simple to go with the plans.

Some builders have been installing "rudder balance cables" to their aircraft rather than using springs to return the rudder pedals. This is quite acceptable and is being used on some Acro Sport II aircraft. As you will probably recognize, the rudder balance cable makes the rudder cable an entire closed loop and eliminates the necessity for springs on the rudder pedals.

XI. The following is from the AVCO Lycoming "Flyer".

THE TURNING SPEED OF YOUR STARTER

What would your answer to this question be? True or False? The faster an aircraft engine turns over, the easier it will start.

The correct answer to the question is False as this statement is not true for SOME models of Avco Lycoming engines. To find out why this statement isn't necessarily true, let's review the operation of the typical starter and its relationship to the ignition system of general aviation aircraft engines.

As a matter of review, the magnetos provide the electrical impulse which causes the spark plugs to fire across the plug gap and start burning of the gasoline and air mixture compressed inside the cylinder. The magnetos are timed to the engine so as to provide the electrical impulse at a very precise time -- usually 20° to 25° before top dead center (TDC) of piston compression stroke travel for most Lycoming engines. This timing is designed to provide engine efficiency at normal operating speeds. Since starting occurs at very low engine turning speeds, magneto timing must somehow be adjusted at low engine RPM if starting is to be successful.

Two methods are used to adjust magneto timing to near top center of piston compression stroke travel for efficient engine starting. First, the retard breaker magneto with separate vibrator provides a shower of sparks at a predetermined retard angle near TDC.

Second, most general aviation engines have an impulse coupled magneto which designed to provide magneto firing near TDC for starting. As an example, t... objective is to delay magneto firing from 20° before TDC until about 5° before TDC by building a 15° lag angle into the impulse coupling. This only happens precisely in theory because impulse coupling lag angle varies with the cranking speed of the engine/starter. This speed may be affected by many things, including battery condition, distance between battery and starter, compression, friction within the engine, and the particular speed of the starter used.

Now let's take a look at the effect of starter speed on engine starting with an impulse coupled magneto. Keep in mind that lag angle changes with cranking speed of the engine and that for best starting the magneto should fire near TDC. If an engine is timed at 20° before TDC and the impulse coupling lag angle is 15°, magneto firing will occur at 5° before TDC when the starter is turning the engine at optimum speed. If the battery is weak or turning speed slowed by any of the many other factors affecting cranking speed, magneto firing could occur too far before TDC for effective starting.

On the other hand, if the magneto and impulse coupling lag angle are designed for best starting at approximately 150 RPM, a starter that turned the engine at 250 to 300 RPM would cause magneto firing to occur well after TDC and maximum compression had occurred. Again, starting would be very difficult.

The point of the discussion in this article is to aid understanding of engine starting, particularly with respect to the importance of correct engine cranking speed. Keep in mind that because of the facts outlined above, faster cranking speed is not necessarily better.

EDITOR'S NOTE: What the article doesn't say is that for those of us without ... electric starter, you can hand prop too fast with an impulse starter. If you h... an impulse starter, easy does it on the hand propping to make it easier for yourse...

The following is stolen from STARDUSTER NEWS.

GLUE TESTS

It is a common practice for homebuilders to use several kinds of adhesives during the construction of wood airplanes because some types are easier to use in certain situations than others. There is, however, a possibility of one type of adhesive adversely affecting another. A long-standing airworthiness directive in England prohibits the use of Aerolite hardener near other types of glue.

To assess possible adhesive interaction, Chem Tech, Inc. of 4669 Lander Rd., Chagrin Falls, OH 44022 recently ran a series of tests using epoxy (Chem-Tech T-88), resorcinal (Weldwood) and urea-formaldehyde (Aerolite). The summary of those tests reads as follows:

"Epoxy adhesives, whether uncured or fully cured, may be adversely affected by the formic acid constituent of Aerolite hardener and to a lesser degree by the acidic resorcinal adhesive. Tests performed on Chem-Tech T-88 epoxy adhesive indicated that it is acceptable for use in conjunction with Aerolite and resorcinal provided that these adhesives have fully cured.

Similarly, normal use of Aerolite and resorcinal do not interfere with previously cured T-88. These considerations should apply to other brands of epoxy adhesives as well, however, the user should satisfy himself regarding the suitability of any other epoxy adhesive, particularly in critical structural applications."

T-88 STRUCTURAL (EPOXY) FOR WOOD

T-88 is a relatively unknown epoxy of superior quality which I have used for several years. The manufacturer of this product is a chemist and ardent amateur boat builder. He (Jerry Schindler) of Chem-Tech has informed me that our own Tony Bingelis, who writes the "Designee Corner" in SPORT AVIATION and is the builder of an Emeraude and a Turner T-40, is a user of T-88. I don't blame Tony one bit for using it. It really is a fine epoxy. A few of its major advantages are:

1. The mix is one-to-one (Equal parts).
2. It can be used at temperatures just above freezing (35°).
3. It is non-staining; after drying, the color is that of varnish.
4. The thickness of the glue joint is not critical. (Some epoxies demand a joint of no more than .011 gap.)
5. It is not affected by rot, fungus, oil or gasoline.
6. It does not shrink.
7. It has good pot life (35-40 minutes at 75° plus you have an additional 15-20 minutes immediately after mixing during which time the mix is heating. It is then re-stirred and is ready for use.)

(The previous article was supplied to Starduster by Jerry Schindler, of Chem Tech.)

<u>EDITOR'S NOTE:</u> T-88 is an excellent epoxy glue for northern climates where the shop temperature can stay pretty cold. It is sold by most of the major aircraft suppliers.

XII. <u>AIRFOILS</u>: The Clark Y is used on the Pober Pixie, the M-6 (Munk) is used on the regular Acro Sport and the Acro Sport II. The Super Acro Sport airfoil is a 23012. There is no supplemental drawing to convert the M-6 airfoil on the Acro II to the 23012 as we felt it was unnecessary for that airplane.

XIII. If you have an airplane that can only be hand started and find yourself alone at the airport, it's probably about time you install a glider tow hitch on the airplane. This will make it quite simple to tie yourself down before hand starting, and then you can get in the airplane and use the glider tow release to release the airplane from the tiedown. If you're going cross country, you'll find many fixed-base operators won't let their employees hand prop an airplane and the only safe way to do it is with a glider tow hitch either attached to the airplane or attached to a long piece of rope to your cockpit with the release there. You can then reel in the glider tow hitch and the release line before taxiing out and stow it in the baggage compartment.

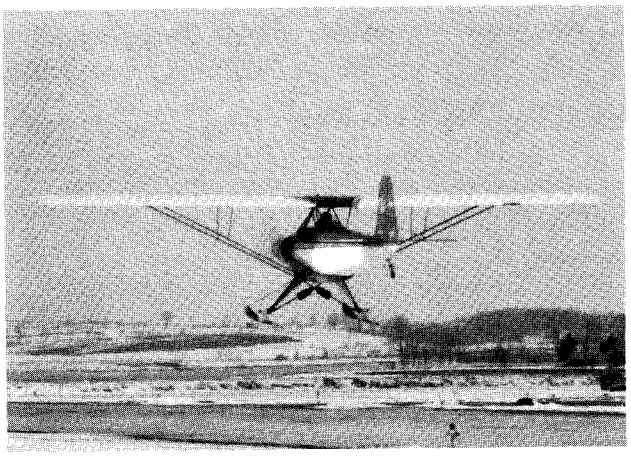
XIV. Regarding installation of engine hoses: The Aeroquip Corp., Aeroquip Aerospace Division, ATTN: Department 75, 300 South East Avenue, Jackson, MI 49203, has available an "Aviation Products Handbook" catalog #117. This is available free. You might also ask them for their Bulletin #1568A titled "How to Identify, Select and Assembly Aeroquip Aircraft Hose and Fittings". There might be a small charge for this last book but it is an excellent reference for hoses. They have another reference titled Bulletin 1515 "Installation and Care of Hose and Hose Assemblies" that is also informative.

In addition, there was an excellent article by Aeroquip in the August 1984 SPORT AEROBATICS Magazine. This particular article was about crash-worthy fittings or fittings that pull loose in the event of a mishap. Anybody wanting a copy of that particular SPORT AEROBATICS article can contact me and I will send the information.

* *

SKI INSTALLATION

The drawing (opposite) was taken from the Advisory Circular 43.13-2A. The two photographs attached are of aircraft equipped with skis. The first one is EAA staff member Norm Petersen's Starduster Too SA-300, N76NP, 180 HP, equipped with Federal 2000 skis. As shown it was flown off St. James Lake in St. James, Minnesota, in 1978 at a 1090 lb. empty weight. It would consistently take off in a stepped-off distance of about 90-100' from a three-point position. The fittings are simple straps bent to the appropriate angle and bolted to the normal landing gear fittings. The fittings are of 4130 .090". Photo by Loren Hurley.



BELOW: The Pober Pixie on skis used water skis. The ski pedestal was built up out of .049" 4130N. The Pixie flies quite well on these converted water skis which would probably also be suitable for the Acro I or II.

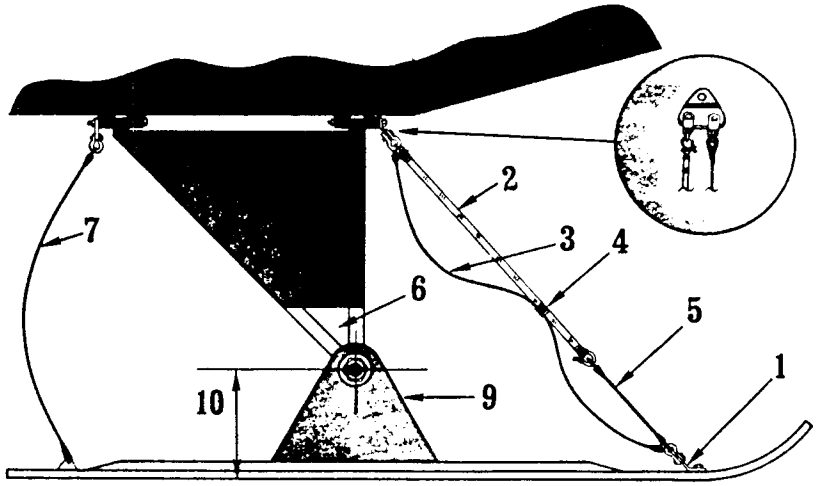
Chapter 5. SKI INSTALLATIONS

Section 1. SELECTION OF SKIS

61. DETERMINING ELIGIBILITY OF AIRCRAFT. Only aircraft approved for operation on skis are eligible for ski installations in accordance with this chapter. Eligibility can be determined by referring to the Aircraft Specifications, Type Certificate Data Sheets, Aircraft Listing, Summary of Supplemental Type Certificates, or by contacting the manufacturer. Also determine the need for the nature of any required alterations to the aircraft to make it eligible for ski operation.

62. IDENTIFICATION OF APPROVED MODEL Determining that the skis are an approved r can be done by referring to the identifica plate or placard displayed on the skis. A Technical Standard Order (TSO) number: Type Certificate (TC) number: or an aircraft part number, if the skis have been approved as a part of the aircraft, will be shown thereon if the skis are approved models.

63. MAXIMUM LIMIT LOAD RATING. In order for an approved ski to be installed on any given



1. Fitting
2. Shock Cord
3. Safety Cable
4. Tape
5. Crust-cutter Cable
6. Fabric removed to facilitate inspection
7. Check Cable
8. Clevis
9. Ski Pedestal
10. Pedestal Height

FIGURE 5.1.—Typical ski installation.

aircraft, determine that the maximum limit load rating (L) as specified on the ski identification plate or placard is at least equal to the maximum static load (S) times the limit landing load factor (η) previously determined from static drop tests of the airplane by the aircraft manufacturer.

$$L = S \times \eta$$

In lieu of a value η determined from such drop tests, a value of η determined from the following formula may be used:

$$\eta = 2.80 + \frac{9000}{W + 4000}$$ where "W" is the certificated gross weight of the airplane.

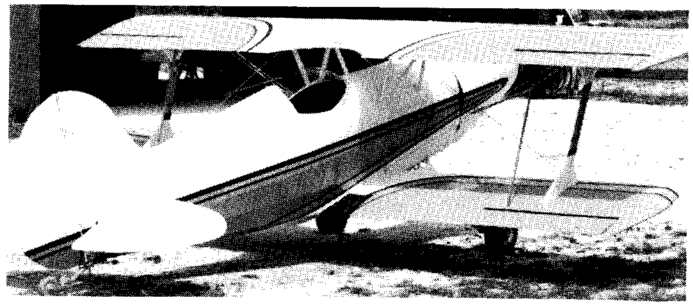
Skis approved for airplanes of greater gross weight than the airplane on which they are to be installed may be used provided the geometry of the ski is similar to that of a ski previously approved for the airplane (not more than 10 percent difference in width or length of contact surface). This limitation is to assure that the performance of the airplane will not be adversely affected by oversize skis.

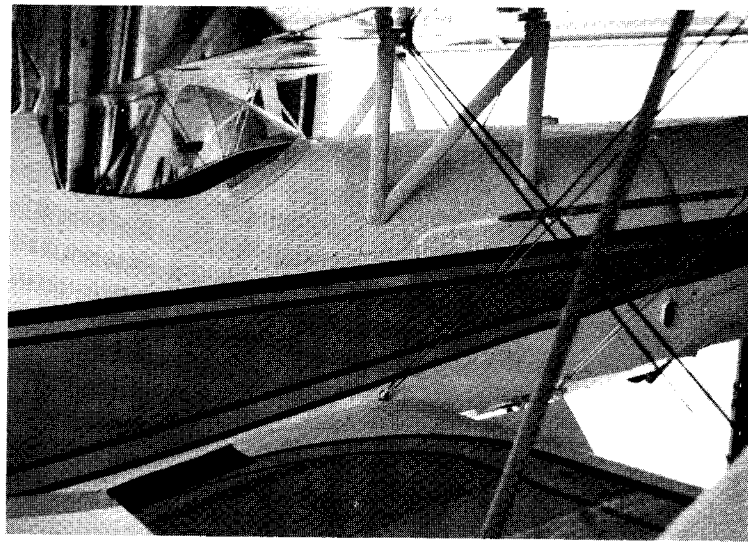
64. LANDING GEAR MOMENT REACTIONS. In order to avoid excessive moment reactions on the landing gear and attachment structure, the ski pedestal height must not exceed 130 percent of the axle centerline height with the wheel and tire installed.

65. [RESERVED]

ACRO SPORT PICTORAL

The Acro Sport I pictured below was built by udents of Frank Smith at Mosley High School in ama City, Florida, under EAA's Project choolflight. The aircraft is pictured here without its "N" number. Frank's Schoolflight class is currently working on a CUB-y aircraft.





* *

FLYING THE ACRO SPORT I BY: ARCHIE McDONALD

Much has been written about the construction and various technical aspects of the Acro Sport. Perhaps some of you who are now completing your pride and joy and do not have much or any tail dragger time would really like to know what you are in for on that first flight. Those of you who are now flying your Acro Sport airplanes might like to compare flying qualities with mine.

Do a normal preflight inspection as you were taught when you took flying lessons. My Lycoming 0-320-A2B with a PS5C pressure carb burns 6 imperial gallons per hour leaned and 7 full rich. Because the 0-320-A2B has a pad type engine mount, I check the motor mount rubber bushings before every flight. I give the bushings a visual inspection, then push on the prop with a hand on each side of the spinner. Any more than about 1/16" upward ement at the spinner would indicate too much slack.

Since I have removed the starter, generator and battery for a weight reduction of lbs., the engine has to be hand propped to start. Tie the aircraft tail down or us safety pilot. With fuel on, mixture rich, throttle advanced about 1/4", 4 shots with primer (with a cold engine), brakes set, stick full back, switch to left magneto, 3 or 4 pulls on the prop and the engine comes to life. Switch to both mags and check for about 70 lbs. oil pressure and 12-13 lbs. of fuel pressure at idle. Now it's time to put in my ear plugs and put on the headphones to protect my ears. My Acro Sport is very noisy in the cockpit and I don't want to develop "engine ears".

Taxi to the run up position off the end of the runway and do a mag check at about 1800 RPM. I get about 125 RPM drop on each magneto. Now a full throttle RPM check, with brakes set and stick back. If you have the proper diameter and pitch on the prop, you should get 2300 RPM plus or minus 50 depending on pitch. I have a 74" dia., 57" pitch prop and get exactly 2350 RPM. This prop is a good compromise for climb and cruise on a 150 HP Lycoming engine.

Now comes the pre-takeoff check and this is the sequence I use: Harness - lap belt, shoulder straps and crotch strap (very important if you go inverted); Canopy closed and latched; Instruments - Check oil and fuel pressures, oil temperature, set altimeter to field elevation (When I go up for an aerobatic flight I always set the altimeter to zero because there is no time for arithmetic. I must know my exact altitude above ground at all times with just a quick glance at the altimeter); Set the G meter to zero; Trim for takeoff, mixture full rich, primer locked, fuel on-off lever "on", mag switches on "both", controls for freedom of movement, and finally check the landing path for no one on approach.

If you have any tail dragger time at all, you have nothing to fear about flying yo Acro Sport. Make sure that the center of gravity of the airplane is within limits a preferably in the forward area of the C of G envelope. In the three point attitude you lose sight of the horizon. Therefore you must make good use of your peripheral vision in the initial stages of takeoff, and in the flare, touchdown and rollout stages of landing. I believe that it is imperative that you get some tail dragger time in a Champ, Cub, etc., before you fly your Acro Sport. Do nothing but full stop circuits for practice. Before you make the first takeoff in your Acro Sport, taxi to the end of the runway and align it with the center of the runway. Sit there and look at the runway, left and right of the nose of the plane and straight ahead, without a horizon. This is what you will be seeing in a three-point landing and rollout in your new bird. Prop yourself up as high as possible with cushions to improve your forward visibility. With the wide landing gear tread and a fairly long fuselage, ground handling is easy with no squirrelliness.

Taxi to the center of the runway, apply full power and go. Now there are two ways that you can take off in an Acro Sport. Number one is to just raise the tail slightly as you accelerate and let it fly off from a more or less three-point attitude. Number two is to raise the tail as soon as possible and get the plane in a level attitude. This gives much better visibility over the nose and you can really see where the runway is. Then once you reach flying speed (about 60 MPH), gently ease back on the stick and it will fly off.

Once airborne I like to drop the nose a bit to accelerate faster in ground effect. When about 85-90 MPH is reached, establish a climb angle that will maintain this speed. My rate of climb is then about 2000 FPM depending on O.A.T. Cruise speed at 2400 RPM is 120 MPH true. (I should mention that our field elevation is 1500' ASL.) Stalls are gentle and straight forward. Power off stall is 60 MPH and power on is about 55-58 MPH. W the large rudder the wings are easily kept level, and slight forward stick pres unstalls the plane immediately.

Now let's come in for a landing. I fly the downwind leg at normal cruise power. After turning onto base leg, I reduce power to about 1800-2000 RPM and reduce speed to about 95 MPH. The sink rate of the Acro Sport is very high; therefore I leave some power on all the way down until over the threshold. When turning from base to final it is a good idea to drop the nose a little more to keep up the airspeed. This is done in case of overbanking and increasing the stall speed. Once on final and lined up with the runway, reduce power some more and reduce airspeed to about 85 MPH. Any speed lower than this creates too high a sink rate. I like to keep the sink rate no more than 1000 FPM. Of course, trim for a neutral stick without holding much pressure. Just before arriving over the end of the runway when you know you have it made, pull the power off completely and start your flare. I round out rather close to the ground, progressively pulling back on the stick as the speed bleeds off to touchdown speed of about 60 MPH. In this manner I rarely ever bounce my Acro Sport. As I said before, ground control is good; but be alert, any tail dragger can get away on you if mishandled. An alternate way to land in gusty crosswind conditions is to make a wheel landing on the main wheels only. Assuming that some of you have never done this, I will briefly explain the technique. Come in low to the strip with a gradual sink rate controlled with power. When the main wheels touch, pull the power off and push the stick forward a bit to put a positive pressure on the top side of the wings. This will keep the main wheels glued to the ground with no bouncing. After the speed has dropped but you still have good elevator control, drop the tail down and proceed with a normal rollout. Bear in mind that you will have to use normal crosswind techniques on your approach. Always straighten out and align the airplane with the runway before touchdown.

Although some of this information is very basic to most of you, I hope that this article contains some worthwhile and meaningful data for the novice Acro Sport flier.

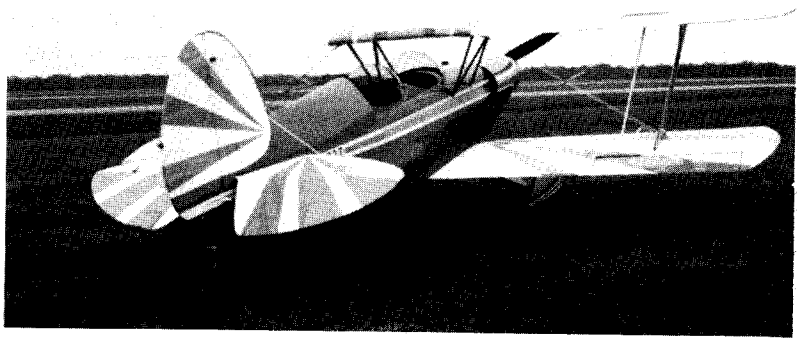
* *

Donald Smith of 4014 Fritz Lane, Valdosta, GA 31601 has rather extensive experience in spinning his aircraft and has commented to us that the usual recovery is within a half turn after control recovery is initiated from a spin. "Al", as he is known, has done rather extensive flight testing in aerobatics with the aircraft and has found that it snaps and spins quite easily without stall strips and with the center of gravity as shown on the plans.

+ + + + + + + + + + + +

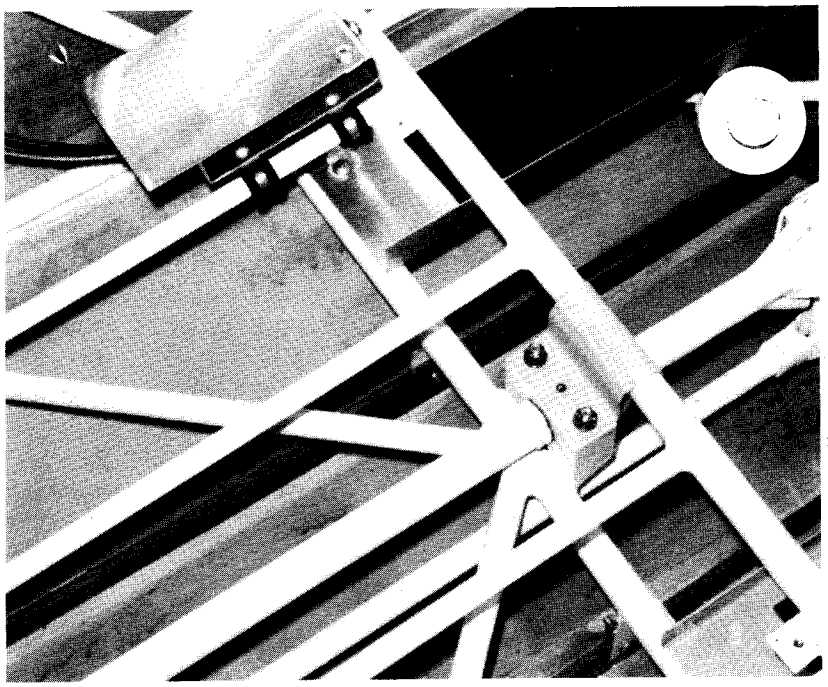
ACRO SPORT GALLERY

This aircraft was built by David E. Comrie, 64 School Street, Dunedin, NEW ZEALAND. David runs the Valley Woodturning and is test flying his aircraft. He is currently in the process of getting approval from his authorities to fly his aircraft in aerobatics, spinning, etc. Any of you Acro Sport II builders who have some extensive experience in aerobatics in your aircraft might drop him a line as he could use the information with his authorities to get their approval to fly the airplane aerobatically.



POBER PIXIE TIPS

Dr. Hartwell Jewell, 1300 S. Eliseo Drive, Greenbrae, CA 94904 has built and has been flying a beautiful Pober Pixie for quite some time. His comments:



"My concern is occasioned by the fact that at the Pixie forum, Oshkosh 80, Bill Chomo described a crack in the rear spar thought due to over travel of the aileron mechanism due to flexing of the seat tube by the aileron stops. A photograph of my "fix" is enclosed. I should appreciate your comments as to whether this gets at the root of the problem. But in any event, I think this is the kind of information that should be communicated to builders as soon as it is available.

In addition, I feel there is still a place for corrections, updating and clarification on the plans. The last I received was dated May 22, 1979, and was passed out at the Pixie forum at Oshkosh and as far as I know was never mailed to plans holders. Presently, I have several questions which I hope you can clarify for me. The aileron push rod tubing is called out in the plans as 7/8 x .035 inches whereas I believe the correct size to fit the AN 490 HT 11P rod end fittings is 3/4 inch by .035 inch. This is a minor matter but going on from there the plans show a fish mouth weld of the tubing to the rod end fittin yet I have photographs of N9PH and N443PX and both show rivets at the upper end at lea of the aileron push rods."

EDITOR'S NOTE: Dr. Jewell is correct in that the aileron push rods should be 3/4" x .035" to suit the AN 490 HT 11P rod end fittings. We have also found that it is a little easier to rivet 1/8" rivets using two for each rod end fitting rather than welding the tubing as shown. Welders may find it easier to do it the way the plans show.

"Finally, with regard to the ailerons, the plans show the aileron horns extending straight downward yet I believe that due to the angularity of the push rods (which is approximately 15 degrees) that the aileron horns should be bent in a like amount and the bolt cocked at an angle to avoid interference between the rod end bearing and the horn."

+ + + + + + + + + + + +

PROJECT 10 ACRO SPORT BY: C. L. "BUD" McHOLLAND

The "Blue Bird" started life in 1973. It is a "Stock" Acro Sport in that the plans were followed as nearly as possible. Some of the finishing details may be slightly different but these are mostly to accommodate the equipment that was included. The engine is a Lycoming O-290-G4B that I rebuilt for an earlier project and sold to a fellow who was building a Smith Miniplane. This was in the early 60's. This passed to another builder that was making a Stits Playboy. All this time the engine was stored in my shop where it is warm and dry. When the Acro Sport was started I thought of the Lycoming as a time saver so I bought it back and it is now in the Acro Sport. A Twin Commanche fuel injection system was adapted to the O-290 and we had a time getting this done as there is no standard fuel injection system for this engine to the best of my knowledge. It work well. A Christen Inverted Oil system is also adapted to the engine, giving unlimi inverted capability. An automotive type alternator is fitted to save a few pounds o

the standard generator that was original equipment on this type engine. A full electrical system is installed with radio and basic instrumentation. Total empty weight presently is 850 lbs. The batteries used for inverted flying were several. First was a manifolded type with an acid retainer attached so no acid would be spilled on the plane. This was not satisfactory as the acid moved from cell to cell in the manifold and caused loss of charge and finally failure. The next two batteries were Gel-Cell types and both of these went bad in less than a year. The final setup is a Gates Electronics 25 amp hour "Six-Pack" sealed Lead Acid battery which is highly recommended for any acrobatic aircraft.

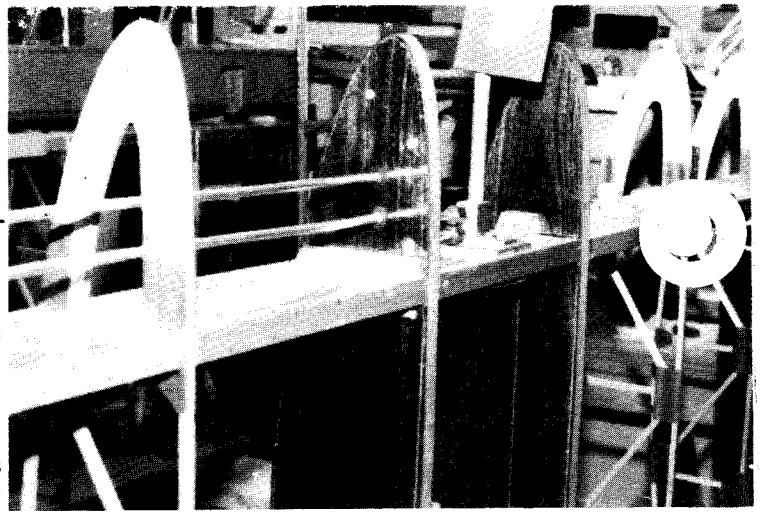
The aircraft was completed in the summer of 1976. Time was short but the hours were flown off and the plane was issued a permanent airworthiness certificate. The Acro Sport was flown to the 1976 EAA Convention and placed with the Museum's aircraft on the flight line as its color scheme was the same. See color photo on page 35 in the October 1976 SPORT AVIATION. The aircraft and builder are again shown in a photograph on page 30 in the November 1976 SPORT AVIATION. I also conducted the ACRO SPORT Forum at the Convention.

During these past eight years ,e owners have treated the plane kindly and it is in excellent shape. The total air time is only 163 hours. A good portion of these hours were put on the aircraft in the early year to obtain the airworthiness certificate and to get to Oshkosh and back. In the interim, the first owner after me was a retired Air Force Major who loves aerobatics and did everything he could think of including vertical torque rolls and Lomcevaks plus the usual routines. The second owners flew the plane for fun but only put 10 hours on it in a year's time. It has always been hangared and kept spotless. It is hoped that the Acro Sport will find a good home at the EAA Aviation Museum. Some snap shots are included.

EDITOR'S NOTE: Bud McHolland's Blue Bird is the tenth aircraft he has built. Pictured is the eleventh, a J-3, and the twelfth, which is a Vari-Eze. Bud has recently donated his Acro Sport I to the EAA Aviation Foundation. We would like to thank him on behalf of ,e Aviation Foundation and express our deep gratitude for his generosity.

+ + + + + + + + + + + + +

ACRO SPORT II NOTES TO BUILDERS BY: BEN OWEN



I was working on Paul Poberezny's Acro Sport II the other night and we were talking about mistakes. It's fairly easy to make a mistake that you think might cost you a great deal. We've had builders mistakenly drill the rear lower wing spars for the landing wire attach when this is not necessary. This is correctable. We've had builders put the leading edge on the wing that was supposed to have the pitot tube connect. This is one that you just have to work around and usually it entails taking the leading edge off that you've just put on. Please see the picture above of Tony Hohenwalde's installation of the pitot tube on his Acro II. Of course where the leading edge attaches to the leading spar, there is a filler that goes in between the ribs so that the leading edge can attach there. We've had these fillers installed in front of the ailerons on the rear spar, which of course is unnecessary. There are lots of different ways a builder can make mistakes on an airplane and still rectify them. One of the most experienced aircraft builders I know, who just happens to be President of EAA, every now and then makes an occasional error, as he freely admits. The real mistake here would be to let minor things like this slow you down or put you off from building your airplane. Even the best make mistakes, and there are very few errors you can make that cannot be corrected. If you are working on your Acro I, Acro II or Pixie and you've made an error and want Paul's opinion, just contact me; we'll discuss it and I'll get back to you.

****

UNTIL NEXT TIME . . . BEN OWEN, EDITOR
ACRO SPORT NEWS

****