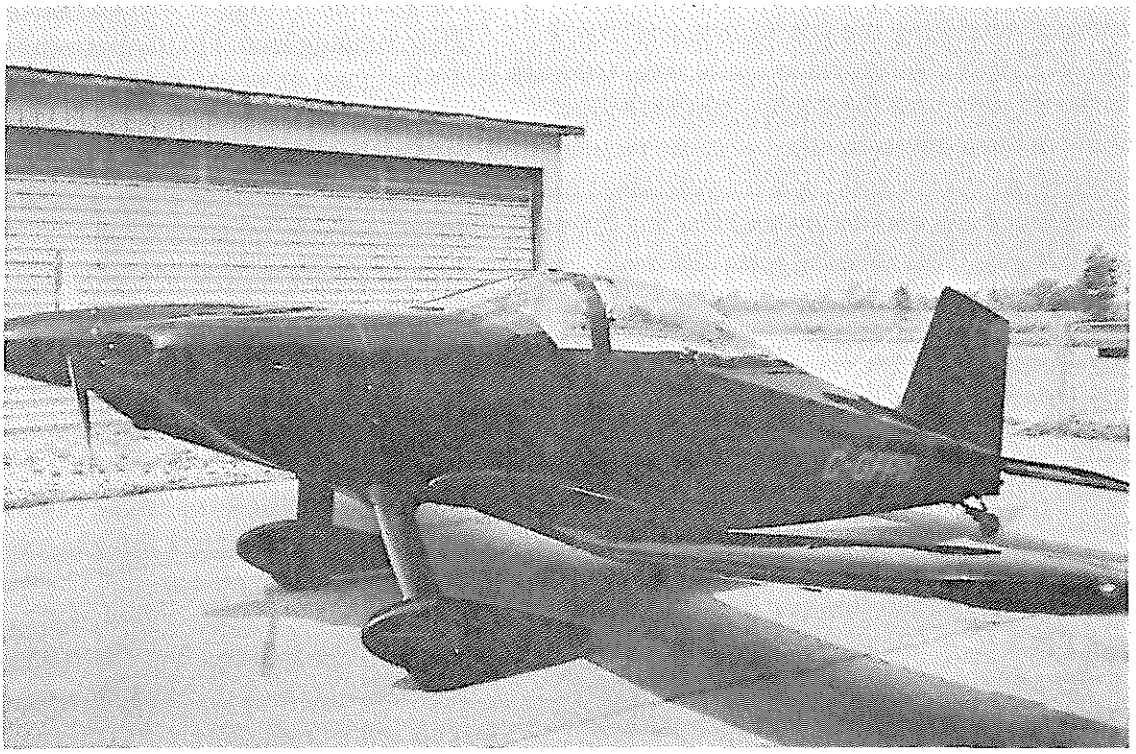
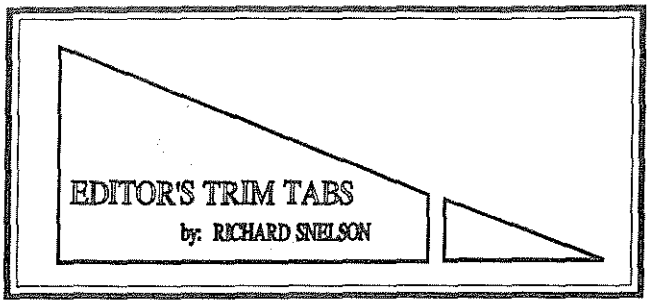
T-18 NEWSLETTER



Fred Gindl's "Black" with gold trim Thorp T-18

IN THIS ISSUE:



When you own and fly a T-18 you get in the habit of measuring the year in terms of Thorp Fly-In Events, Oklahoma in the Spring, Oshkosh in the Summer and Kentucky Dam in the Fall. Well, in those terms another year has passed. I hope it has been a good one for you. Mine has had a lot of ups and downs and I'm not talking about flying. That dreaded term "Re-engineering" caught me as my company eliminated all middle management supervisors, including me. We were kept in a temporary pool and allowed to apply for other jobs that opened up in the company. Luck was with me, I landed an engineering job in our Natural Gas Department. I went from having 8 people to worry about to having only my self, less responsibility, for slightly less pay. I wish I could have gotten this job several years ago. I love it.

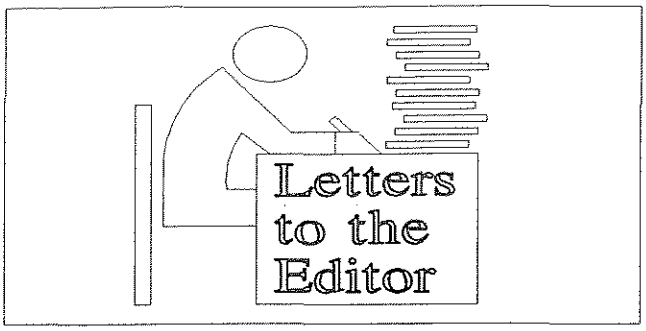
I want to thank the membership for the great articles in this and past newsletters. Keep them coming there just getting better and better. I'm getting more and more items on computer disk, I like that because it saves a lot of typing. I can transfer most word processor files into my publishing program so don't worry about the file type. Just send the articles!

I recently learned the advantages of "Email" and the Internet. I now have several members that I communicate with using Email through the internet. My Email address is rsnelson@prairienet.com. You need a computer and a modem and a gateway computer service to get access to the internet. America On Line (AOL) and Compuserve are two dial in services that provide that service. While using AOL you will find a section under Aviation/Homebuilts where a Thorp T-18 bulletin board has been started. Several of us are using this section to promote the Thorp and exchange ideas. For those of you wanting to know more about Email and the Internet I'll put together the details in a future newsletter article.

Safety Note: I use gravity flow for my fuel system, and recently realized that under certain conditions my engine was not getting enough fuel, running lean. On the bottom half of the tank, I would get an occasional backfire or roughness for a few seconds. On one high speed pass and pull up the engine backfired and went very rough. To make a long story short, pulled the carburetor off three times, plus made several checks of the ram air pressure inlet and tank vent system. I finally replaced the gasket on my gas tank cap and the problem went away. It seems that there is lower pressure in the fuselage and it's enough to lower the pressure on top of the fuel if the cap gasket is bad. I had a clue weeks before when I found some gas on top of the cap after a short flight. How in the heck did that get there? Now I know, it got sucked out.

There has been word that Phil Tucker has sold Sport Aviation. A couple fellows that were involved with the Thorp 211 have purchased it. Phil tells me that they plan to continue supplying parts to builders and may kit the airplane. I think it's a good time because there are a lot of people looking for good Thorps. They don't stay on the market very long. To me that means that we are continuing to sell them way to cheap. If you want to give your airplane away, don't put the price in the add. Then it won't make people think they can be purchase for near nothing.

The news isn't spreading fast enough, the FAA has a new proposal on the table for new Medical requirements that will cost us money with out any benefit. Find the details and let the FAA know if you don't like it.



October 25, 1994

Dear Richard,

Due to the initial indications that excessive forward pressure was required on Bill Warwick's first flight of the T-18C at Phoenix, I have contributed my time to assisting the NTSB and FAA investigations into the possible causes of the crash which occurred on the second flight. On October 12, 1994 George Leider, Earl Ody and myself examined the wreckage in the company of Dean Hennies of the Scottsdale Arizona FAA Flight Standards Office. George has built three plus T-18s and Earl two. George brought a fixture to verify the location of the 509 Lugs and 510 Mast Assembly and I provided all the pertinent drawings. The following excerpt from my letter to Warren Wandel of the NTSB, summarizes our findings and some remaining questions:

1. The Horizontal Tail Assembly (B-502) was in substantial compliance with the pertinent drawings. The 509 Lugs and 510 Mast Assembly, which are critical to proper rigging, were correctly located on the spar tube.

2. The Tab Linkage (A-521) was substantially correct with the following exceptions:

a. The 513L and 513R Tab Arms were approximately 0.2 inch too long when compared with the drawings.

b. The 513L arm had two rivet head clearance holes drilled in the section of the tube welded to the -2 Plate.

c. The 513R arm had three rivet head clearance holes drilled in the tube. This arm was broken through the hole intersecting the bend. This fracture had to occur at the time the right horizontal tail surface failed on impact with the ground. This is evident since the right hand -2 arm on the 703 Torque Tube Assembly was bent out away from the fuselage during separation of the tail surface. These holes on both arms were necessary due to the use of AN470 brazier head rivets instead of the A-517 drawing specification of AN426 flush rivets on the tab ribs.

3. The A-701 Elevator Trim Jack Assembly was in compliance with the drawing. The trim position was approximately 11/2 turns from full nose up position. It is unknown if it had been moved since the accident. The system was hard to move due to distortion in the bulkhead by the vertical tail spar during the impact.

4. An approximate measurement of the broken (2 pieces) 495-1 Elevator Push -Pull Tube indicated a measurement of 116.75 inches. This was close to the drawing specified 116.98 inches.

5. Examination of the area in the tail where the control system and mast assembly would move during normal elevator travel indicated no blockage of that travel.

Discussion:

The effect of the longer tab arm in item 2 a. above would be a change in tab rigging angle of approximately 1.6 degrees tab trailing edge down. This would have caused an aircraft nose up trim force which may have felt unusual to an experienced T-18 pilot. This may explain the adjustment which was made to the tab arms between the first and second flight. This original difference or the observed shape of the tab arms after the crash would not have caused uncontrollable pitch forces on either flight.

The effect of the clearance holes in items 2 b. and 2 c. would be a weakening of the 513 arms but as explained previously, the failure of the 513R arm had to occur after impact to have bent the -2 arm on the 703 Torque Tube Assembly.

Editors Note: At this point Dick Eklund has several questions that are directed to the builder of the aircraft. It's my feeling that these questions should be asked by the NTSB, rather than in this newsletter. If we learn additional facts about this accident they will be presented in the newsletter.

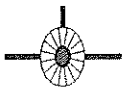
Our findings basically eliminated some possible causes and it is hoped that sum of all the data available to the NTSB will be able to pinpoint the actual cause. I will continue to provide any new information as it becomes available.

I would like to emphasize the often repeated statement, to "Build the T-18 according to the drawings." Dave Neustel's procedure , if carefully followed, will give any builder the peace of mind that his aircraft is in conformity with the Elevator Control and Trim specifications.

I would also like to remind all T-18 owners that the usable rear limit for weight and balance is 16 inches aft of the wing leading edge (Sta. 71) or 32 percent of the wing chord. This gives a reasonable margin from the theoretical neutral point at 17 inches or 34 percent chord. (See Newsletters #27, #61 and #63 for representative calculations.) The actual stability margin available depends on the friction in the elevator control system.

The stabilator hinge friction is the source of most of the stability degradation. Probably based on his experience with high friction in one of the early T-18s, N299V (Newsletter #18), John Thorp recommended a conservative aft limit of 31 percent of wing chord or 15.5 inches aft of the wing leading edge.

Sincerely, Richard Eklund, Eklund Engineering, Inc.



Rich-Regarding the **quick drain failures**, there are the words "Auto-Valve" stamped on the bottom of it along with part number BJ10OOAH3DO. The FAA will be issueing an AD very shortly. This drain is one of the most common you will find. It is listed in the Cessna parts catalogue but is actually made aftermarket. I found several on some of the Thorps at Osh this year.It seems that when pilots remove a drain hose from the nipple end, they impart a twisting motion which sets up stress cracks on the internals and the part then fails at any time. I recently spoke with Phil Tucker and he related to me that yes the sale of his "Sport Aircraft" was all but final and yes they intend to certify the T-18. He added that it is going to be the original bird only for certification (standard body) in that much of the needed requirements have already been met. He says that parts prices will be going up substancially as these people are profit minded as opposed to Phil who has been providing more of a service. Regarding Thorp trailers, I spoke with Gus Gorden and he can supply sketches(not plans) and black and white photos showing construction details for $45.00 bucks. Gus is willing to build a trailer for $2200 bucks. I have seen Gus's trailer and it's a beauty. Gus is a auto-body man by trade and has built several Thorps and acts as the local Thorp helpmate for anyone who requests his help. His Thorp is called "Maiden America" and has been featured in several flying mags over the years. He can be reached at 11312 Haskill Ave, Granada Hills, CA 91344 Ph 818-366-3841.
Thanks Don

Editors Note: The above is an Email message received on the Internet. This is a great way to communicate. I check my Email each day and find it an outstanding, effortless way to get back to questions and problems "without writing a letter or trying to get someone on the phone". Get a computer and modem, start by joining America Online for a gateway to the Internet. My internet address is rsnelson@prairienet.com to leave a message on America Online use rsnelson1

Joe Gauthier 9 Kowal Drive Cromwell, CT 06416 (203) 635-4058
I am nearing completion of my Thorp project. It is a S 18-CW which I expect to fly early this spring. I have a question for you or your readers. The KS6A Bearing that supports the threaded pitch trim mechanism appears to have excessive axial play. With the mechanism completely assembled, the control bellcrank arms can move up and down about 3/16". 1 am certain that this condition is unacceptable and I know it is caused by the play in the bearing. I have purchased two bearings, both new, from reputable suppliers and they both have the same degree of play. Coincidentally, I have a friend who is building a Glassair and works for the Torrington Company. The Torrington company now holds the license to manufacture that bearing. Neal checked with the engineers and found that because of it's self aligning feature, this bearing can have up to .040" play and still meet the manufacturers specifications.

I purchased some used parts from an T-18 that was damaged by high winds some years ago. Included in that purchase was the pitch trim screw, supports and the threaded shaft and block. That bearing ran a little rough, it would not rotate as freely as I thought it should. Upon close inspection it appeared that the sides had been "Staked" as evidenced by small indentations around the perimeter of the dust shields on both sides. Is this the solution to limiting the play in that bearing?

I have T-18 Mutual Aid Society newsletters by Dick Cavin and Lou Sunderland back from the beginning and could not find any reference to this situation in any of them. I'm certain that I am not the only one who has experienced this condition.

I would appreciate a phone call from any of your readers, collect of course, who can shed any light on this question. I am always home, in my shop on Tuesday or Wednesday evening after 7:00 PM.

From the beginning of my construction, I have kept a Photo Log of every step in the project. I hope to pull together my construction notes and the Photo Log and produce a document that might be helpfull to others and their projects. That will not be available until next year, after my Thorp is flying with the bugs worked out.

Editor's Note: I called Joe and discussed putting a shim behind the jackscrew to take up the bearing play.

Rich,

I just received my package of newsletters dating back to day one. It will certainly take a few days to digest the information. What I hope to glean from the back issues is the fill-in information about any weaknesses in the existing design (admittedly there are a couple), plus information from others that have flown a similar configuration to what I am starting. My initial configuration is pretty much per the plans: 0-320 with constant speed prop, deluxe VFR instruments, some added fuel capacity (+20%), comfy interior. The basic plane fits my mission pretty close. This is my first endeavor at homebuilding an aircraft of my own, but I have been involved with the Experimental Aircraft Association for the last ten years. By trade, I have been a structural design engineer for the last 14 years, mostly on launch vehicles (a genuine 'Rocket Scientist').

I have S-18 plans (s/n 143) purchased in March of this year. Thus far, I have finished a three dimensional CAD database of the fuselage, from the firewall aft to STA 90.00. 1 want to investigate the room in the cockpit, instrumentation layout and clearances (vs. the fuel tank), plus locate all the other little goodies (vents, switches, map pocket, etc.). I have also developed a bill of materials (Microsoft Excel format) for the airframe, based on the drawing requirements. This 'shopping list' has allowed me to have all material requirements in a short (35 page) list. In addition, I can sort out raw material (by type), and all the fasteners.

I have been going to auctions at some of the southern California area defense contractors. At these, I have been able to pick up clecos, rivet guns, lockbolt pullers, various hand tools, plus some material. All has been purchased for less than ten cents on the dollar. At least there is a good side for somebody to the shrinking defense industry. The raw material is mostly in lots too large for a single builder, often in thousand pound increments (that's a lot of .032 skins), but the hand tools are high quality. Some have just been serviced, while some are brand new (I got 450 new clecos, plus pliers, for $5; five dozen Visegrip type clamps for $10; and three dozen cobalt letter size drills for $5). Maybe somebody else might be able to use this tip.

I look forward to receiving the next issue of the newsletter, and will supply an update when I get finished with some real parts. Sincerely, Ed Lambert 2166 Farrington Drive, El Cajon, CA 92020 Phone: 619-562-5635

Editors Note: See the Placerville Article also from Ed in this newsletter. Thanks Ed.

Rich, I just wanted to mention that I enjoy the newsletter and the Oshkosh forum and appreciate the effort that goes into it. The only suggestion I could give is although I own a Thorp I have never seen matched hole tooling or the process and maybe a small mockup could be brought and demonstrated at the forum. Maybe a builder that lives close by could drive some stuff in. Another idea is for a professional instructor to speak on the flight characteristics of the Thorp. I know a fabulous one if he's a willing speaker. He is the only instuctor I know of in Southern Cal that teach's in Thorps regularly, including acro. Perhaps these things have already been done, but I think we should speak to the people who want to get in or get going with a T-18. I enjoy everyone's fine comments about the T-18, but I think not enough is said about the trouble you can get into in a short coupled high performance

taildragger, particularly new pilots transitioning from tri-gear, which is about the only place new pilots come from now. Incidentally, I installed an airwolf aftermarket oil filtration system on my T-18 and just love it. I did the installation completely in front of the firewall (did not have to get in front of the tank with a doubler). I will write an article on it for the newsletter if you would like. Thanks, Don

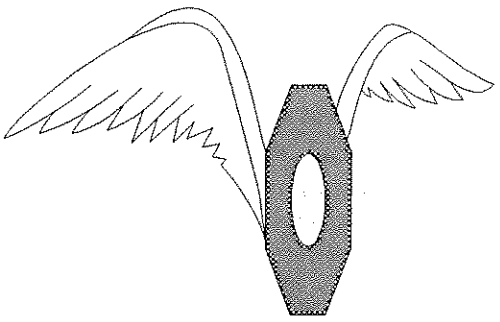
Editor's Note: Please send us an article on the filter system. Thanks for the comments on the forum. We would welcome a flight instructor speaker.

To Richard Snelson —

When you so kindly returned my call several weeks ago and answered my halting questions about the T-18, I thought I might make it to Kentucky Dam, as you suggested, to get a closer look at the aircraft and perhaps fly one. No such luck; instead, I took a 3-week trip elsewhere—strictly business—and have just returned. Before I left, however, I did get a brief look at a T-18 for sale in Fredericksburg, VA, and I contacted EAA, which sent me reprints of several articles on the plane. Very impressive, especially the fact that the design has been flying successfully for 30 years, and that there are a number of Thorps active. In short, the drift seems to be in that direction, as I am looking for a plane that is nimble and fun to fly (many qualify), capable of traveling (fewer make that cut), and not outrageously expensive (fewer still in that category). However, I don't think I'm up to building one. Time, not skill or confidence is the factor; in my well-spent youth, before I got into my present work (writing and editing) I worked as a carpenter, do-all, and machinist. But I am capable of handling the care and feeding of an experimental — if I can find one that's well-built and cared for to begin.
So ... the point of this babble is to ask your advice on how to proceed. I suppose, as you suggested, buying the full stack of newsletters would be Step 1, certainly moving me up the learning curve. How about shopping tips? Does the Mutual Aid society also serve as clearing house for buyers and sellers? And, of course, training. I'm a 900-hour comm/instrument pilot, but with no experience in light, high-performance taildraggers.

If you'll tell me how to pay for the newsletters, I'd like to take step 1. If you'll help with advice on Steps 2-3-etc. I'll be most grateful.
My full name, address, etc is:
John R. Sullivan
1308 Tracy Place
Falls Church, VA 22046
Phone (home and work) 703-532-6604 Fax 703-538-5073
AOL address is JRSULLIVAN
Thanks for you help, past present and futured.
John

This NUT Flew Around The World

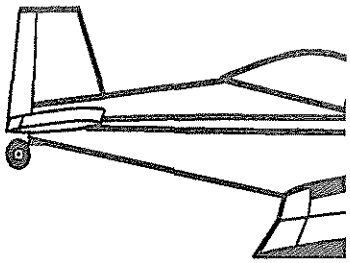


The Contest Winners

Harvey Mikelsen
Ken C. Morgan
Roy Farris
Dave Eby
Paul Kirik
Frank Snedeker
Hal Stephens
Dick Eklund
David Neustel
Ed Lambert
Lyle Trusty
Larry Whetzel
Ben Harrison
Dick Penman
Eddie Eiland
Joseph L. Kroupa
Coyt Johnston

If I missed anyone please let me know. I'm working on a plaque to mount the nuts and bolts on. So I have some wood working to do before I send them out. Thanks to all for their articles and to Don Taylor for his aircraft parts.

Thorp Stabilator Alignment



by David Neustel

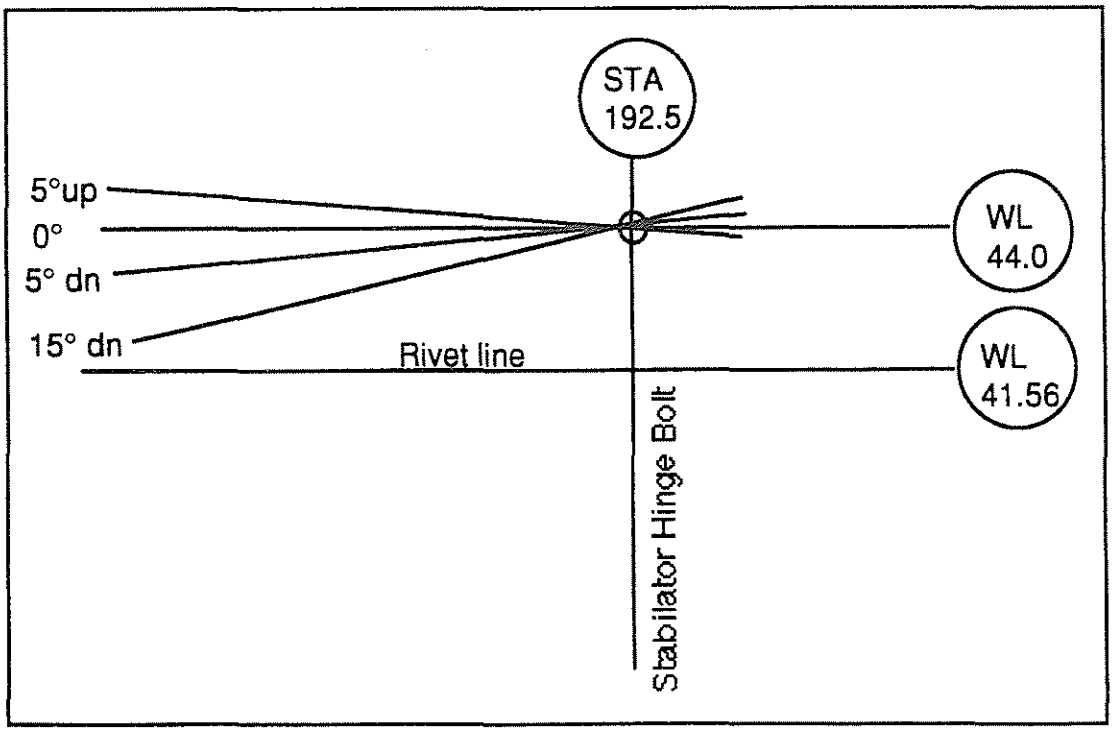
Due to recent events, I feel there is a need for a detailed procedure for rigging the stabilator. Since I was in the middle of rigging my own, I recorded the method I used. The following procedure is based on a standard fuselage. A wide body may be different but I can't say for sure since I don't have the wide body plans.

Rigging of the stabilator can be accomplished in a number of ways. Drawing A-521 indicates the rigging position of the stabilator, trim screw, and trim arm when the anti-servo tab is neutral(streamlined). The method I used consists of several steps which not only determine correct travel, but also locate and lock all components in the stabilator control system in the correct position. After all components are checked and positioned, the 513 tab arms to the anti-servo tabs are bent, cut, and welded.

Step 1: Level the fuselage using WL 42 angles. The fuselage must remain level throughout the rigging process.

Step 2: A template is laid out and taped to the side of the fuselage at the leading edge of the stabilator. This provides a method for locating the position of the stabilator and checking it's travel. Using drawing A-521 as a guide, layout a paper template which shows the stabilator center line in each angled position as shown on the following sketch.

STABILATOR TRAVEL TEMPLATE



The rivet line of the WL 42 angle (WL 41.560) and the stabilator hinge bolt (STA 192.5) are used to align the template horizontally and vertically on the side of the fuselage. After completion of the paper template, trim the area around the stabilator hinge enough to allow the template to be aligned with the WL 41.560 rivet line and not interfere with the hinge. Using a level and straight edge, align the template with the rivet line and the stabilator hinge bolt. Tape the template into position on the fuselage.

Step 3: Assure that all components in the stabilator control system are in place and the bolts are tight. Check the full up and full down travel of the stabilator by seating the walking beam against the stops and referencing the template. If the stabilator does not have full travel (5° nose up and 15° nose down), check the complete control system until you understand what is causing the problem. Correct any major deviations from the drawings. Minor adjustments in travel can be made by filing the forward or aft stops, but be careful, you could be creating additional problems by not understanding **why** the travel is wrong.

Step 4: Now that the travel of the stabilator is correct, the trim jack screw is checked for proper travel and the 703-2 arms are checked for proper position. Draw a center line on one of the -2 arms. With the fuselage still level, place a level on the -2 arm center line and adjust the trim screw until the center line is level. This places the -2 arms on WL 44.770 which is the mid point of the trim screw travel (5.4 turns). Assure that you have 2.7 turns nose up and 2.7 turns nose down from this position. If the travel is wrong, check the complete trim system until you understand what is causing the problem. Some possible problems could be:

- The trim screw stop nuts can cause travel problems since the plans call for stop nut thickness of .190" but the purchased nut thickness is from .220" to.250" (note that .060" is one full turn of the trim screw).
- Additional trim travel problems can be caused by the 707 spacer not resting flatly against the A-582 doubler which causes the trim screw to be positioned farther forward than the plans show.
- Adding a shim between the end of the 704 jack screw and the A-582 doubler to take up the KS6A bearing end play will also cause the trim screw to be positioned forward.

The combined affects of these problems can easily take up one or two turns of adjustment in the trim screw.

Step 5: After determining correct travel of the trim screw, reposition the 703-2 arms in the level position (WL44.770). Drawing A-521 shows the 703-2 arm link attach bolt in the WL 45.020 position. This position is 1.35 turns nose up from the level position. Turn the trim screw 1.35 turns nose up which will be the final position for rigging the stabilator per drawing A-521. An additional check can be made to verify this position by using a level aligned with the center of the link attach bolt. With the level aligned with the bolt head, measure down to the center of the 703-1 tube. This measurement should be .250".

Step 6: The A-521-1 links must be locked in the correct position so that the correct anti-servo tab ratio is achieved. Install the -1 link arms and A-521-2 bushings to the 703-2 arms using an AN3-5A bolts. Starting on one side, cut two small pieces of .025" aluminum and position them between the -1 link and the -2 arm on either side of the bolt. Lightly tighten the bolt so that the link is snug but still movable. The A-521 drawing shows the link lower bolt slightly aft of the upper bolt. By scaling the drawing, this difference appears to be .080". Place a level vertically against the forward side of one -1 link and insert a .080" feeler gauge between the level and the lower end of the -1 link. Adjust the -1 link with the level and feeler gauge until the bubble centers. Tighten the -1 link to -2 arm bolt to lock the link in this position. Repeat step 6 on the opposite link to lock it into position.

Step 7: Drawing A-521 indicates the rigging position of the stabilator as 5° nose down. Place an angle across the walking beam and clamp it to the main wing spar and the 592 bulkhead. With the stabila-

tor at 5° nose down, as measured from the paper template, clamp the walking beam to the angle. The control stick angle should be approximately 7.5° forward from vertical with the stabilator in this position.

Step 8: Using a small block of wood or angle, clamp both of the anti-servo tabs to the tips so that they are streamlined with the stabilator. Also check the alignment of the anti-servo tabs to each other by sighting along the trailing edge.

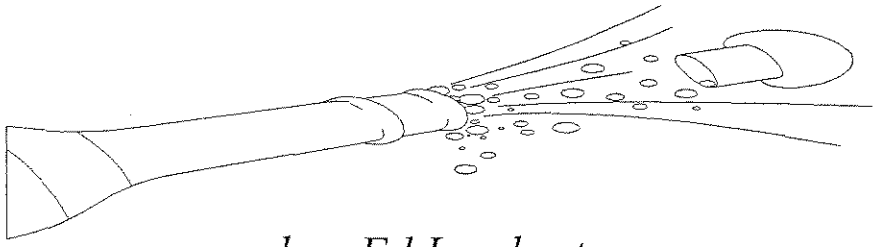
Now that all of the components in the stabilator control system have been positioned per drawing A-521, the 513 tab arms can be bent to align with the A-521-1 links.

Step 9: If not already done, bend the 513-1 tube end nearest the 513-2 plate per the view in the upper right hand corner of the 513 drawing (true view of bend). The bend near the AN 481-4 clevis must be left straight and long at this point. Screw one of the 513 tab arms to the anti-servo tab using two AN 502-10-6 screws. Place a straight edge against the face of the A-521-1 link and mark a line across the 513-1 tube. This line marks the approximate center and angle of the bend needed in the -1 tube to align with the A-521-1 link. Using a heavy duty tube bender, bend the 513-1 tube leaving it long. Cut the -1 tube slightly long and insert the AN 481-4 clevis. Trial fit the 513 tab arm and carefully shorten the -1 tube until you can insert a bolt into the clevis and lower -1 link hole without moving the pre-set position of the link. Once this is accomplished for both 513 tab arms, bolt them both into place and scribe one or two short witness marks across the -1 tube and the clevis. Remove the tab arms and weld the clevis to the end of the -1 tube assuring the witness marks are aligned. Install the completed tab arms and make any small adjustments which may be needed because of welding distortion.

Step 10: Now the completed system must be checked for proper travel and freedom. Remove the .025" aluminum from between the A-521-1 links and the 703-2 arms. Remove the clamp and angle from the walking beam. Assure that all bolts, nuts, and screws are tight. Rotate the stabilator to both nose up and nose down stops. There should be relatively little resistance to movement. It should be noted that excessive stabilator control system friction will move the stick free neutral point forward of the theoretical 34% wing chord. This reduces the stability margin at aft C.G. locations (ref. news letter 18 page 1). With the 703-2 arm still in the rigging position, rotate the stabilator to its rigging position (5° nose down). Place a bubble protractor onto the anti-servo tab and level the bubble. Record the protractor reading then rotate the stabilator full nose down. Level the protractor bubble and record the full down reading. Next rotate the stabilator full nose up. Level the protector bubble and record the reading. Determine the total anti-servo tab angular change in each direction from the starting stabilator position (5° nose down). Note that the method described results in an angular change that is the sum of both the stabilator and anti-servo tab. Drawing A-521 shows an anti-servo tab angular deflection of 20° nose down and 20° nose up. With the stabilator rotation added, (10° up and 10° down) the total anti-servo tab angular change as measured should be 30° up and 30° down. If your anti-servo tab measurements do not match, go back through the steps and recheck your system.

That completes my long winded procedure for rigging of the stabilator control system. I feel that this is one area in which making any changes to the design could be dangerous to the average builder. Any deviation from the print could easily change the anti-servo ratio or stabilator travel and produce an unwanted response...especially on the first flight. Sincerely, David Neustel 1045 Sunfish Dr. Manteca CA, 95336 Plans #1258

PlacervillePlacervillePlacerville III



by Ed Lambert

The third annual Placerville Fly-in was the first one of it's kind I've attended. It won't be the last. I cruised up on Saturday to the Mother Lode country in my Honda powered factory built job at a steady 59 kts. I missed out on the lunch, but was greeted almost immediately by one Hal Stephens. For anybody that hasn't met Hal, he is quite a friendly type with a level of enthusiasm I haven't seen in a long time in one person. I would like to get an aerosol can of it to spray around the garage. Within 10 minutes of arriving, he had me introduced around, and set me up with my first T-18 ride. Courtesy of Gus Gordon, as a matter of fact. Having just logged 8 hours en route, I took the time to meet and talk to some of the others there. I must apologize for not writing all the names and places. Some of the individuals were: Gar Root out of Sacramento, Mac Booth, Brad and Sonya Chapman from Oregon, Dave Neustal from Manteca, Richard Eklund, Lyle and Anne Trusty from Palmdale/ Lancaster area, Gus Gordon of Granada Hills, Hal Stephens, and Jim Critchfield.

The turn out was, as I understand it, a little less than last year. The general feeling was that weather in the area was a contributing factor to no-shows (there was quite a bit of nympho-cumuli to the east). But in Hangtown, the weather was great. There were six Thorps on hand, plus two Scooters. For anyone that hasn't seen a Sky Scooter before, it is something to look at. The wing lacks just about all the structure one might expect to find. This is not meant to be a comment on the integrity, just an observation on the construction. The wing skins are stiffened with corrugations on the external surface. Inside, are a couple of ribs, and a spar. It looks a little weird, but it has to be light. Low part count, too. Somebody ought to certify this idea. (Yes, I did just fall off the proverbial turnip truck).

With the socialization out of the way, it was off into the wild blue yonder. Guess I should have polished up the ol' flying skills (log book shows about 100 hours, but none in the last 6 or 7 years). Nevertheless, I was most impressed by the Thorp, and Gus' example is a beauty. Suffice it to say, my ride turned up the heat on that pile of aluminum sitting in my garage. Also had a short chance to really drool all over the other examples there. Sorry boys, I did try to clean it up afterwards.

Next on tap was the Famous Champagne Cork Flying Contest. Like all good pilots, the challenge was to fly right down the centerline for the greatest distance. Midway through the contest, a vigorous discussion arose on the merits of real cork versus plastic substitute (composite) stoppers. It really didn't make any difference. Grand prize was more champagne. By the time the winner was announced, nobody really cared. Last activity on tap was consuming of the dead cow. And all the fixin's- salad, bread, pie (from Apple Hill) were included. Evening accommodations were camping out in a nice little patch next to the Hangtown Chapter's hanger, or at one of the fine hotels in town. They even left the light on for me.

Sunday morning was pack it up and move it out time, but not before I had a chance to shoot up another couple of rolls of film. I would have sent some along, but I didn't take many photos of whole airplanes. I shot three and a half rolls of film, almost all of little details. Things like gear leg fairings, light installations, fairing installations, etc. I know that they will be a valuable asset during one part of the assembly phase or another. Again, I would like to express my thanks to those of you that let me have a close up view. Heck, Gus even field stripped his cowl to show off the engine compartment. By the way Gus, I made it home before midnight. But not by much.

We also had a chance to get together a real collection of brain power to look over the latest worry Critchfield has. After spending the last 29

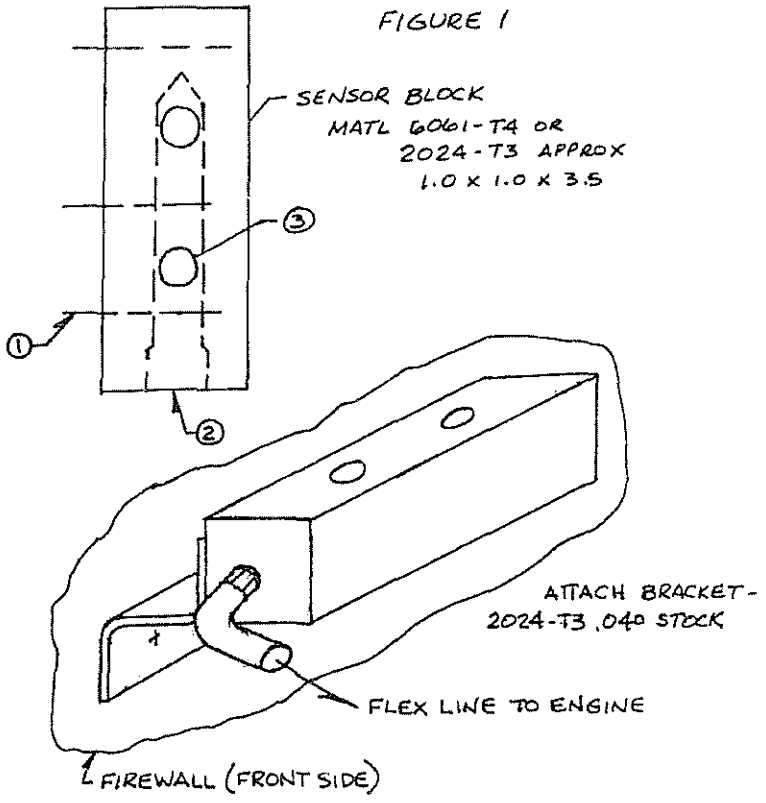
years in the building process, I guess you can develop a lot to worry about. From the discussion, Jim has made some progress in the last year. He has the engine mounted and plumbed, the panel installed (but I don't know if it is all hooked up), and most of the structure all together. The next major task is to trim and install the canopy on the frame. He got a lot of tips on cutting and drilling Plexiglas.

As an assist to the rest of the builders that are out there, and couldn't come, I have also included some information out of my notebook that I got from those people attending. These are just the kind of things I would like to see in the newsletter, and well if nobody else has the time, here goes:

1) First I'll pick on Gus Gordon. In addition to having some of the finest metal work I've seen anywhere, he has a couple of other goodies worth mentioning. Gus told me about a failure he experienced a while back (See also a similar story as told by Gary Green in Newsletter #88.). He spotted an oil leak during a fuel stop. Started looking for something loose, and he broke off the fitting mounting the oil pressure (or temperature) sender from the front of the engine. After a nice car ride to get the plane home, he pulled off all the engine mounted senders. He then built a remote sensor block (see figure 1). This looks like a fine way to eliminate that potential problem, without going to expensive fittings.

The next thing has to do with mounting the cowl cheeks onto the upper and lower cowl pieces. Gus came up with a way to incorporate a flush, butt type joint, as opposed to the lap joint per the plans (see figure 2). Not only is it a bit cleaner, but it can allow for reinforcement of the cheek edge to eliminate any distortion. If any parts are a bit wavy, a thin piece of aluminum or stainless sheet can be bonded to the inner surface to smooth things out a bit. Gus couldn't remember the precise adhesive used, but it appears to be Hysol EA 934 (aluminum filled, two

FIGURE 1



① DRILL & TAP FOR #10 SCREWS 3 PL
LOCATE BELOW MAIN PASSAGE - DON'T BREAK THRU!

② DRILL ~~THRU~~ 1/4 DIA, DEEP ENOUGH TO PICK UP TWO OR THREE INSTRUMENT PICK-UPS. C'BORE & TAP FOR ELBOW

③ DRILL THRU TO MAIN PASSAGE
C'BORE AND TAP AS REQD FOR TRANSDUCER/TEMP PROBE

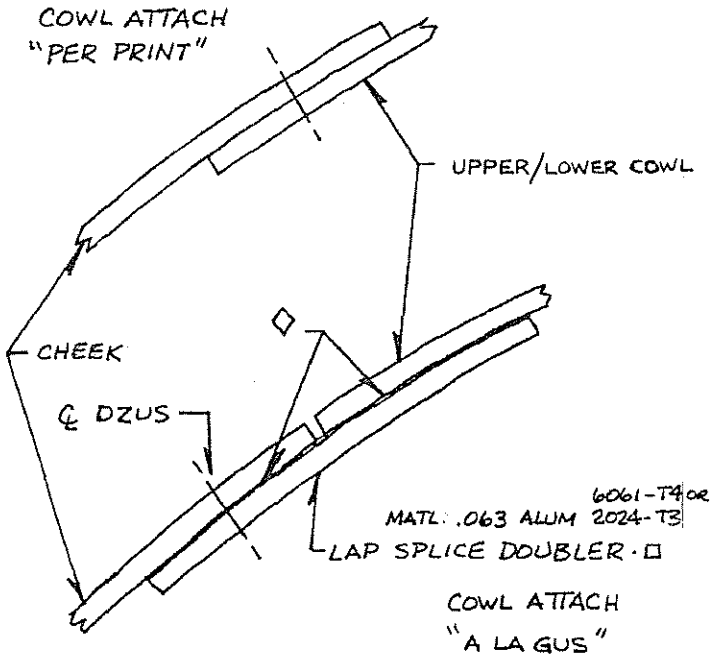
E. LAMBERT 10/10/94

part epoxy). This (or equivalent) would provide more than enough strength for this application.

2) Next is the nice Thorp of Jim Stuart from Santa Ana. The newsletter pictures do not do this one justice. The paint job is a sort of purple, and is pretty sharp. In building his ailerons and flaps, Jim made use of trailing edge material to close out the aft ends.. Available from aircraft supply house and wholesalers, this barbed shaped extrusion (see figure 3) allows for real straight trailing edges. It also allows the builder to put together the skins with flush fasteners (flush top side only-solid AN426, I think they were 3/32 diameter). I would suspect that some trimming of skins would be necessary to maintain the same overall length.

3) From the collection of brains, suggestions on working with Plexiglas were abundant. There were a few different favorite techniques, but all of them centered around using a high speed tool to melt instead of cut. High speed abrasive disk for cutting and trimming, a high speed rotary file to 'burn' holes through. Jig saws got the old thumbs down. Not fast enough, and will grab and result in a crack at some point. Just about all agree that the canopy should not be left to sit around for a long time, or it may distort (come on, Jim. Get with it!). Lastly, you will have less risk of developing a crack if you work with the Plexiglas when it is warm instead of leaving it for one of those winter projects.

FIGURE 2



◇ - BOND SPACER TO INNER SURFACE USING HYSOL EA934 OR EQUIVALENT.
SPACER : .015 TO .020 CRES OR ALUMINUM

□ - BOND DOUBLER TO INNER SURFACE OF UPPER AND LOWER COWL USING HYSOL EA934 OR EQUIV.

E. LAMBERT 14/10/94

4) The last bit of information comes from the Thorp of Brad and Sonya Chapman. Unfortunately, I didn't get all the necessary details. The goodie is the canopy latch and lock he has. It looks a little like a Grumman type, but is very low profile. It sticks out into the slipstream about .60 of an inch. I will forward to you all the details as soon as I have them myself.

Well, I think that's about all for now. Got to get back to cutting chips. I will try to figure out a way to get out to Kentucky Dam before I get finished. That is definitely too far to cruise in the old rice burner, so maybe a airline ticket is in order (I hate when that happens).

P.S. Is there any interest in an article stress relief of

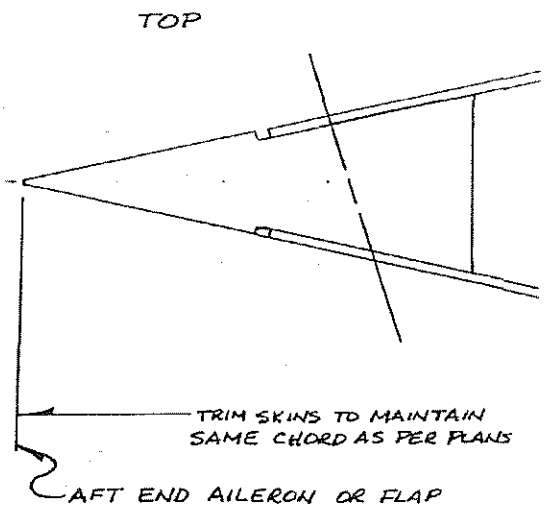


FIGURE 3

welded steel components using a process called Cryo-stabilizing? I've seen it done around work. It can increase toughness 10 to 30% with no reduction in tensile strength. Let me know, and I can put something together for a future newsletter.

Best regards,
Ed Lambert
#143
2166 Farrington Drive
El Cajon, CA 92020

S-18 plans

Installing an Autopilot

by
Lyle Trusty

NAVAID DEVICES AUTO PILOT INSTALLATION IN A THORP T-18

First of all, it's easy to install, Second, it works great. Third, once you've flown it you can't go back Fourth, it costs about 1/3rd that of other autopilots. Now to fill in the blanks...

It reduces the work load sufficiently to allow you to communicate, navigate, be your own flight engineer, and look around a lot. That all spells comfort, convenience and safety to me.

It was designed originally for a Varieze/Longeze installation, however, other builders have successfully adapted it to aircraft such as Midget Mustangs, RV4's, SX-300 and Thorp T-18's. They are also found in simpler, slower aircraft such as the Avid Flyer and Kitfox. The servo actuator size and bellcrank throw mate up very well to the T-18 control system. It also comes with complete instructions for installing and adjusting it to your aircraft.

I was surprised by the simplicity of the unit. There are basically only two assemblies in the kit, the AP1 Gyro/Computer unit that goes into the instrument panel in place of the vacuum Turn and Slip indicator, or Turn Coordinator, and the S-2 Servo Unit that mounts on the rear side of the main spar web outboard of the bottom of the left stick. There is an area there that just seems to have been made for this unit. Three color coded wires connect these two units together. Complete instructions, wiring, a length of aluminum tubing, and rod ends are also included in the kit.

I spaced the Servo unit rearward about three eighths of an inch from the main spar with a mounting plate so that the autopilot servo output bellcrank and push-pull tube lines up with the centerline of the control stick interconnect pushpull tube, which connects the bottom of the two sticks together. This is necessary to avoid inputting a side force, with subsequent rotation, on the stick interconnect push-pull tube. This could result in lost motion and, therefore, sensitivity problems.

I had to make two parts; The clamp fitting that attaches the auto pilot servo push pull tube to the aileron control push-pull tube, and the mounting plate for the servo motor. I chose to mount the servomotor on the mounting plate with plate nuts and 10/32 bolts. In turn, the mounting plate is riveted to the vertical center of the spar web. This allows for easy removal and installation of the servo motor assembly. The clamp fitting allows for coarse adjustment of the servo push-

pull tube to the aileron push pull tube when the ailerons are in neutral and the servo is nulled out, during final rigging.

The basic installation provides Turn and Slip Indicator functions with an electronic bar graph readout and a lighted inclinometer that give the same information you normally get from a Turn Coordinator, It also generates the servo control signal. A three position switch determines in which mode the system operates. In the center position only the Turn Coordinator is activated

Switching to Wing Leveler position engages the wing leveler, with which you can maintain a constant heading or, using a turn knob, maneuver the aircraft to a new heading. You can use this function almost anywhere except for landing or takeoff. There is also a trim knob with which to correct for lateral cg changes or wind drift.

The other position is a tracking function. It allows you to lock onto a VOR, LOC, Loran or GPS signal and maintain a track. I have VOR/ LOC and Loran tied into a second remote switch so I can select either one or the other functions. I like the Loran function best because it will track through a waypoint and the airplane will continue on course with only a small overshoot, then remain on course within 1 or 2 tenths of a mile, no matter where you are along the route.

The LOC works good for approaches, keeping the needle centered all the way down to the runway threshold. My VOR tracks well at normal cruise altitudes but the needle wanders at low altitude in the vicinity of mountains, and of course the autopilot follows the needle. (You don't find this out until you put a Loran in your airplane, then you see how the VOR scallops the course) It's better to disengage the track mode during a station passage because of the needle swing. If you have the autopilot authority set up to turn the airplane at max rate you can get a sixty degree right and left bank.

For more information contact Doug Spears at 615752-1718, and there is an excellent article by Gary R. Jones in the August 1992 issue of KITPLANES, "An Autopilot For Homebuilts".

Building the Horizonal Stabilizer

by Roy Farris

I recently completed building the horizontal stabilizer for my T-18. 1 followed the matched hole tooling concept in building the horz. tail, but I found a terrible twist had developed when I clecoed the assembly together. By laying a long straightedge on top of the complete horz. tail at the leading and trailing edges, I could measure nearly one inch of twist. Both sides were exactly the same, but never the less twisted. I could not accept this much twist in the tail, so I devised a way to eliminate it. I built a holding fixture to hold the assembly straight while I completed the drilling of the rivet holes and during the final riveting. For anyone who is interested, I am including some photo's of the fixture, and following is a description of the fixture and my assembly procedure.

The holding fixture was constructed from two eight foot lengths of one inch by one inch aluminum angle purchased at a local hardware store. I then built a structure from wood to hold the aluminum angles perfectly straight and parallel with each other. The wood structure had a base made from two by six's, and then vertical pieces made from two by fours to hold the aluminum angles. I placed a plywood floor across the two by six base, then positioned the aluminum angles across the vertical two by fours at a suitable working height above the plywood floor, so I could lay on the plywood and rivet upwards. The entire holding fixture was leveled, and the aluminum angles attached to the two by fours making sure the two were level and perfectly parallel with each other. The front aluminum angle was twisted somewhat so that the horizontal tail skin would lay flat on it. Five eight's inch (5/8") holes were drilled in the rear angle to permit clecoes to fit through. The aluminum angles were then covered with duct tape to prevent them from scratching the skins.

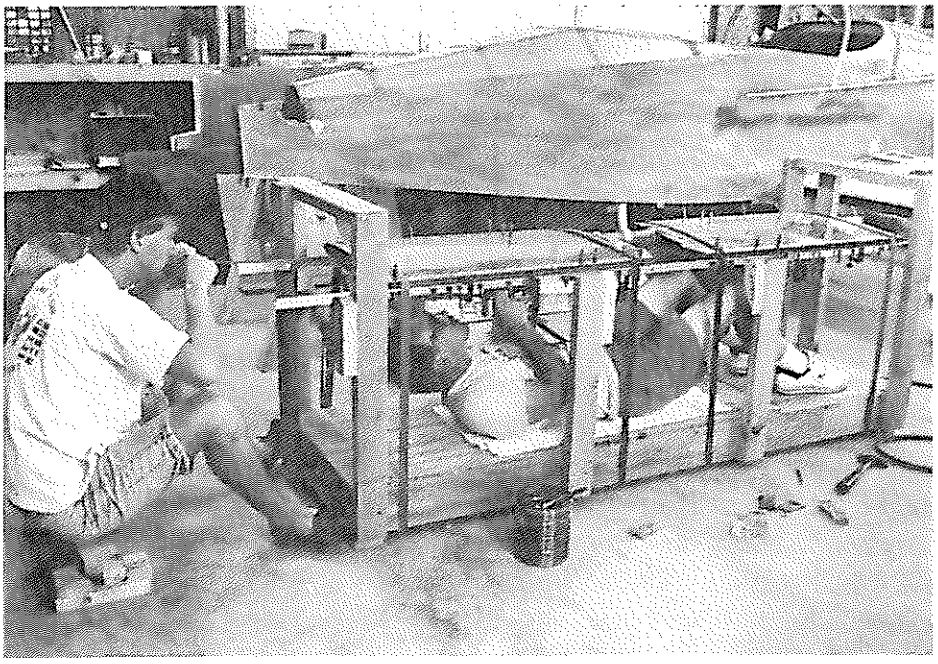
I then took the horizontal tail assembly, with all the rivet holes drilled out to #40 and clecoed together and positioned it on top of the aluminum angles with the top upward. Four one inch web straps were used to hold the tail assembly down flat on the fixture, two straps on each

half of the stabilizer. I put just enough tension on the straps to pull the tail flat. Then, one side at a time, I removed all the clecoes and let the tail assembly "relax". I found that it shifted, but not really as much as I thought it would. I then began enlarging the rivet holes to one eight inch (1/8"). Most of them I simply ran a one eight inch (1/8") drill through, some were enough off that I first used a jewelers point file and matched the holes more closely, then ran the drill through. After doing both left and right sides in this manner, I found that the whole tail assembly would lay straight on the fixture without the web straps.

Then when riveting the tail assembly, it was again strapped down with the web straps so it would remain straight. The end ribs were removed,, and the bottom rivets were driven in the spar tube from underneath. Then as many rivets as we could get to on the nose ribs, both top and bottom were driven. I wanted to get the tail assembly as rigid as possible. The tail was then flipped over, bottom up, and strapped back down to the holding- fixture. The top spar tube rivets were driven, again from underneath and any remaining nose rib rivets. The tail assembly was flipped over, rightside up again, the end ribs installed and clecoed, and the assembly again strapped down to the fixture. The end rib rivets and every-other rear beam rivet was then squeezed in. The web straps were removed at this point, and the remaining rear beam rivets were squeezed in. This completed the horizontal tail riveting.

When completed, I again lay that long straight edge across both the leading and trading edges of my

horizontal tail. Maybe..... just maybe there might be a total of one sixteenth inch (1/16") twist in the entire length, a heck of an improvement, one I think I can live with. I hope my explanation is understandable, its hard to describe something like this and get it across the way it is intended. This holding fixture is simple to make and to use (took me about three hours to build). If anyone has questions about the fixture or my assemble procedure, please give me a call, I'll be glad to discuss it further. (618)723-2594 Roy Farris Noble, Illinois.



Great idea! Roy. Just think, if you had a blanket you could sleep there too.

The Journey and Dream of 18 Years

by Larry Whetzel

The past 10 days have been a very special time for me as I flew my T-18 from San Diego to Oshkosh. Seeing old friends, meeting a great group of T-18 people from around the country and getting a chance to pick their brains was a delight. There were some beautiful T-18s there, and congratulations on your prize winner.

The saga of 60LW started from the inspiration of a visit to Rockford when the first T-18 hatchlings appeared in the latter 1960s. After a move to California from Miami in 1972, I talked with a gentleman (name withheld to protect the guilty) and I was assured I could build this machine in 2500-3000 hours for about $7500. I started my project in July 1975 and after 18 years and about 12,000 hours of building, sniffing, scrounging, making parts, re-making parts, at times cursing it, it did finally fly in May of 1993. Cost was about 5 times initial estimates.

I owned a 160 HP conversion of a Grumman AA1-B which is the two seater for the last four years of the project. I think this is an excellent transition airplane to check out prior to first flights in a T-18. The main differences are speed, and the Grumman has a tricycle gear, otherwise the two fly very much the same. Before I made my first flight I took Dave Eby up on his invitation to come to Wichita Falls and let him check me out in his T-18. Going there removed the lingering doubts that I could handle this airplane as a relatively low time pilot. A finer couple you will not meet, than Dave and his wife Pat. In addition I got to meet the great group in Wichita Falls.

My first flight of any significance was to Kerrville 1993 which took me on to Pittsburgh, down to Miami and back to California. During this trip I was harassed by a bad battery solenoid, which failed to activate the main bus. I was told this was my problem by mechanics in Tyler, Texas and Elizabeth Town , KY where flashlight in mouth I crawled into the black hole behind the baggage compartment to bang on the solenoid to get it unstuck. At the Rostraver Airport just south of Pittsburgh I was met by, Ed Burke, Ken Coleman and Paul Redell and several others who spent a cold afternoon helping me install a new solenoid. After an uneventful trip to Miami and an over night in Creatview, Florida I found myself at the crack of dawn, fully packed and strapped in ready for the last two days back to California. Trip the master switch and expect to hear the now familiar click of the new solenoid was all I needed to start me on my way. There was no click however, just a deafening silence as I sat there in total frustration. _____! I shouted and slammed my fist against the panel. Much to my delight I heard the whirring of gyros and some movement of instrument needles. This was the first time I realized this was no damn solenoid problem. After performing this bash the dash exercise a few more times I made it back to San Diego, installed a new master switch and have had no further problems in this regard! There is a lesson here and the first thing might be THINK! A couple of thoughts I would like to pass along-

STALL STRIPS, They make all the difference in the world on how this airplane stalls and the warning you get. These strips are a simple and inexpensive, virtually fool proof stall warning device. My strips are 7 inches x 5/8 in. angle mounted 19 inches from the fuselage slightly above the chord line. I duct taped them on at a number of positions around this location prior to pop riveting and it didn't seem to make a whole

lot of difference. Most of you know Bob Hernandeen was killed several months ago when he flew his Christian Eagle into the side of a hill while photographing a home he was trying to sell. Bob was a friend of mine and had his hanger near mine. He was one of the every best pilots in the world, lost during what had been called "a moment of inattention" Something that could happen to any of us.

SOUNDPROOFING: I installed the 3M product, double on the fire wall and floor, one thickness throughout the cockpit area. I suppose my airplane is somewhat quieter with this treatment but it is still noisy. I recently bought an ANR headset which drops the noise to a much more comfortable level. With the availability of these new headsets it probably isn't worth the money and weight penalty to install this soundproofing material.

I now have 202 hours on my T-18 and enjoy it more with each flight. The only thing I regret about building it was it took so long. A caution to anyone getting up in years. Try to have some runway of life remaining when you finish building. Best regards Larry Whetzel 60LW

THORP PARTNERSHIP

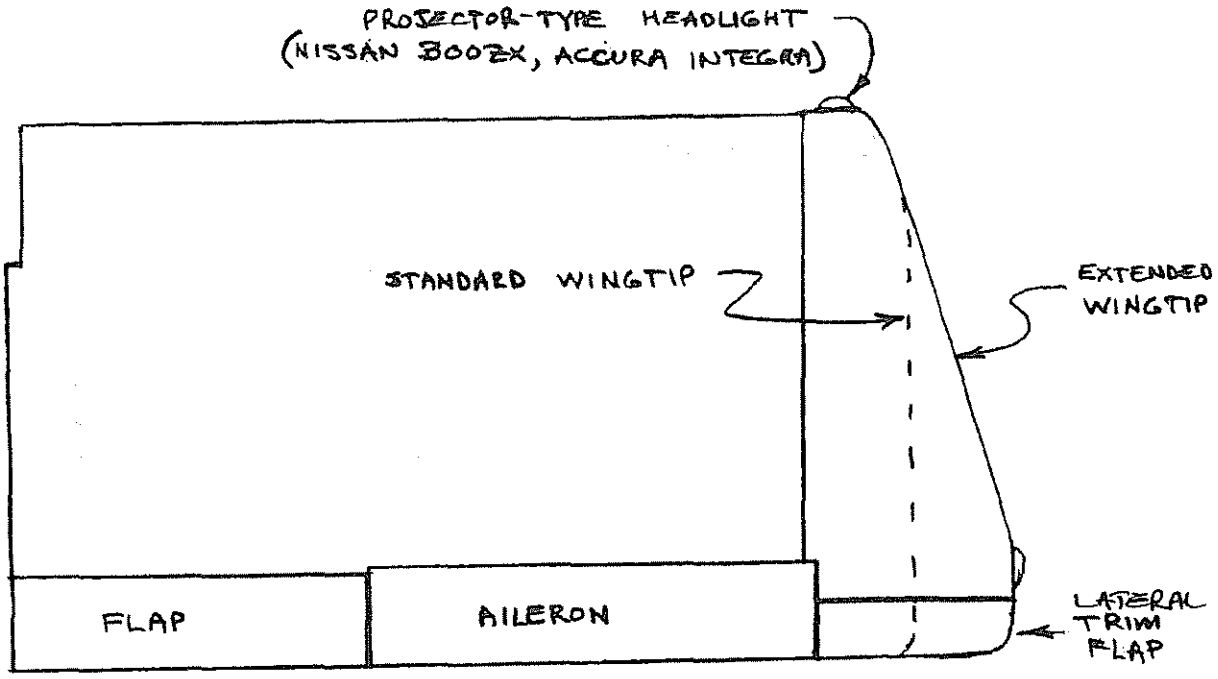
by Ben Harrison

June 20, 1994

I recently became part owner of a T-18 project when my friend Don Johnson and I each purchased a 1/3 interest in the airplane which Ed Bjornrud has been building for many years. I have never built an airplane, but I restored a Tandem Luscombe, a Cessna 195, and a T-6. The T-6 was a seven year project, probably comparable in man-hours to building a T-18. After restoring and operating these airplanes, I have often said that my next airplane would have fixed gear, fixed pitch prop, four cylinders, and one brand new radio. I also said I would never again be hostage to any airport landlord. This problem is solved by the folding wing. Our T-18 is a standard body with Sunderland airfoil and an I0 320-BIA. Over the last twenty years I have ridden in T-18's owned by Bob Hammer, Len Edvinson, and Frank Neal. I was always impressed by the light, responsive controls, good stability, and excellent visibility, but the cockpit is marginal for my 6'3" height and long legs. At the risk of offending your loyal and highly chauvinistic readers, I would choose an RV-4 or RV-6 kit if I had to start from scratch. But I have already spent too much of my life working on car and airplane projects. When I heard that Ed Bjornrud was thinking of selling, I decided to investigate. Ed has built most of the structure and flight controls, has the engine mounted, and the instrument panel fabricated. Don and I persuaded Ed to retain part interest. Ed is an engineer with good knowledge of materials, heat treats, fasteners, and most importantly, John's drawings. Don is a good engine man, and has recently restored a Navion, which is undoubtedly one of the finest in the country. The three of us seem to have the right combination of skills to finish this thing properly. Our first project was to modify the cockpit so I can get in and out without injuring myself! We chopped 2 inches off the bottom of the panel, eliminated a center console, and relocated the throttle and mixture to a bracket on the floor tunnel. Shortly after getting into this T-18 project, I read the entire T-18 newsletter collection plus several years of "Kitplane" magazine which Ed had collected. I also attended the Placerville fly-in, where I studied and photographed several T-18's and spent many hours talking with experienced builders, most nota-

bly Lyle Trusty-Everyone was very hospitable and helpful. Gus Gordon gave me my first T-18 ride in years. My only disappointment at the fly-in was that I placed only second in the champagne cork flying contest. Unfinished structural items on our T-18 include tips for the rudder, stab, and wings. I am considering a raked wing tip with approximately 16" trailing edge span and a small flap for lateral trim. This would be electrically driven, and would be direct trim, rather than a tab driving the aileron. I am also considering an integral landing light, using one of the new style projector head lamps, first used on the Nissan 300ZX, and now showing up on various other Japanese cars. I would be interested in hearing of any application of these head lamps to a homebuilt. Please transfer the newsletter subscription to my name and address. Thanks for your efforts in publishing a very helpful and interesting newsletter.

Ben Harrison 11211 Kelley Rd. N.E.
Carnation, WA 98014
Phone (206) 788-5074



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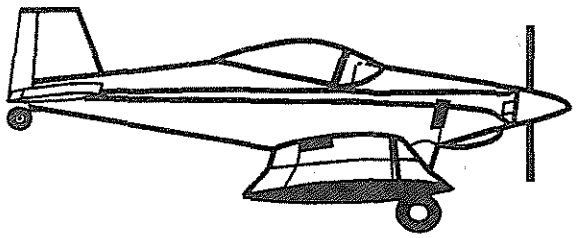

THORP T-18 MUTUAL AID SOCIETY ------ 1995 DUES

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City: _____State_____ Zip Code:_____
Phone:_____
Aircraft:_____Hours on Aircraft:_____
Wife's Name:_____
Notes: (Building?, Flying?, Thinking about it?etc.)_____
_____

Please Note: Please help and send you dues in now! It will help us all, by allowing me to spend my time on writing articles not on sending late notices.