Just returned from Cape Canaveral, where about a million of us gathered to watch the launch of the world's fastest and high flyingest homebuilt, the Columbia. I don't have to tell any of you how beautiful the re-entry and landing was. The evening before I left, Hank Smidinga and his wife came thru Dallas in their T-18 on the first leg of a transcontinental tour to celebrate his recent retirement from NASA. What a beautiful airplane he has! Most of you will have to wait until OSH to see it, tho'.

Here's a little scoop for you: I just talked to Clive Canning, who lives in Victoria, Australia, and he told me that Peter Hodgens and 13 other Aussie homebuilts will be brought to OSH this year in the cargo compartment of a Quantas 747, (along with about 260 EAA types) and the 747 will open the show with a low pass down the flight line. Clive said that Pete's newest T-18 (Tie-ay-teen, as they call it down under) is truly a show piece, so look for it. I mis-figured the time, so my call to Clive came in at 4 AM, much to my embarrassment. Please, Clive and Joan, forgive me. By the way, if any of you don't have Clive's book of his adventures while flying his T-18 around Australia and the round trip to Great Britain, you really should have it. I can guarantee you that you won't put it down until you've read it from cover to cover. He recently sent a shipment of the books to Ken Knowles (a few dozen I think) and I don't know what the price will be, but his account of the Syrian Mig jets jumping him is a cliff hanger and worth whatever the book costs. (Title: "Charlie Mike Charlie).

I now have occasional access to an outward WATS line during daylight hours and also on the week end, so if any of you have T-18 building problems you need help on, send me your day and night phone numbers and I'll call you as soon as time permits. (Yes, I can call internationally, too).

I'm trying to get this newsletter airborne before the middle of May when I have to go back to the hospital for more surgery to make a permanent fix on the surgical hernia I got from a gall bladder operation. The Dr. has told me to cool things for two months afterward, so maybe I can get another newsletter cranked out in early July while recuperating. I would sure appreciate your input on any areas of engine hook-up or airframe building, no matter how the subject has been written up before. If some of you made patterns for your baffling, how about sending them to me? I'll make some full size tracings from them and have them run off on a giant size copier I have access to and make them available to the troops. I'll return your patterns of course. With over 300 T-18s having flown, the law of averages surely would mean that one or two of you would have baffle patterns and be willing to do his bit to help out his fellow man, wouldn't it?

Rudy Arndt: One of the pioneer T-18 builders, whose airplane was the subject of several national magazine articles, is flying again!!! Rudy's kind and pleasant disposition made him a favorite with all who knew him and when it was learned he had cancer several years ago it grieved all of us, but in recent months his cancer has gone into remission and he is rapidly returning to good health. I calle him at his Palm Springs home recently and he sounds great and says he has been feeling well enough to fly his airplane quite a lot the past few months, so that is really good news. He lived in the Burbank vicinity when he built his T-18, which was powered with one of John's GPU conversion engines, and was well known for his skill in metal working. When he retired he moved to Palm Springs. If any of you are in the area I'm sure he would be delighted to hear from you.

John Thorp: John has now moved most of his Sun Valley shop equipment up to the family home in Lodi, CA, and will soon have it going full speed again. He had a large concrete floor poured in the old barn behind their house and in the very near future there will be some lucky T-18 builders happily turning out parts

I don't know just when John's shop will be open to new builders, not what arrangements he plans to make, but I do know he's never happier than when he has a gang of T-18ers working in the shop like busy bees, so if any of you that are lucky enough to live in the genereal are and would like to start building your T-18 under the tutelage of the Old Master himself, you'll never have a more golden opportunity. If you had thought of a California vacation, maybe you can kill two birds with one stone, so to speak. Mind you, that I'm saying all this without John's knowledge, but knowing him as well as I do I know he's delighted when a new T-18 starts. Incidentally, plan sales have now passed the 1450 mark and are continuing to increase at a surprising rate. That speaks pretty well of the T-18's reputation when one considers that John no longer advertises plans and people have to do a little scratching to find him. Just in case you have a buddy that's interested, his address is "Thorp Engineering, Drawer T, Lockeford, CA, 95237". His phone no. is 209/ 727-5700. My Calif. buddies tell me John looks better than he has in several years and they say that the shop has really been a tonic for him.

It's hard to pin down all the factors influencing the upsurge in T-18 building, but no doubt Don Taylor and Clive Canning's flights have had some impact. Speed and economics are probably the biggest factors. With prices of new and used high performance airplanes going completely out of sight, it's no wonder that a 200 mph airplane as rugged as is the T-18 can be had for less than the price of a year old Cessna 150, has become popular. Apparently the wing folding feature is also a big plus, as hangar rents everywhere have gone crazy (When you can even find one). No wonder some are calling it the "Poor man's Mercedes". If the Javelin Escort engine lives up to its advance billing, you can bet your ailerons that there will be a real upsurge in T-18 building.

Escort Engine update: Dave Blanton recently called to tell me that the Ford engineers had called him to excitedly tell him that they had just finished a dyno test on an Escort engine and that it had put out 185 hp at 6500 rpm, unaspirated! It had a special camshaft and it would be premature to draw conclusions at this point, but it's beginning to seem that the potential of this little engine has been understated. EPA emission requirements have been relaxed to the point that it now appears certain that the Escort engine will be available this fall with the factory installed Porsche supercharger. In the meantime everything is on schedule in the preliminary testing phase at Javelin. One of the engines is now being installed in the dynomometer and the other engine will be installed in the Cessna 150 test bed in May. Dave expects to begin flight tests with it the last week in May. If no problems arise he hopes to have it at OSH with about 150 hrs. of test time on it.

I wrote a rather long article on it for the April '81 issue of "Homebuilt Aircraft Magazine" and if any of you are interested in getting copies of that issue you can send $3 to them at 606 Wilshire Blvd., Suite 100, Santa Monica, CA, 90401 and they'll send you a postpaid copy. It's a newstand mag in some areas, but any of the flying mags are getting hard to find on the newstand these days, so the best bet would be the publishers. (I hope I build airplanes better than I type).

CHRIS FAST: Our "Old Faithful" has come thru again! On the next page you will see Chris' step by step procedure for building the wing flaps. The flaps are probably the most difficult part of the airplane to build in the opinion of many T-18 builders and even tho' Chris' assembly sequence is predicated on the use of parts supplied by Ken Knowles. As many of you may know, not only are the rivet holes located via punch marks, but also the skins have several inches added to locate a synthetic trailing edge. These lines of holes are added for the sole purpose of making the nose of the bend fall in the right place. It is much more critical (difficult) to get the bend to exactly conform to the nose of the ribs than on the wing skins, not only because of the tightness of the bend, but also because the camber difference between the top and bottom skin is so great. The main idea is to add enough material to the flat bottom side to make top and

bottom curvatures identical. For bending purposes it converts it to a symetrical airfoil. This excess is then cut off after bending is complete. The horizontal tail skins are symetrical airfoils, so we don't have to add any for bending. Since the flap chord is so much less than the wing chord it's necessary to add nearly a foot to each trailing edge in order to get enough bending leverage via the 2 x 4 pressed down parallel to the L. E., etc. Here's Chris' sequence now:

1. Cut & trim #632-1 skin and drill (or punch) all holes with #40 drill/punch. Note: DO NOT make #634 & #635 hinge bracket cutouts until after skin formed.
2. Cleco trailing edge of skin together at forming index line (cleco every other hole) and mash/crush it down to the approximate shape of a nose rib by using a flat particle board 1" thick x 12" wide x 4.5 ft. long.(Remember that the ends will tend to crush faster than the center, so don't get your knees too close to the ends). This will give you the approximate form you want, but not entirely. See the next two steps.
3. Trim the skin back to the final trailing edge line and cleco the trailing edge holes together (like you did the index lines of holes).
4. Very carefully crush the skin a Very small amount....just enough to change the crown of the top leading edge to give the nose rib a good fit. Note: If you overdo the crushing it may cost you a new skin. It can't be unbent!
5. Open the skin and install (rivet) all of the -2 stiffeners (upper & lower).
6. Re-cleco the trailing edge together...do NOT install the -4 .040 filler strip yet. Use #40 clecos.
7. Fit the #636 beam to the top skin, using #40 holes & clecos. Then open holes up with 1/8" drill and install 1/8" clecos. NOTE: before attaching the #636 lower flange, it will be necessary to RE-FORM both top and bottom flanges slightly to fit the skin contour perfectly. Connect bottom flange and skin with #40 clecos, then open up to 1/8" as on the top skin. NEVER try to go thru with with a 1/8" drill first! ! !
8. Remove #636 beam, attach #662 nose rib assembly to beam with clecos and re-install both assemblies in skin,in order to locate # 662 nose rib in skin for final holes. *****see note at end (ED)
9. Remove trailing edge clecos and beam assembly, deburr and dimple all holes. Zinc chromate as necessary.
10. Re-install #636 beam & #662 nose rib assembly & attach to upper skin. Use only AN rivets in the top skin. Riveting is done with the trailing edge held open for access with bucking bar at this point.
11. Close trailing edge (still with #40 clecos and with NO -4 filler strip.
12. Attach lower skin to bottom flange of the #636 beam with clecos and rivet with MONEL pop rivets. This method guarantees proper alignment as long as it is done with the T.E. clecoed together.
13. Now with the #636 beam riveting completed, open up the trailing edge and fit the -4 filler strip, still using #40 holes & clecos.
14. Clamp the T.E. to a straight heavy aluminum angle, drilled out to the T. E. rivet pattern to clear clecos. With T.E. securely clamped to backing angle remove the #40 clecos one at a time and drill holes out to #30, installing 1/8" clecos as you go. Now SQUEEZE in SOFT alum. rivets.
15. Remove clamps and backing angle. Your flap will have no twist and the T.E. will be straight.

(Here Chris made a note to me that he thought the problem I wrote about in a previous newsletter came from fitting the #636 beam without the T.E. closed).

CHRIS FAST FLAP SEQUENCE cont'd

16. Fit and install end rib assemblies # 634 and #635 last
17. Caution note: Do NOT drill the hinge bracket holes until you fit the flaps to the aircraft, as they may not fall dead center, due to accumulated tolerances. It's very important that the flap aligns with the wing properly.

***** After writing the above I talked to Chris and he reviewed the sequence and suggested that the nose rib installation (riveting) be done before the final installation of the skin and that it be done with pop rivets. I believe Step #8 would be about the right place to do this, altho I haven't had a chance to check it out.

As we said before, building the flaps is a tuffy. We would appreciate builder comments or further suggestions from any using this sequence. Also any of you that built flaps from "scratch", it would be appreciated if you'd write an account of it as best that you can remember. By the way, if any of you don't want your name used when you send in a tip, please specify. No problem. The main idea that's behind the N.L. is to pass on useful info to the next guy. I would venture to say that 99% of you have been benefitted by something you read in the N. L.s, so doesn't that seem to make YOU just a little bit obligated to repay that debt with an item or so that would help the next guy???? Most builders tell me they have good intentions to do that very thing and many have, but when it comes to getting one of these N.L.s together all those intentions result in blank pages. (Hint)

FITTING FLAPS TO WING: In N.L. #46, pages 13 and 14, we ran Paul Marks's account of the use of incidence boards in properly aligning wings and flaps. To again describe an incidence board briefly, it is a carefully squared board about 6 or inches longer than the complete airfoil. It is also about the same amount wider than the airfoil height. The inside of this board is cut out to the exact size and shape of the complete airfoil, so that it can be slipped on a riveted wing and a level put on the top edge to read any deviation from squareness at whatever point on the wing selected. This board is split into two halves, with the chord line as the dividing point. The ends are locked together with some sort of external brackets with quick removable pins or bolts. The incidence board is especially useful for holding flaps in perfect alignment with the wing while the flap hinge brackets are match drilled. This requires the use of proper thickness shims between the rear spar and the flap nose, of course.

If you are building a wing with the new airfoil and are too busy to lay out the wing profile to make yourself a set of incidence boards, perhaps help is on the way. One of the brand new builders in our area told me he would volunteer to scribe a profile on a strip of .016 and send it to you for the cost of materials. .016 would be used, as it could be rolled easily and put in a cardboard tube for mailing. Drop me a postcard to let me know if you want one and I'll have more details in #54. Actually you really ought to make your own from the coordinates shown in the previous N.L. It's not that hard or time consuming to do. These incidence boards have another use, too: They are mighty handy to check the hand radius at the skin L.E. when you are doing that little job. Another very important use for it is aligning wing tips when being installed. It doesn't take much misalignment to make an airplane wing heavy.

John Klieber, 213 Sheffield Dr., Danville, IL advertised a standard wing, (just removed from his T-18) in N. L. #52. It's now sold and already installed on Dave Eby's fuselage (3806 Martin Blvd., Wichita Falls, TX, 76308). This will put Dave's T-18 in the air pretty quick now! He has a 160 hp Lyc. already mounted in the fuselage and as soon as he gets the engine hooked up and his canopy installation complete he'll be close. Dave also has another almost complete airframe nearly ready to rivet. If one's good, two's even better.

JOHN WALTON, 5726 Boyce Springs Dr., Houston, TX, 77066 sends this story of the life and times of his beautiful T-18:

January 23, 1981

T-18 N51863 (Plans #46) was test flown by Del Hainley and Dick Cavin during January, 1981. The aircraft was built by John Walton, with the help of his sons, over a seven year period.

Plans #46 passed through the hands of at least 2 different owners before surfacing again in a classified advertisement in Sport Aviation shortly after the 1973 Oshkosh Fly-In. Some may recall that that was the year that John Shinn arrived in Oshkosh with his beautiful N4784G, which won the admiration of all as well as an EAA best upholstery award.

John Walton has been an EAA member for several years and had talked about as long of building a T-18. John Shinn's aircraft and wife Barbara's reminder, "You had better do it, you aren't getting any younger!" finally cast the die. Plans #46, along with T-18 newsletters and some aluminum were soon on the way to their home in Neenah, Wisconsin. By January, 1974, with generous help from John Thorp and Lu Sunderland, the plans and newsletters were brought up-to-date and the early hesitant steps of construction began.

This project was to be accomplished in their basement. Successful stories about getting boats out of the basements abound, and we all know that a boat is larger and clumbsier than a T-18. At any rate, this was a scant problem when construction triumphs were the completion of a few ribs, a practice rivet strip, and the first Aileron.

Gradually, the assortment of parts began to evolve into finished assemblies, as many builders already know. Son Bill, then in high school, had learned to be an excellent rivet bucker. Youngest son, Lee, a toddler when the T-18 began, has grown up with her and has been very involved in helping with the final stages of construction and assembly. In fact, the final colors and painting scheme was designed and supervised by Lee. He did such a nice job with the T-18 that a Houston RV3 builder commissioned him to do the paint design for his aircraft, now also flying.

Construction progessed steadily during the mid-seventies, with time out for a house addition project and a major rebuild for one of the cars following an accident. By 1978 the basement looked as if it had grown much smaller. The fuselage was on its gear, with Lycoming hanging up front, and wings and tail bolted in place. It filled the construction area, and suddenly looked very large in that low ceiling basement.

The following Spring, the Waltons were to move to Houston, Texas. The time was thus forced to make good on the promise that she would indeed come out of their basement. Fortunately, the window framing in Barbara's dining room was 3/4" wider than the T-18's standard fuselage. All that remained to do was to roll up the carpet and remove the floor, which easily gave way to a power saw; thus making an adequate 4' X 10' opening. This was no problem for the T-18, she came out willingly and without a scratch; although the inflexible real estate people, trying to show the house, imagined a wide variety of ominous problems throughout the operation.

The fuselage, wings, engine and other components were carefully crated for shipment on the moving van. The crates easily outweighed their contents several times over, as they were built to protect the Thorp from almost any disaster. Everything arrived in Houston in perfect condition. Before the dishes and clothing were unpacked, the Thorp was out of her crate, (after all, they needed all that plywood to deck the attic), back on her gear and at roost in the garage shop which had been prepared to receive her. During the final sixteen months, engine hook up, wiring, brakes, plexiglass, upholstery and painting were completed. The upholstery was done with the help of a commercial walking-foot sewing machine rented for a month from a machine dealer in Houston. This rather feared phase of the project turned out to be a lot of fun and much easier than John had expected. This was achieved through some valued coaching from John Shinn, who is a master at this task.

The big day, the move to the airport, was in October. After

assembly and taxi tests, John Selgraph of the San Antonio FSDO signed her off in November. One note of caution to uninitiated future builders. The newsletters are full of comments warning of the tendency for the Thorp to be squirrelly in slow taxi. This is especially true with power off. The controlability in this situation is to a considerable degree, affected by the amount of tension put on the tail wheel springs. Don't leave them sloppy - they should be compressed about ½ of their original length.

Del Hainley and Dick Cavin kindly performed the test flights. Both have been a great help in evaluating the aircraft during the test period and their assistance is deeply appreciated.

T-18 #46 is configured with the standard fuselage and standard wing. (It should be noted though that Barbara gave John a set of Lu Sunderland's folding wing plans for Christmas 1980.) The landing gear is extended 2" and the canopy roll bar raised 3/4". The baggage compartment is converted to a small passenger jump seat, similar in concept to the descriptions in the Newsletters #35 and NL #49. The seat itself easily snaps out to provide battery access or to remove the baggage floor installed over the flap rigging.

The 571 frame is bulkheaded with removable panels to reduce tailcone noise. The cockpit is fully lined with ¼" foil-faced urethane insulation/sound dampening. Snap-out panels of .016" aluminum, covered with lightly padded upholstery fabric complete the cockpit. The seats have fold forward backs and are upholstered with matching fabric and flame-retardent Naugahyde trim.

The Gee Bee light-smoke tint canopy and windshield were fitted with their covers overlapped at the roll bar as stressed by speed-artist, B. C. Roemer. The canopy frame also has two additional hold-down lugs installed to mate with dowel pins at the 571 bulkhead, when it is in the closed position.

Many of the components were supplied by Ken and Gerry Knowles. These include the Thorp cowl, tips, fairings, Dynafocal engine mount and landing gear. Needless to say, the T-18 newsletters were another indispensable contributor to the final configuration of the aircraft.

The exterior paint is DuPont IMRON because of its durability and flexibility. This was applied over Alodine surface treatment and Colar zinc chromate epoxy primer.

The panel includes a King 170B Nav-Com, transponder, the usual complement of flight instruments with gyros driven off a dry vacuum pump. Engine instruments include CHT and EGT.

Cockpit ventilation is provided by two leg level eyeball vents bleeding outside air from wing leading edge intakes. A vent is also installed in the back of the canopy. Cockpit heat is ducted from an exhaust pipe heat exchanger.

A Hush-a-Com headset/intercom system supplied by Revere Electronics enables a high degree of cockpit ear comfort and normal voice level conversation while not interfering with radio communications capability. The transmitter is keyed through a switch on the left stick.

The Lycoming O-320-E2A carburetted engine swings a 68 X 72 M-76 Sensenich propeller. This prop was vibration-tested to determine its harmonics prior to installation.

Vital Statistics:

Empty Weight	989 lbs.
CG Empty	63.87"
CG Forward	64.50"
CG Rear	70.97"
(72# Baggage Limit)	

(Uncalibrated) Air Speed Date -

Stall, No Flaps	60 MPH IAS
Stall, 20° Flaps	54 MPH IAS
Cruise, RPM	2450
Top Speed	193 MPH IAS
Rate of Climb FT/MIN	1500 SOLO 1200 DUAL

As of January 20, 1981, the aircraft has flown 14.0 hours. There have been no squawks nor modification required to date.

T-18 NEWSLETTER #53 PG 5A

Dick Davis,
T-18 Mutual Aid,
10529 Somerton,
Dallas, TX.

"Fairhaven",
Dronford Road,
Shirrell Heath,
Southampton SO3 2JN
England.
Mid March 1981

Dear Dick,

Thank you for most of NL 45-49 which got here O.K. I have got copies from Ron Miller of parts the postal services destroyed. Enclosed is another £ 5. According to the stamps they cost more than £ 5 to send.

When I had made all the flap parts and read everything I could find I still could not see how to relate beam and ribs accurately to the skin. I think I have now found a way.

Use ⅜" dowel clamped over the 25 thou. sheet to make the first bend for the skin as shown in diagram 1. Use progressively larger round material, moving the clamping block back as one does so to achieve an accurate section. I used broom handle then two progressively larger sizes of plastic plumbing material. If you are careful you can get two flap skins out of a 48" width.

Make two accurate nose ribs of ¾" or thicker hardwood and saw a tough piece of ¾" x 2" hardwood cut to ⌐ section a few thou. smaller than to fit immediately behind the beam. Screw 5 pieces of ½" x 5/8" hardwood to this false beam as shown in diagram 2. The bottom skin is placed on a flat, true 1" or ¾" x6" board with the L.E. parallel to one edge and clamped to it with the dummy nose ribs, beam & false beam as shown in diagram 3. The nose ribs should be opposite the outer 5/8" thick blocks according to whether you are building the outer or inboard segments.

Ease wedges between the false beam and the clamping block at W with the two large G cramps gripping lightly via another true board. You may need to take it all apart and go to work bending again but finally you will end up with a good fit. Once your vernier shows the same distance x both sides note this and make sure it is the same for all four segments. Now the clamps G can be tightened. Using the protruding ends of the false beam ~~as a guide~~ (face 'A') as a guide, measure ½" forwards. This is your rivet line for the beam. Drill and cleco 3/32" (no. 40). Now mark the position of the false beam inside the skin.

Unclamp and carefully edge the whole issue forwards until you have space to work from face "A" on the under surface. Clamp all up again, replace wedges and reestablish dimension x both sides and line up the marks inside the skin with the false beam, sighting carefully along the now unsupported face to make sure it is not twisted before drilling and clecoing up the lower face of the beam. This box will not now twist.

Using the beam rivet lines erect perpendiculars as far as the T.E. where ribs and stiffeners go. Measure 7⅞" from the beam rivet lines on the upper surface and 7¾" on the lower surface and rule spanwise lines. Sight along these, bringing the T.E.s together where they coincide and clamp up. Your flap should be without twist. If it is it can be adjusted when you drill the rib and T.E. holes or when you drill out the beam attachment holes to 3.3mm. (no.30).

Tap the ribs firmly towards the L.E. and the ends of the mainspar or clamp a wood block to the edge and lever them. Use a vernier or depth gauge to ensure that the edges of ribs are parallel with the rivet lines before drilling and clecoing. All the upper clecoes can now be removed, releasing the hardwood nose ribs. The already assembled aluminium nose ribs can be inserted at the correct stations and drilled. If you have pre drilled the hinge attachment holes in the ribs it is easy accurately to make the holes in the skin. Measure from the edge of the skin to the outside face of the rib. Add .15" and make a pencil line parallel to the edge of the skin. Use calipers to measure from the attachment holes where the fore and aft faces of the hinges will come and mark these positions on the ribs. Sight along a square to mark these positions on the line parallel with the edge. This gives you the centre line and edges for ⅜" holes.

I must say I found making good flaps easy this way with the minimum of jigging. I hope this may help others.

Best wishes,

JIM WALLER

Thanks a million for a very well written report, Jim, and also for the excellent illustration that should make everything quite clear. We do appreciate your efforts. I certainly hope this will be a shining example to more builders to contribute material.

It's so easy to assume that "Everybody knows how to make a flap (or aileron, fin, rudder, etc)", but everyone doesn't know that . This article also highlights the fact that there are more than one or two ways to build things and no one method is necessarily better than another. In any case, such presentations will certainly enrich your knowledge store. In all the years I've been associated with T-18 builders one fact has repeatedly surfaced: The rank amateur builder is a very ingenious person and even tho' the pro's have told him, "You can't do that", he'll figure out a way of doing it.

SEE SKETCH PAGE 6A

BENDING FLAP SKINS

DIAGRAM (1)

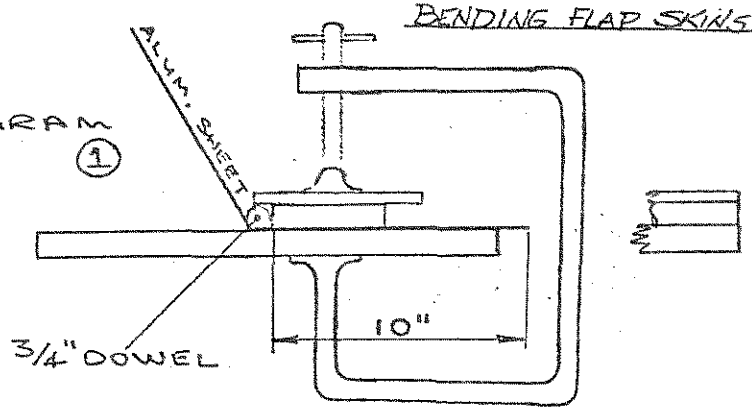


DIAGRAM (2)

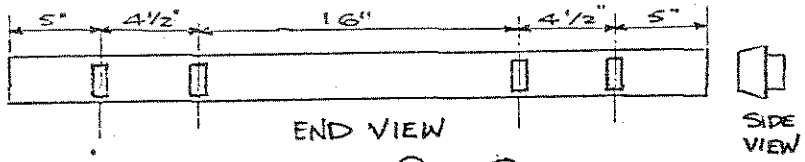
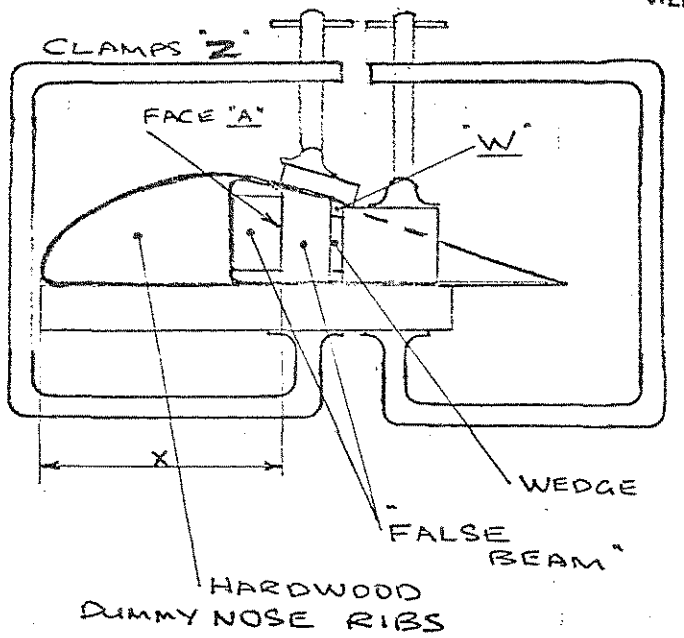


DIAGRAM (3)



THANKS TO JAS. WALLER

ENROUTE UPDATE THIS NEWSLETTER : I had intended to have this newsletter in the mail prior to my hospital visit in late May, but I guess that too many higher priority items got in the way. I've just had my 1000 mile checkup from the Dr. and he says everything is ok and on schedule today (June 23rd) and if I keep on being a good boy I can go fly my T-18 in mid-July. At any rate I hope to get this N.L. mailed before then. Thanks for your patience in the meantime.

BUILDING OUTER WING FUEL TANKS: Tony Russell, 406 Cardinal Dr. Slidell, LA.70458, sends the following account of how he went about making his outer wings "wet": "I added an extra nose rib just outboard of the attach fitting. I didn't want to have to go into the tank in the future if I had to remove the fitting for any reason. Aviation Products, Ojai, CA (address ?) sells a good little book on the sealing of integral fuel cells and they also sell the PRC product that is used by all manufacturers to seal floats, fuel cells, and pressure cabins. Use 1422 B2 for all faying surfaces and 1422 A2 for brush sealing. Also get a large bottle of MEK to use for cleaning, as that stuff sure is messy! Also wear your wife's apron because it will NOT come out of clothes. Pop rivets will leak. Driven AD rivets will not. I sealed all the faying surfaces with the B2 as I assembled the wing. After it had dried for a week I leak tested them. I only had a couple of seeps to re-seal. To do this I used a hole saw to cut oblong shaped access ports in the bottom of each section. Through these I used the A2 liberally to seal all the places where it could leak. You can thin the A2 with MEK and it will run down in hard to get places. The MEK will then evaporate, leaving the PRC. The filler neck is at the outside rib (highest point). I attached a piece of .25 alum plate to the rib and used a 45° fitting I picked up at a surplus place in Wichita.. Access will be thru a door in the wing tip. Inside the tank I put an .040 doubler at the top and bottom of the two inside ribs for the fuel and air to go thru after I cut 1" holes in them. The tanks fill okay and I also put an air vent at the top of each outside rib by the filler neck, using AN fittings. Each tank holds a little over 9 gals, roughly 2.25 gals. per running foot in the standard wing. The access holes are closed and sealed using B2 sealant and making covers with #8 metal nutplates and shaping a piece of .025 to fit the cutout for streamlining.

I hope this will help some of the other guys that need that extra fuel for the 180 hp engine."

A very good report, Tony. In case you didn't quite understand all the details you can probably reach him at night at 504/ 641-8152. Re the access doors I assume he meant oblong plates of .040 were cut to be about 3/4" larger than the hole, pushed thru the hole and bolted with the #8 nutplates to the skin, with the .025 carefully cut to the shape of the access hole, to fit flush with the ou outer skin, and it is probably riveted to the .040. I'll check this out with Tony and advise later. Tony said this part of the operation was the most labor intensive job he'd gotten into yet on the project. I've also heard others make such statements. Some FAA people might insist you put a tank drain at the low point to drain any water that might accumulate below the fuel outlet point and the bottom skin, as water could pool as much as ¼" deep there. Needless to say, an adequate screen strainer of rustproof metal is a must at the fuel outlet point.

A variation on Tony's method I've seen is access panels (removable) mounted in each rib with nutplates. The ones on the outer ribs used a flat rubber gasket for sealing. These plates were mounted on the outside face of the ribs, rather than the inside like Tony did, but there is no reason they couldn't be attached to the inside of the ribs, using PRC sealant like Tony did. I don't have any authoritative info on the relative merits of the access door location, do any of you?

TONY RUSSELL: BUILDING THE LANDING GEAR " I was faced with the same dilemma as a lot of other guys tryin to save a few bucks here and there to apply on the buying of one of the sky-high priced engines for my T-18. The $545 price of a store bought gear from Knowles or Brock seemed like a place I could get a few bucks put aside in exchange for my labor. After talking to aircraft welders and reading all the EAA books on the subject, I decided to buy me a rig and learn how to weld. I figured I might learn a new skill in addition to saving some money. The first thing I learned was that the most confortable type of torch had the valves at the tip end of the body and not at the hose end. I found that welding 4130 takes a lot of practice and patience, not magic as a lot of professionial welders would have us believe. Also I got a lot of practice by welding up a lot of the small fittings used in the T-18. I also got a lot of satisfaction in the making of parts out of steel.

Back to the gear: I looked at a lot of sources of 4130 tube, including the ship and oil industry here in New Orleans. After all that time and trouble I found the best place, as far as price and delivery goes was from Ethel Ferree at Airparts in Kansas City. I used my 4 x 8 work table for a jig and laid laid it out according to Mr. Thorp's instructions. I learned that you shouldn't cut the legs to the final length until you have fitted all other parts first. The grinding and filing was made very easy by using a Sears Heavy duty grinder, with an abrasive wheel that all the welding shops use. It is very easy to take off too much of the steel if you don't watch it. I tacked the gear together on the table and then welded it. The only place that was difficult to get hot was the inner-outer tube joint. I used a #4 tip for welding and also another torch (very large) to help preheat. Also, when welding the pads to the legs the legs twisted BADLY. After one had twisted so bad I didn't weld the other. I used the grinder and took off the old pad weld.

I called Mr. Thorp and asked him about some comments a local pro welder told me. The welder said he welds chroemoly tubing on motorcycles with a low hydrogen rod with very good results. John said that the best way to go was to heli-arc the pads on and avoid as much heat as possible, but that he thought the low hydrogen way would be alright. This statement was an <u>opinion only</u>, with the final decision and responsibility left up to me. John's opinions are worth their weight in gold, but I would hate for someone to take one that I pass on as being the recommendation from the designer as a way to do something. He has been too unselfish and free with his time for us homebuilders for anyone to read something into his opinions that may or may not be there! (Amen-Ed.)

After welding the gear I looked for a place to heat treat it. Dominy in Dallas wanted .18$ to do it. I called several places in Houston and they would do it for their minimum charge of $25 and take a couple of weeks to do it. These places deal mostly in oil field equip't and they are really set up to handle it. As it turned out, they had trouble getting my gear hard enough. I sent a sample to the mill and they confirmed it was the proper material. The heat treater then used a different method to quench it and this time it checked 42 and 45 on the Rockwell scale (C). They didn't want to fool with it any more, so they didn't charge me for their work. Also the gear had some nice bows in it, so I put the gear in a press used to straighten prop blades and finally got it straight or near enough to it. The only problem was a crack at the outer tube at the bottom and a couple of cracks in welds. Again I imposed on John and he said the best way to go was to anneal, re-weld, and re-heat treat. He said to remove all theold weld before re-welding. I asked him about using the heli-arc, since the legs were harder than called for and he said it probably would be alright if I checked the hardness of it about ½ inch from the welds. After talking to the welder again, he talked me into the low hydrogen way again by saying that there would be less heat

with one pass of low hydrogen than several passes with the heli-arc. Also John said that if the gear failed it would not fail all at once, that there would be some warning. Cracking, I suppose. Again, this was an opinion from John, not the Gospel. I guess the only way to really know if the gear is good is to finish the T-18 and fly it. If I had to build the gear again, I would not hesitate to do it myself. Also I failed to mention that the legs can be cut very easily and accurately by using a horizontal band saw found in most welding and steel working shops.

Dick, I'm in the process of overhauling my O-360 engine. I find that Superior Airparts has the best prices on engine parts anywhere. They are in Addison(TX) as you know, and stock new exhaust valves and pistons, etc. at very good prices.

I am still shooting at flying this summer. I started the project 2 years ago in April. You know, I work as a pilot and Director of Maintenance on King Airs and a H-S 125 jet and I can say that the average homebuilder who has completed or nearly completed a metal airplane has a greater working knowledge of airplanes than 90% of all the A & P mechanics I talk to.

It's really great to read the NL and take advantage of someone else's experience. John Thorp, Lou Sunderland, and you have been so free with your time and thoughts during the life of the T-18 that we all owe you all a debt we can never repay. Hope to see you in OSH this year if I can get John Hardy to give me a ride in his T-18."

Best regards, Tony Russell

Thanks for all the kind words, Tony, but there <u>is</u> a way that all of us can repay our debt....and that's to pass on our knowledge and experiences to the new guy, just as you just did in the two excellent reports above!

I would like to add a few comments on building the gear: About ten years ago 3 of us pooled our labor and money to build 3 gears. Money wise we came out quite a bit better tha the store bought gear, but it turned out to be a lot of hard hours of work. We had grief with the heat treat co. here (Dominy). At the first attempt they carelessly threw away the alignment jigs we had fastened to them to prevent warping and the gears came out a mess. We made them anneal them annd do it all over and demanded they do all of it in our presence. They came out okay this time. We had had ours heli-arced all the way by a skilled pro welder that worked for one of our trio. All gears were the extra long versions (2½ to 3½ in. longer, as per individual) and all of us tapered the outer tubes. I retained the inner tube wall thickness clear down to the axle, while the other two also tapered the inner tube some down to the axle. We all left a "cannon mouth" lip on the very bottom of the outer tube, for greater resistance to cracking at that point. All have held up fine in service. Further, I would strongly recommend the longer gear in every way. I also believe the gear extensions to the shorter gears are a definite plus, altho' I haven't flown one. Most builders agree a longer gear is not only softer, but allows slower, shorter landings and takeoffs.

The major drawback to building your own gear these days is the lack of suitable heat treat facilities. (I might add reliable to that, too). Lu Sunderland was able recently to get 5 or 6 gears heat treated by some firm in his area and I think their work turned out okay. I think it would also be well to consider building the gear in two pieces (as per Lu's drawing in an earlier NL) because of the problem with finding a heat treat oven of sufficient size to handle the gear in one piece. As to building your own vs buying one, it's the old question of which drummer you march to. Do you trade your labor and time for dollars, with possibly poor results, or do you opt for a known product of professional labor for what at first seems like more shekels than it should be??????If you want to get the T-18 airborne quickly, the choice is obvious.

MORE ON ENGINE MOUNT BUILDING: Bob Dial, 5175 Wing Lake Rd., Bloomfield Hills, Mich., 48013 writes:
"Dear Dick, got your good #52 NL today and thought this a good time to make some comments.

I just read Paul Shifflett's excellent and very technical article on how to make the motor mount very accurately. I well appreciate the time and effort he put into not only the article itself, but also the amount of study and research he went to. He very obviously is and engineer and most competent at his trade. However, I couldn't help but reflect that I couldn't have made my mount from his technichal description, as I'm just a plain ole' farm boy and my mind goes into automatic "reject" if something seems complicated. I guess I really look for the easy, lazy way out. (That's understandable, Bob. All of us that have been professional pilots all these years obviously are lazy and felt that it was better than having to work for a living....Ed.) Instead of the precise measurements and compound angles, here's how I did it.

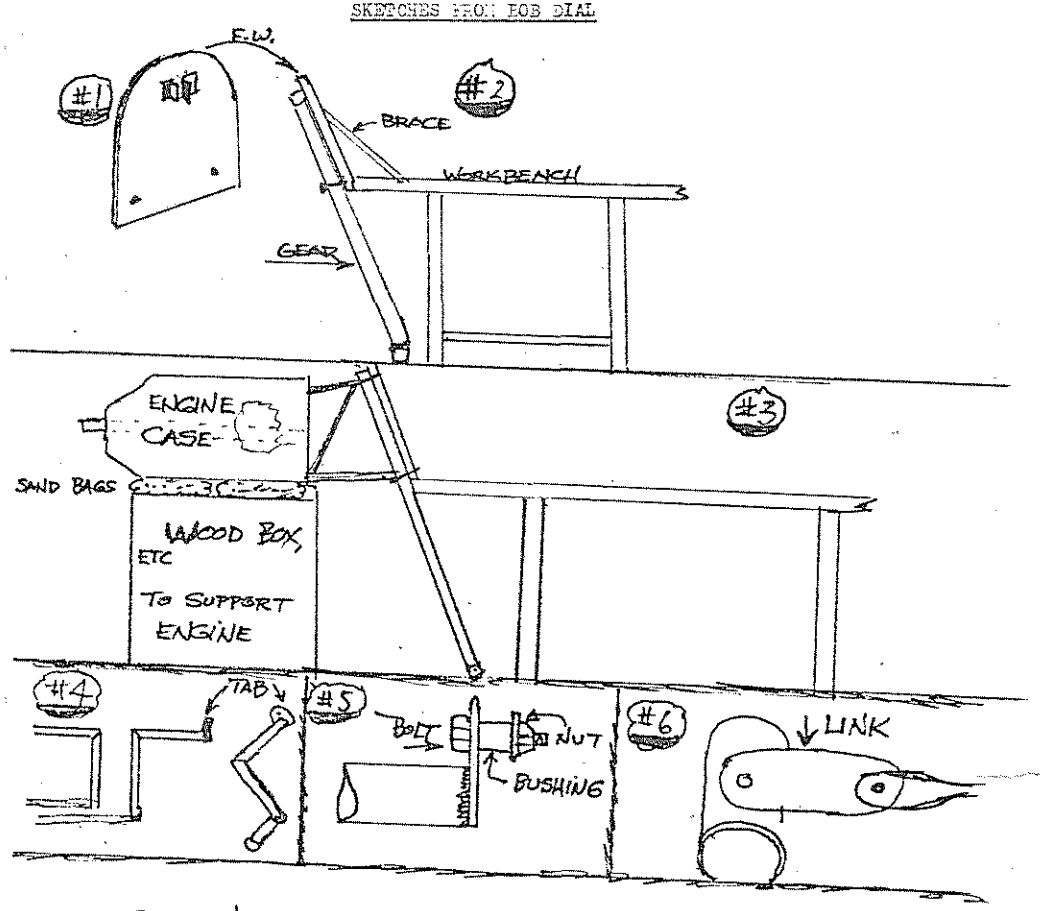
I first made a plywood mock-up of the firewall. Using scrap angle extrusions I located the landing gear attach points like this (see sketch 1). I then bolted the gear on this form and set the whole rig on the end of my work table like this (see sketch 2). After making sure the "firewall-landing gear" was properly positioned, I simply took my engine case and positioned it at the proper distance from the firewall, with the proper amount of down thrust angle and right thrust angle. The case center line will give you a reference line for right-left angle measurement, while a modified broomstick in place of the crankshaft gives you a good up-down reference. I had already made up pads, which I bolted to the engine mount holes in the back of the case and I had bent up tubing to make the ring that connects these pads. I tack welded the tubes to the pads right on the engine, (careful with the torch) thus it had to fit perfectly. (Some store bought mounts take a little extra persuading to fit sometimes). I then simply cut tubing to the proper length and 'laced' the engine to the firewall and landing gear...no measuring...no sweat...and everything fit perfectly, because it was all done in place.

This method may seem crude, but it is easy, requires no jigs or fixtures and very little measuring. It has worked for over ten years for me and my Thorp metal cowl fit perfectly at the spinner opening and firewall."

See sketches on page 8B for further details. The method Bob details is a time honored methodused on many, many types of airplanes and you could have every confidence in it if you chose to use it. Here is demonstrated the value of the newsletters to the builder, with two different methods of getting from point A to point B being demonstrated. No matter which method you choose your knowledge quotient has been raised by simply studying both methods. I again urge you to contribute your way of doing some operation. Also, don't be bashful about telling about what went wrong, too. All of us have made mistakes before doing it right and if you don't really believe that, just talk to any builder that has finished a T-18.

Bob also had some details on eliminating his front tunnel and re-locating his RUDDER CABLES TO THE OUTSIDE OF THE FUSELAGE: " I was fortunate to have welded the tabs on the ends of my right rudder pedals when I first built my airplane, so it was a simple matter to use them. I then made a link out of .065 4130 that was about 2" long to account for the additional length needed for moving the cables. The clevis on the end of the cable is attached to the other end of the link." (See 8B for details). Bob also said he is working on his second T-18, a partly completed project he bought, and he hopes to fly it late this summer. It also has 160 hp and a wooden prop. He may sell one or both, depending on how his application for getting his physical back goes. Thanks again, Bob, for the info.

SKETCHES FROM BOB DIAL



SEE NEWSLETTERS #47 & #52 FOR PULLEY SIZES AND LOCATIONS

LETTER FROM NORMAN BUEHLER, A SUPER-EXPERIENCED BUILDER:

June 15, 1981

T 18 MUTUAL AID SOCIETY
10529 Somerton
Dallas, Texas 75229

Dick

Enjoyed our telephone visit very much and hope that by now your hospital time is all over and that you are doing fine. This is a little later than I intended, but this seems to be a busy world.

The T-18 has been nearly completed for nearly 5 years and is the second of three airplanes that I built. The first was a Jodel and the last a Varieze. The further away that I get from the building the less the problems seem to be. That, and that the problems of the three seem to run together.

I still do remember the rudder, the leading edge of the flap, and triangular fuselage skin just below the deck. I just remember the problem but am afraid to say just how I got it done as would be sure to leave out some important step that would goof someone up. It seemed like I tended to make everything over before it suited me. My wife seemed to think that I was too particular and made a suggestion that I might try if were going to build another homebuilt. Build two of them and the parts that didn't quite suit would go on the first one and then after you know how make the pieces for the second one. Sell the first one as it would please most people and keep the second one as it would suit me. She isn't quite right though as I have seen T-18s that were several notches better than mine.

N172 is pretty much built as Thorp's plans. I've never quite figured how Cessna let that N172 number get away. Anyway, it has Lyc. 160 hp non dynafocal mount engine with Sensenich wood prop., 68-72. I probably get out of my grass strip better with 76 pitch but it is sure nice after one gets off. Rate of climb never was one of my top priorities unless of course there were trees down at the end of the runway. In level flight with full throttle at 4000 msl the engine will turn 2900 rpm.

Over measured distance at full throttle it will go 192 mph TAS. Calculated 75% of power (2525 rpm) it will go 172 mph TAS. Everything sounds nice to me at 2400 RPM and at that speed I get 163 mph TAS. It has a dry empty weight of 955 and I did all my certifying and testing at 1550 gross. That gives me 412 lbs of useful load after it is full of fuel and oil. I regularly fly it out of my 2500 ft, 3000 ft altitude grass farm strip. When testing I flew it out at full gross on a 80 degree F day. On a warmer day for safey's sake one would need to either lighten the load or put on a lower pitch prop. AT least those are my safety numbers.

I varied from Thorp's plans in the following:
I didn't install the battery until I determined cg and then mounted it on the firewall as I saw a Mooney installation. I did this for two reasons, one- I liked the cg figures better but mostly to shorten the starter cable. Several T-18 owners had told me to get a geared starter because without it was difficult to get engine turning. I thought that the long battery cable was the problem and I guess it was

as mine turns the engine better than the geared starter T-18's I've seen.

I beefed up the tail wheel fuselage attaching point and used the steel spring. I figured that I needed to do that because of the regularly used grass strip. Also mounting the battery on the firewall helped to keep the cg right.

I thought that the engine ran too cold on cold days so I designed and put on cowl flaps on the gill openings. Haven't had any trouble with them and does keep the engine warmer on the cold days. I didn't have them on when I was doing my speed checking and have never given them a good speed check. However if they increase the speed it wouldn't be much or I would notice in my regular flying.

Trim control is pretty much Thorp except that I used a right angle drive and a couple of flex joints. Seemed to have less slack that way. Would still like to have some system to identify the trim setting that would work on my system but still haven't come up with one.

Instead of using the metal strip at the base of the windshield, I built up a fiberglas strip, blending it in with the fuselage. Looks much better than the metal strip and has given no problem.

I sort of went overboard on soundproofing which probably added 10 or 12 lbs to the empty weight. I used double aluminum tape on the firewall and single over the entire cockpit as well as the baggage compartment. Glued the Ken Knowles insulation kit to the outer skin and firewall. I then glued 3/4 in. fiber glass to the .016 inner skin including floorboard skin. Must be pretty effective as the first thing my homebuilding friends talk about when I take them a ride is that it is the quietest homebuilt they ever rode in. Maybe though they just haven't rode in many homebuilts.

I put a landing light on both the right and left wing leading edge as well aswingtip strobes.

I used countersunk rivets and filled them with a filled epoxy and sanded smooth. Took a lot of work and I probably wouldn't do that again. Painted with Alumigrip and that is when I found some of these build up in a persons system and you've got problems.

I only get abput 25 hours a year on it. With three homebuilts and one family Cessna, hours on any one plane don't build up much. Product liability lawsuits keep me from selling the homebuilts and I am reluctant to tear them up and sell the parts. I probably will do that some day soon though. I couldn't afford to keep them now if I had to pay hangar costs.

Dick, I'll enclose a picture of the three of them and give you my impression of the three different airplanes. I know that everyones impression would be different but thought you might like mine as we are about same age.

HAVE KING Radio & TRANSPONDER & 9 geo instruments

The first homebuilt was a Jodel D-11. I had no airplane building experience and no knowledge. In fact I had never seen a homebuilt until I had this one done. The Jodel is, of course, a wood plane. It has a cont.75 hp engine, razorback covering, and covered the plywood fuselage with a light fiberglas and polyester resin with a lot of red color in the resin. It isn't painted, only the red resin. Pretty nice as there are no scratches as paint would get. I flew this to Rockford twice and to Oskosh five times without any problem. It has about a 30 mi per hr touchdown speed and 105 mph cruise. I put on big J-3 tires and this is the plane I want to be in when the engine flies apart.,

As I've gotten older and seen so many low time pilots building planes I've about decided that the Jodel type planes are the ones they should be building. One would just about have to fly into something to hurt themselves in it. It has an empty weight of 712 lbs I forgot the gross but there isn't room enough in it to exceed it. The only things that change the cg are amount of fuel and baggage and that very little. Pilot and Passengers sit right on CG. A well built and excellent low time pilot plane. (after they have checked out in tailwheels)

The last homebuilt was the Varieze. I built this one mainly because I had built a wood airplane, a metal airplane, and wanted to try the only other material left. At the time I bought plans, Rutan was advertising a 100 hp Cont powered 525 lb empty weight plane with a 1050 gross weight. Sample cg loading in the middle of the envelop. This gave me nearly as much useful load as my T-18 had. Needless to say, the finished airplane never came close in any of this. Although I built this plane as skimpy as possible without cutting structural strength, 610 lbs was my empty weight. In order to getthe cg in the middle of the envelop (both Jodel and T-18 in that range) I had to add 33 lbs in the nose to the 610 empty weight. With a full fuel tank it is a single seated plane with a lot of baggage room, unless you want to cheat on the design weight. You can set at any flyin and watch guys do that all day long. When I ask them about it the answer I getis,"Oh! it'll handle it", and I guess they do. I've never seen a Varieze lighter than mine and when I watch them I'm using my empty weight so they are even more over gross than I'm figuring them. I could spend at least one page telling you how serious epoxy poisoning is. Another one on how difficult to use Rutan's new Safty Epox. It doesn't poison and seems to do good work if you can take the difficulty. I could tell you about landing and takeoff being like driving a car looking out the side windows at eighty miles an hour. Makes good landing though just nerve wracking. Fast building? there is no way to build an airplane good, fast.

It has two great things going for it though. It goes fast on low hp and it draws a crowd every time I fly it anyplace. If those two things are ones top priority then it is the plane to build. For myself these two advantages over T-18 aren't near enough.

Norman Buehler
RR 3
Scott City, Ks 67871

tel 316-872-3019

N172

T-18 N851LT

Lyle Trusty
7500 W. Ave. A
Lancaster, Ca.
93534

2-17-81

Dear Dick:

Remember a couple of years ago you asked me to make a drawing of my aileron trim tab installation? Several otner people have too so I finally attempted to put it all together. It turned out to be a bigger job than I thought. It took me longer to design it than it took me to actually build it!

At any rate I'm enclosing a sample of what I ended up with and, rather than put out part of the information and get someone in trouble, I asked Ken Knowles to sell a complete set of plans and provide the motor and materials at reasonable prices, which he agreed to do.

The plans consist of five 11" by 17" drawings, including a wiring diagram, and will sell for $20.00. Ken intends to stock the motors, etc., which will appear in his next catalog.

I suppose I should say a few words about the operational end of the installation- 851LT requires a trim change between takeoff and cruise airspeeds, due to wing twist that came with the wing skin templates so I imagine a lot of T-18's have the same problem. Secondly, I have 65 pounds of fuel in the right side of the baggage compartment, fly single or two place randomly and carry considerable baggage on the left side occasionally. The trim tab has handled all kinds of asymmetric loads with only about half travel. I've never had to trim to the limit of travel for any loading, but do want to retain the limit switches as good insurance against the motor tearing up the planetary gears due to a mechanical jam at the end of the jackscrew travel.The sensitivity is good with the tab as designed in that you need to hold the switch for two or three seconds to notice the difference. This lets you trim to a "hands off" condition easily without oversnooting. I have flown 851LT for over 200 hours with this installation and have'nt had a single problem. Zero maintenance. I recommend annual lubrication though to keep the reliability high.

One last item, which everyone can try for themselves, is to determine trim drag due to flap extension. I massaged the ailerons per newsletter so the aircraft flew hands off with no trim and two people aboard. I then had just enough "flap trim" to compensate for me, single place. I found it took 6 to 7 degrees of left flap extension and it cost me 3 to 4 miles per hour cruise speed. In other words the airplane would pick up that much airspeed if I just cranked out the trim when flying by myself. I still carry the trim knob as a manual backup if the motor would quit but have never had to use it.

Best Personal Regards, Lyle Trusty

LYLE TRUSTY LETTER CONT'D

One other item.....

I'm also enclosing an information sheet on a new 2¼ inch 2 in 1 CHT/EGT instrument which I've installed in my T-18. It's very accurate and gives you the ability to really pin down engine operating temperatures and the efficiency of your cooling system as well as precisely lean the engine for best power, best economy or whatever you want. I found, after tedious calibration that I had an 18 degree error in my original CHT gauge, from 320 degrees to 450 degrees - right where I did'nt need it. Ken is going to carry these gauges also or they can be ordered direct from me. The price is $95.00.

All of us are very grateful to Lyle for taking the time and effort to make the aileron trim drawings available and to make arrangements with Ken Knowles to stock the drawings and the parts. If you haven't flown your T-18 as yet, and if so you may not fully appreciate what a great thing this little gizzy is. I'm not "putting down " John's slick little flap trimming method of laterally trimming the airplane, but it does have limitations, as everything on an airplane does. First of all, the moment arm is relatively short, so it takes quite a lot of deflection to do the job and this does result in a noticeable increase in drag. It also lacks authority to handle very much and causes a bit of yaw when most of the trim is used.

This may seem like an insignificant thing, but it really can get pretty tiresome on a long cross country. A good many of us that have flown bigger equipment over the years got a little spoiled,I guess, as all airline and other large airplanes are trimmable on all 3 axis, so to say I'm delighted to see Lyle make his plans available is the understatement of the year. After I get my plans from Ken I want to take a long look at the feasability of adapting the unit to the rudder, also.

The other thing that got my attention was Lyle's enclosure on the combo EGT and CHT with the digital readout for real pin point accuracy. The 2¼ inch display is a big plus, too. Panel space for instruments and radio gets pretty tight for most everyone, so every inch saved adds up. The proper use of a combo EGT/CHT can justify its cost several times over in engine life extension in normal operation of the airplane. It goes without saying that it is an invaluable trouble shooting tool in any sort of irregular engine operation.

I ~~would~~ have included the operating instruction sheets in this NL, ~~but the printing is already quite small and wouldn't lend itself to any further reduction~~.

The brochure doesn't specify whether more than one pickup is available, but I feel pretty sure that they have multiple pickups available, so EGT and CHT can be monitored in each cylinder.

Now if this isn't enough from Lyle, take note of the next four pages:

Some fuel system basics by Lyle Trusty, Designee #52.

There are several things missing from your plans when you open them up. Maybe you've noticed there's no fuel system schematic (let alone plans) no electrical diagram and no instrument hook up information. No matter, that's a long way off. Right? The reason given is because every one is going to have a peculiar engine installation, unique to his (or her) airplane. Well, that kind of unloads the designer but it doesn't help the builder in finishing his airplane. Here are some helpful hints, tip, do's and donts concerning a gravity feed fuel system like most of us use.

1. You need 0.5 psi at the carbureter inlet,according to Marvel-Schebler in order for the carburetor to function properly. What that translates into is; without that amount of pressure you wont have enough fuel flow to run the engine at full power for a go-around. (14 gallons per hour is about 15 ounces per minute)

Without considering ram air pressure, it takes about 17 inches vertically(The heigth of the bottom of the fuel tank above the carburetor inlet) to provide this head pressure.

Ram air pressure will provide 1/7th of a psi at 100 mph (.14 psi) but the rest has to come from head pressure or fuel pump. Starting to get confusing, huh? Let's unscramble with a neat little trick thats easy to understand.

When you get ready to run your engine up before going to the airport, block up the main gear, lower the tailwheel into a ditch or whatever you have to do to get the airplane into a 12 to 14 degree approach attitude. Put a gallon of fuel into the tank, put a container under the carburetor, disconnect the fuel line at the carburetor and see how long it takes for that gallon to run out.

$\frac{14}{60}$ as $\frac{1}{N}$, Therefore $N = \frac{1 \times 60}{14} = 4.28$ minutes

or 4 minutes and 17 seconds per gallon.

Thats what it takes for a 150 horsepower Lycoming at sea level,full throttle. In order to avoid problems you really should flow about 150% of that required to run full throttle.

2. The above is the end result of having built a good fuel system. How do you get there from here? Here are some rules of thumb:

All fuel lines must be at least 3/8 inch. 5052 aluminum line and AN 6 fittings, tees, elbows and etc. make a good combination.

A short piece of flexible hose at the outlet of the fuel tank will avoid cracks at that point.

Dont mount the fuel shutoff valve on the bottom of the tank. Each time you turn it on or off your'e straining the tank boss and eventually it will crack out of the tank. Mount it where you can turn it off from the seat.

The fuel line must run downhill, without running uphill, all the way to the fuel strainer and the fuel strainer must be mounted at the lowest point in the fuel system. It must be lower than the carburetor float bowl in order for any water in the system to flow to that point(and not on into the carburetor.)

You must have a strainer or gascolator drain so you can drain water out of the system. It has to be drained on preflight each day so make it easy to use.

You must have a finger strainer in the bottom of each tank at the outlet. This is a MUST. I've heard of cases where a flake of resin or scale blocked the tank outlet causing fuel starvation when there was no finger screen installed. A friend of mine with a Stits Playboy learned this lesson the hard way.

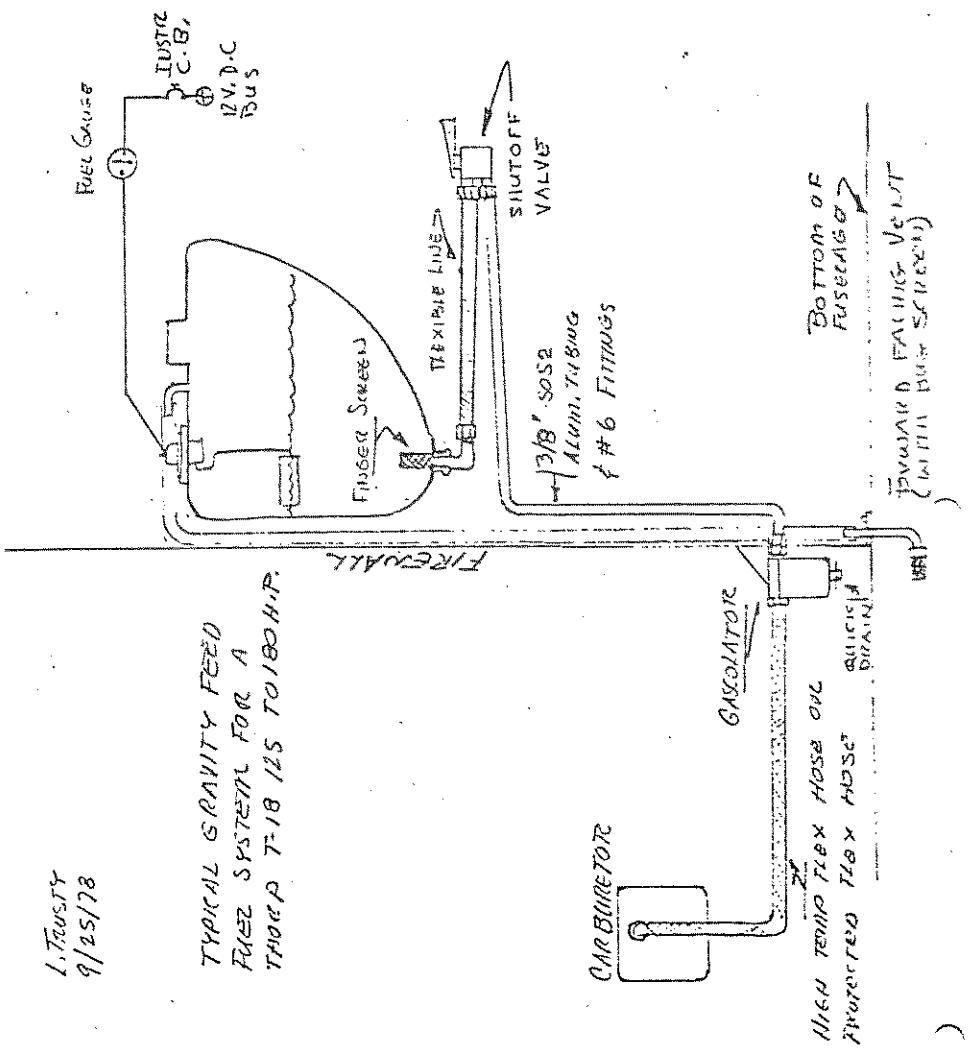
There must be a tank vent. It should come off the top of the tank, vent overboard where it cant re-enter the cockpit and above all - FACE FORWARD. The ram air pressure cant get into your fuel tank unless the vent faces forward and can in fact suck a vacuum on your tank at high speed and cause fuel starvation if you have the vent facing to the rear.

Never use check valves in gravity feed systems. They rarely work like theyr'e supposed to.(Taking one out of John Thorps T-18 solved a problem he'd been fighting for over a year.)

If your tank filler neck is recessed inside of the fuselage you must build a dam and provide a scupper drain. This is so fuel wont run into the cockpit when you overfill the tank, or the cap is left loose by the line boy.

Use heat resistant lines or cover them with rubberized asbestos sheathing from the strainer to the carburetor. This could give you the time you need to shut off the fuel and avoid one heck of a fire in the event of an engine compartment fire.

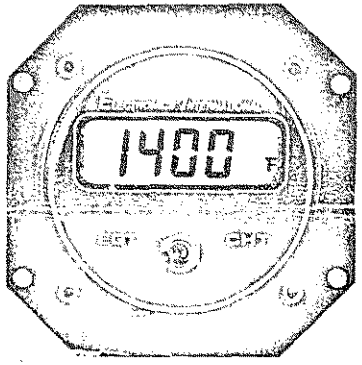
Dont skimp on the components, use aircraft shutoff valves, fittings, strainers and aluminum tubing. No automobile fittings allowed (they're all 45 degree flares and airplane stuff is 37 1/2 degrees) Your fuel system has a great potential for harm, inherently, both from lack of fuel where you need it and the prosence of fuel where you dont want it. Put it together right so you'll never have to worry about it.



EGT/CHT

ELECTRONICS INTERNATIONAL

DIGITAL DISPLAY FOR PRECISION TEMPERATURE MEASUREMENTS



2¼ INCH MOUNT

FEATURES

- **LIQUID CRYSTAL DISPLAY** — DESIGNED FOR IMPROVED CONICAL VIEWING ANGLE AND EASY READING IN DIRECT SUNLIGHT. BACK LIGHT FOR NIGHT OPERATION.
- **IMPROVED ACCURACY** — EC-1 DIGITAL DISPLAY RESOLVES 1°F MAKING LEANING FAST AND ACCURATE. AMBIENT TEMPERATURE COMPENSATION ASSURES ACCURACY.
- **ENSURE SAFE PERFORMANCE** — ACCURATELY MONITORING EXHAUST GAS AND CYLINDER HEAD TEMPERATURES ASSISTS IN DETECTING CONTAMINATED OR WRONG FUEL, SUPER COOLING OR OVER HEATING PROBLEMS AND INTAKE MANIFOLD OR IGNITION SYSTEM PROBLEMS BEFORE THEY LEAD TO ENGINE FAILURE.
- **IMPROVE FUEL ECONOMY** — PRECISE LEANING OF YOUR ENGINE RESULTS IN CLEAN BURNING, REDUCED DEPOSITS AND IS THE SINGLE MOST EFFECTIVE METHOD OF REDUCING FUEL CONSUMPTION AT A GIVEN POWER SETTING.
- **REDUCE ENGINE MAINTENANCE** — EARLY DETECTION OF ENGINE PROBLEMS CAN AVOID COSTLY REPAIRS.

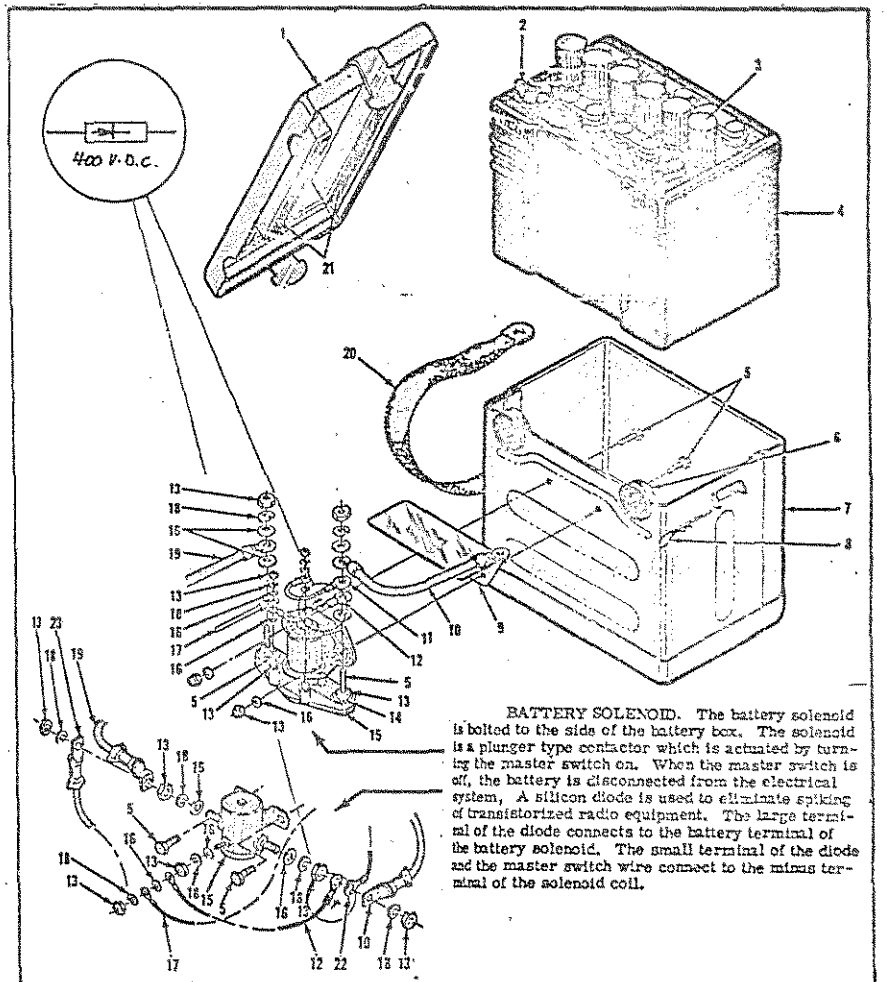
OTHER FEATURES INCLUDE: PANEL SAVING 2¼ INCH MOUNT BY 2½ INCH DEPTH. VERY LOW POWER DRAIN. 12 OR 24 VOLT OPERATION. UNIT INCLUDES E.G.T. AND C.H.T. PROBES AND EXTENSION WIRE. ONE YEAR WARRANTY. F.A.A. APPROVED.

EC-1 —STANDARD MODEL.
EC-1A—NON BACKLIT, HEATED MODEL FOR EXTREME COLD CLIMATE OPERATION.(CONTINUOUS OPERATION BELOW -15°C)

#100

From the Designee file, Lyle Trusty, D.I. # 52

A Master Relay wiring diagram filched from a production aircraft service manual shows a couple of important items sometimes overlooked. The diode protects your radio from large D.C. voltage spikes(in the order of a couple of hundred volts)when you turn off the master switch with the radios on.... and the wire to the master switch is a ground wire, which makes it'fail safe'. If it chafes through on a bulkhead it doesn't short out and start smoking...it just keeps on working.



BATTERY SOLENOID. The battery solenoid is bolted to the side of the battery box. The solenoid is a plunger type contactor which is actuated by turning the master switch on. When the master switch is off, the battery is disconnected from the electrical system. A silicon diode is used to eliminate spiking of transistorized radio equipment. The large terminal of the diode connects to the battery terminal of the battery solenoid. The small terminal of the diode and the master switch wire connect to the minus terminal of the solenoid coil.

1. Battery Box Lid
2. Wing Nut
3. Filler Cap
4. Battery
5. Bolt
6. Grommet
7. Battery Box
8. Spring Clip
9. Water Shield (Some A/C)
10. Power Cable
11. Jumper Wire
12. Diode Assembly
13. Nut
14. Star Washer
15. Battery Solenoid
16. Washer
17. Wire to Master Switch
18. Lockwasher
19. Starter Cable
20. Ground Strap
21. Insulators
22. Clock Wire
23. Gnd Serv Recpt Cable

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EC-1 OPERATING INSTRUCTIONS

E G T

LEANING: As the mixture is gradually leaned from the full rich position, the Exhaust Gas Temperature (EGT) will increase until a peak reading is reached. Any further leaning will result in a decrease in the EGT. Peak EGT with a float-type carbureted engine is frequently a vague point because of the fuel/air distribution problems in these lower horsepower engines. As a result, these engines tend to operate smoother at 150°F to 50°F on the rich side of peak EGT. The fuel injected engines of 250 horsepower and higher will provide a more precise peak. Most engines normally operate within an EGT range of 1200°F to 1400°F at cruise powers. As of this writing (9/30/80), Avco Lycoming allows leaning to peak EGT at 75% power and below on their direct drive normally aspirated engines. For your engine check the engine manufacturer's recommended procedures. It is not recommended to lean for peak EGT above 75% power settings. The richer mixture is needed to cool the combustion temperatures and keep the anti-knock capability of the fuel high enough to prevent detonation from occurring at the higher power settings.

During descents to the traffic pattern, it is recommended maintaining the mixture at the leaned cruise condition with a gradual richening of the mixture, carrying some power and at a sensible airspeed to maintain the most efficient engine temperatures possible. Avoid low power--high speed descents which may cause sudden cooling, severe lead fouling, cracked cylinder heads and warped exhaust valves.

A rich running engine wastes fuel needlessly and tends to run on the rough side thereby creating vibration which cause a deterioration of engine accessories and engine mounts. Proper leaning at cruise and during descent means less spark plug fouling, longer life for the plugs and reduced maintenance costs. Good leaning techniques, likewise, result in cleaner combustion chambers with fewer lead salt deposits on the pistons and exhaust valves. Under certain conditions these deposits invite pre-ignition and higher maintenance costs. Proper leaning at cruise during cool or cold weather aid in raising engine and oil temperatures to desirable minimums in order to evaporate the water and acids out of the oil. Water and acids attack the insides of an engine, causing rust and corrosion.

THEORY: A fuel/air mixture is injected in a cylinder, compressed and ignited producing a combustion temperature of approximately 4000°F; this represents an energy level. Some of this energy goes to producing power. Some of it, unfortunately, goes into heating the cylinder heads and the rest is exhausted. As the engine is leaned, the excess fuel in the fuel/air mixture is being reduced, the combustion temperature is increasing and the EGT is increasing. Peak EGT will result from the correct mixture of fuel and air which gives maximum utilization of the mixture.

Since the EGT is directly related to the combustion temperature, it is an indication of the engine's ability to produce power. If the engine is not producing the correct amount of power, the EGT instrument can be a very valuable trouble-shooting tool as well as an early warning system before engine failure occurs.

C H T

OPERATION: The Cylinder Head Temperature (CHT) gage helps the pilot protect his engine against the threat of excessive heat. Most general aviation aircraft take the CHT off the hottest single cylinder determined by extensive flight tests. Minimum inflight CHT should be 150°F, and maximum in most direct drive normally aspirated Avco Lycoming engines is 500°F. Some of the higher powered, more complex engines having a limit of 475°F. Although these are minimum and maximum limits, the pilot should operate the engine at more reasonable temperatures in order to achieve the expected overhaul life of the powerplant. It would be normal during all-year operations in climb and cruise to see head temperatures in the range of 350°F to 435°F.

Sudden cooling of the CHT is a problem that is common with aircraft engines. This is caused by fast descents with little or no power and rich mixtures. This may result in long periods due to exhaust valves sticking, spark plug fouling, broken piston rings, cracked cylinders at the spark plug and valve ports and warped exhaust valves. To avoid these problems, do not allow the CHT to cool more rapidly than 1°F every 3 seconds during inflight operation.

THEORY: The source of heat in an engine is from the combustion of the fuel/air mixture producing temperatures of approximately 4000°F. Some of this heat energy goes into heating the cylinder heads due to radiation and conduction. This heat is sinked away from the engine by the air flow over the cylinder heads. When the heat being generated in the cylinder heads equalizes with the heat being sinked away, the cylinder head temperature will stabilize.

Another factor affecting the CHT is RPM. Lower engine RPM causes slower piston speeds which allows additional time for the combustion temperatures to transmit more heat into the cylinder heads. Therefore, high throttle settings with low RPM causes higher cylinder head temperatures. Controlling the CHT to within operating limits is essential. Some methods to reduce cylinder head temperatures are:

1. Open cowl flaps (increased airflow sinks more heat away from engine)
2. Enrichen mixture (reduces combustion temperature)
3. Increase airspeed without increasing throttle setting (increased airflow sinks more heat away from engine)
4. Increase RPM without increasing throttle setting (reduces heat energy transmitted into cylinder heads)
5. Reduce power (reduces combustion temperature)

EC-1 INSTALLATION INSTRUCTIONS

EGT PROBE: The EGT probe should be installed in the exhaust stack of the leanest cylinder. This information is available from the airframe dealer's service department.

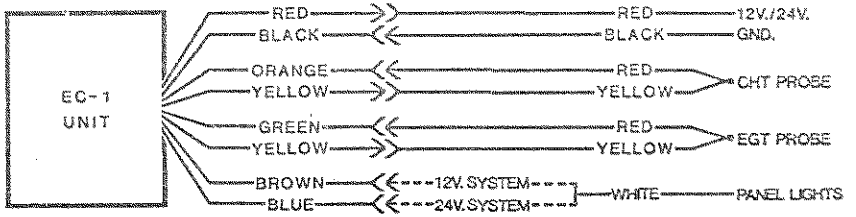
Drill a 3/16 inch diameter hole in the exhaust stack 1 and 1/2 inch from the exhaust port you wish to monitor. Adjust the spring clip on the probe so when it is placed in the stack, it protrudes approximately halfway in. Tighten the clamp around the stack and cut off any excess tail. The spring clip should be between the clamp and the stack. Dress the EGT wire away from the exhaust stacks, cylinder heads and any unshielded spark plug wires. If the EGT wire is too short, order thermal couple extension wire to length needed.

CHT PROBE: Remove the spark plug on the hottest running cylinder. This information is available from the airframe dealer's service department. Replace the copper spark plug ring with the CHT probe and reinstall the spark plug. Dress the CHT wire away from the exhaust stacks, cylinder heads and any unshielded spark plug wires. If the CHT wire is too short, order thermal couple extension wire to length needed.

INSTRUMENT: The EC-1 is designed to fit a standard 2 and 1/8 inch mount and be installed and easily removed from an instrument panel. Install the unit from behind the instrument panel using the 6 x 32 screws supplied with the unit. If it is to be installed in a 3 and 1/8 inch hole, an adapter plate is available from ELECTRONICS INTERNATIONAL.

For wire connections see the diagram below.

WIRING DIAGRAM



NOTE: We do not recommend cutting or splicing the thermal couple wires.

A little while before my recent hospital visit my old friend, Pete Gonzalez, of Colorado Springs, CO, flew his T-18 in for a visit and we had a good, old-fashioned gab session on building T-18s. He said he would forward some dope for the newsletter when he got home and sure enough, he did.

On page 17B is his tail wheel tow bar drawing and it is very well done and looks like it would work like a charm. Pete also included a 5 page "scrounge" list, as per his letter below, but space won't permit using it until next NL. He also sent in an index of drawings that I'll need to re-type and update before printing in a later issue. Thanks a mil, Pete. We do appreciate your efforts!

DICK:

Enclosed is the drawing for the tow bar that I built.

It works very satisfactorily, especially on a hard surface.

Hope you can use it.

Pete

P.S. Also, I am enclosing a couple of index that I developed while I was building my plane. The may be slight out dated, but maybe not too much to be of some use to other builders, especially as a start to complete one of their own with the newer plans.
I have found it useful for locating a plate for reference even to this date.

In addition I'm enclosing what I called my "scrounge list" when I was building the plane. On occasion, I might find myself in a place that had potentially useful metal, such as a small piece of, to them, scrap .250 2024 plate but by carrying this list with me, I could immediately determine if it was too small for me out was it useful,

If it could be used by me, I would purchase or beg it from them, preferebly beg.

As an example-A local window builder had a small piece of .250 2024 alclad that was basically too small for anything he might be manufacturing. I was able to purchase all my .250 2024 alclad from requirements from him for the then junk price.

I thought of sending this to you when I was using the copy of the I had made of the Newsletter index for the second or third time and realized how this index in Newsletter #51 had helped me.

Hoping you can use some or all.

P.P.S. This scrounge list is incomplete, but I think that the portion I have completed might be useful. Some day I may complete it from my notes.

Pete

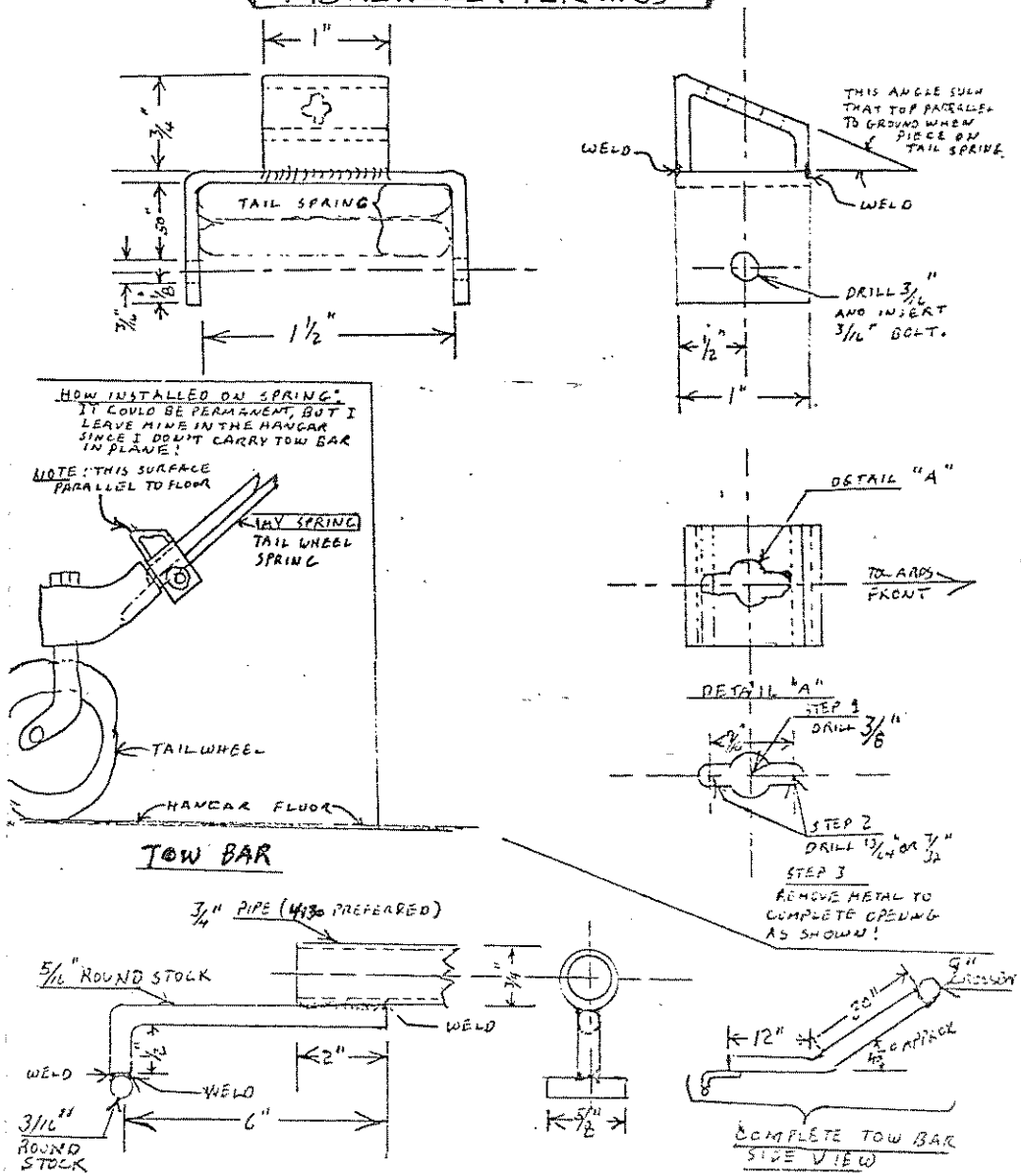
P.O. GONZALEZ PIECE TO ADAPT TAIL WHEEL SPRING TO TOW BAR

MATERIAL: .090 MIN. STEEL (NOTE OF SKETCH TO SCALE...)

"I USED 4130—MILD STEEL WOULD PROBABLY BE SATISFACTORY."

PAGE 17B

T-18 NEWSLETTER #53



(From the Lewis EA-2A Newsletter, courtesy of Chas. Vogelsong) I have used this method for many years and in my opinion it's the only way to accurately use a brake and it dispenses with having to use a formula)

HOW TO FORM METAL ACCURATELY, by Charles T. Vogelsong, EAA 10199

For years I have been passing along to other homebuilders, through forums at Fly-ins, class instruction, and chapter lectures, the simple technique of accurately bending metal. I have tried to explain it at a level that anyone can understand by breaking it down into several basic procedures. If you want to understand how simple it is to bend metal accurately, read and understand each step of the following before moving to the next part of the discussion. Remember, understand thoroughly before moving to the next sequence!

Forming a simple angle. (Fig. 1) We need two bits of information: the dimension of "A" and the dimension of "B" (Fig. 2). To keep things simple and easy to figure let's have dimension "A" equal one inch and dimension "B" equal one inch on the finished angle.

Problem # 1: Forming dimension "A", which is a one inch leg on the angle. (Forget "B" for the time being). First make some form blocks, using wood, metal, plastic or whatever is necessary to support the type of metal you are bending, be it aluminum, steel, or whatever. Two blocks will be necessary, one with the proper radius for the metal you are going to bend, (Radius will be discussed later; we are concentrating on bending accurate dimensions now) and one to use as a back up block. (Fig. 3)

We know we want a finished angle one inch on each leg. We need to know one other bit of information now, the thickness of the metal we are going to form. Again to keep figures simple, we will use 1/8 inch as a dimension of thickness for simplicity of figuring. (Do you understand the above? If not reread until you do!)

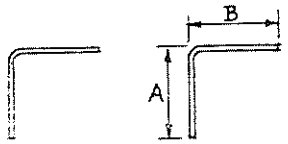


Fig. 1 Fig. 2

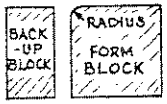


Fig. 3

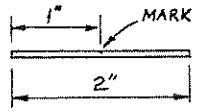


Fig. 4

Next step: Let's take the piece of metal that we have selected to bend which is 1/8 inch thick and cut a piece two inches wide to use as a test piece. (Length is not important here for this part of the problem. Make it two inches long if you want or any other length!) The flat layout of this strip should be as shown in Fig. 4. The one inch is dimension "A". Now we need a "scrap" of the same metal which is 1/8 inch thick. Place it in the forming blocks which are "C" clamped or used in a vise. (Fig. 5) Notice that the scrap piece with 1/8 inch thickness is placed on the form block and the mark lined up with the top of the 1/8 inch piece. Clamp in this position. (Reread and understand!)

Next step: Remove the 1/8 inch scrap piece and bend metal over form block. (Fig. 6) Since the piece to be formed is 1/8 inch thick, we have moved the bend mark 1/8 inch above the form block by using the scrap of the same material. When the scrap piece is removed and our metal part is bent, the allowance for the material thickness is displaced and the resulting flange is equal to dimension "A", exactly one inch! (Fig. 7) (Do you understand? Reread until you do!)

(18B ON NEXT PAGE

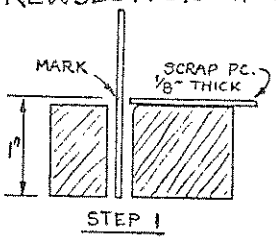


Fig. 5

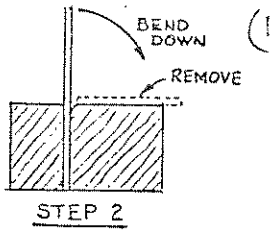


Fig. 6

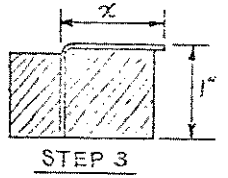


Fig. 7

Now at this time we better explain how to measure accurately before going any further. Using a rule that has a sliding clip, we measure as follows: (Fig. 8) Slide the clip down and read on the rule; this will be one inch exactly if previous instructions were followed exactly. This is the simplest and most accurate way to measure.

We now have dimension "A" formed to exactly one inch on our test piece and will now explain how to form dimension "B" to one inch. - - - Using the above method of measuring, reverse the test piece so that dimension "A" is on our flat reference surface and measure "x" as shown in Fig. 9. Again to keep figures simple, let's say we find "x" to be 1-1/8. inch. Therefore we gained 1/8 inch due to the radius of the form block. With this information we can now lay out our original angle in the flat pattern which would be as shown in Fig. 10 and form as before to get our perfect dimension of one inch on each leg of the angle, (Fig. 11). We started with a two inch wide test piece and the above method proved we gained 1/8 inch due to bending, therefore by subtracting 1/8 inch from our flat layout, a 1-7/8 inch piece will bend accurately to one inch on each angle leg.

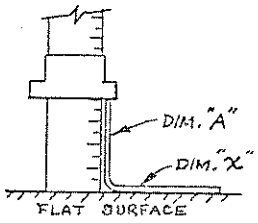


Fig. 8

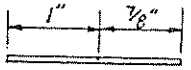


Fig. 10

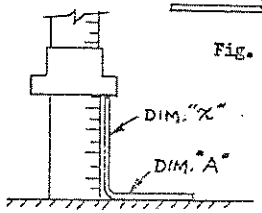


Fig. 9

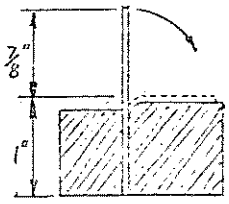


Fig. 11

Forming other shapes using the same technique. - - - To form a channel over a block we do this: Let's say we need a channel with these finished dimensions: Two inches on the web with one inch flanges. In this case let's say our metal to be formed is 1/16 inch thick. Our form block would then be 1-7/8 inches wide, (two inches minus two metal thicknesses of 1/16 inch) and a thickness of one inch or more (Fig. 12).

First again we start with a test piece of known dimensions, since we now have a different form block. In each case of a different form block we must "prove" our "bend allowances" with a test piece. In this case our test piece can be four inches long (two inches plus one inch plus one inch). Center this piece over the form block, bend, and accurately measure each flange to find by how much it exceeds the one inch dimension (Fig. 13). If we find this to be 1-1/8

inch it would mean we gained 1/8 inch in each bend or 1/4 inch overall. Therefore our flat layout would be as shown in Fig. 14.

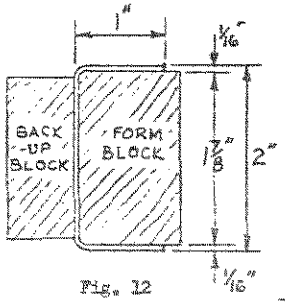
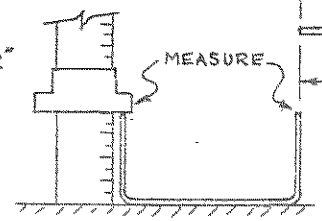


Fig. 12

Fig. 13



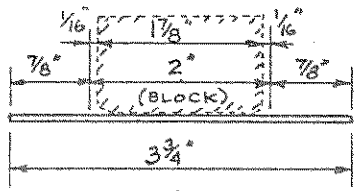


Fig. 14

The above information can be used for any variety of shapes. Just remember to "prove" by bending a test piece over each different form block to determine the exact gain or bend allowance.

The preceding discussion covered the use of form blocks when bending. When using a bending brake, the principle is the same except the "mark line" will be in another relative position. In the discussion of bending brakes, first let's give names to a few of the parts of the brake, (Fig. 15). Note that the "hold down" must be set back a little more than the thickness of the metal being bent to provide clearance.

Now let's use the brake to bend the same two pieces we used as examples previously. First the angle, (Fig. 16). Cut a test piece of material two inches long. Make a flat layout, (Fig. 17). This piece is to "prove" our brake or to find how much gain the nose piece radius will give us. This should be checked with every brake used rather than using some set of given tables.

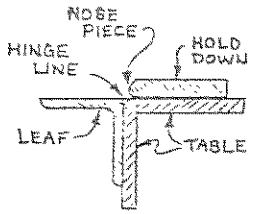


Fig. 15

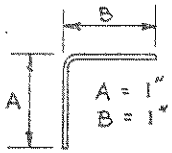


Fig. 16

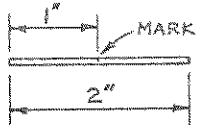


Fig. 17

Another term I use is "wanted dimension". This is the one inch section of the test piece (Fig. 17). This "wanted dimension"is always placed under the "hold down", placing the mark on the hingeline (Fig. 18). Now bend the test piece 90 degrees with the leaf and measure the wanted dimension. This should be one inch. If it is less than one inch, make another test piece laid out exactly as before. This time place the mark slightly over the hinge line (toward the hold down) equal to the amount that the first test piece was "shy" of the wanted dimension. Now this will give us our exact dimension for flange "A". Again measure the remaining flange of the test piece, and if this would show 1-1/8 inch as in the earlier example, we then know that our "gain" is 1/8 inch per bend. Therefore the flat layout would be as shown in Fig. 19. Since the one inch portion

is the "wanted dimension" of our angle, this would be placed under the "hold down". When bent, the gain of 1/8 inch over the nose piece will make flange "B" exactly one inch to finish our one inch by one inch angle.

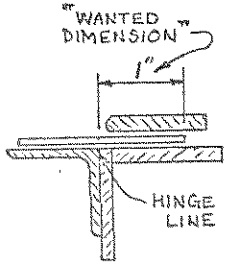


Fig. 18

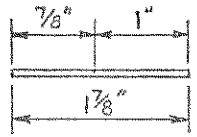


Fig. 19

Now to bend a channel (Fig. 20) in the same brake, using the same nose piece which gives us 1/8 inch gain per 90 degree bend, our flat layout would be as shown in Fig. 21. (Two bends, 1/8 inch per bend equals 1/4 inch). Note that one end with the one inch "wanted dimension" is placed under the hold down and bent. Then remove and reverse the piece and place the other end (H.D. #2) under the hold down and bend. Since each bend gained 1/8 inch on our test piece, for each 90 degree bend in our channel, 1/8 inch will be added to the center portion being pushed by the leaf. Therefore two 90 degree bends will add 1/4 inch to the 1-3/4 inch web to make our perfectly planned channel.

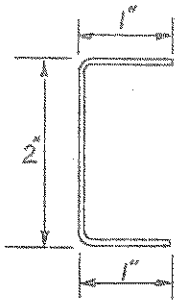


Fig. 20

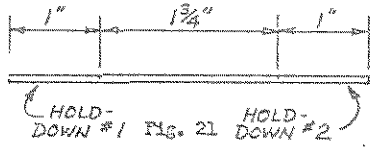


Fig. 21

That is the procedure for bending. Remember each different thickness of metal will give a different bend allowance. With my home made brake and a 1/8 inch radius on the nose piece, I have found the following bend allowances for 2024 T3 Alclad sheet aluminum:

.025 sheet, bend allowance is	.100 per 90 degrees
.032 sheet,	.110
.040 sheet,	.120
.063 sheet,	.220 (nose piece added)

I have found the 1/8 inch radius is adequate for all sizes up to and including .050 aluminum. A simple radius guage for shaping a nose piece on a bending brake or on a form block can be made as follows: Take a scrap of aluminum sheet about one inch square. Drill a 1/4 inch hole in the center. Cut out a quarter segment and you have a perfect 1/8 inch radius guage, Fig. 22 & 23.

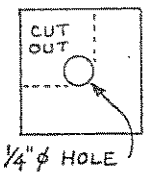


Fig. 22

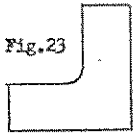


Fig. 23

Our thanks for the info, Charlie.

Steve Marlo McKinty) See his display at OSH '81

BECAUSE EXPLOSAFE HAS NO CONTROL OVER THE PLACEMENT OF ITS PRODUCT IN EXPERIMENTAL AIRCRAFT, EXPLOSAFE ASSUMES NO RESPONSIBILITY OR LIABILITY FOR ANY OCCURENCE OR CONSEQUENCES THAT MAY ARISE FROM SUCH PLACEMENTS

INSTALLATION OF EXPLOSAFE

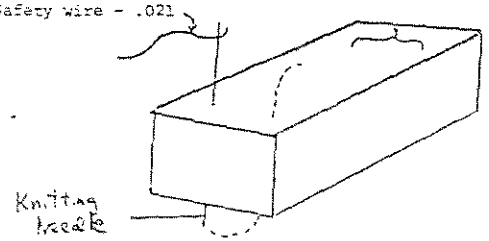
It does require a little thought and planning ahead to adapt to different shaped tanks, float areas, drains, fuel pick ups, etc. In planning beforehand, think of assembling a series of blocks shaped and placed in proper sequence so as to allow, for practical purposes, a complete filling of the tank volume. Don't allow the placement of one batt to keep you from having access to another area. If you have an odd shaped tank, you may wish to make styrofoam mock ups of the shapes prior to actually cutting the explosafe batts.

The pinning or stitching of the batts with aluminum rods or safety wire before handling or cutting, aids in keeping the batts together, and maintaining their shape. The safety wire or aluminum rods can be left in after installation. The foil can be cut to accurate shapes to avoid stuffing small areas with waste foil.

EQUIPMENT NEEDED:

1. Knitting needle - 13" long, with eye drilled in one end, or in some cases, the aluminum rods that come with the batt may be all that is required if the tank shape is simple, and doesn't require odd shaped batts.

2. Safety wire - .021



3. Small needle-nosed pliers for bending aluminum rods into U shaped hooks on the ends to hold compressed batt.

4. Template material: either thin metal sheets or thin stiff cardboard, and scissors for cutting the template.

5. Marking pen (felt Mark-a-lot or equivalent).

6. Electric knife (kitchen variety with bypassing blades).

PRESENTED IN ANSWER TO MANY REQUESTS FOR INFO

TEMPSFOAM: The situation has changed a great deal since last year: the original company was sold and the new manufacturer is having lots of problems. The cost was high before; now it is ridiculous, and it no longer meets F.A.A. specs for fire retardancy in certificated aircraft.
If you really have to have safety and comfort at any cost, it now comes in one inch layers of the soft, medium and hard and you make them up to suit your individual needs. The very firm bottom layer comes only in 16" x 18" x 1". A 3 inch cushion will cost around $45.00. Hopefully, some other manufacturer will produce a similar product at a more reasonable cost.

STEPS:

1. Plan batt sizes, shapes

2. Carefully use knitting needle to thread safety wire through the batt, or carefully thread the aluminum rod through the batt on both sides of the proposed cut. This is to keep batts in desired shapes after cutting.

3. Measure, mark, and cut the batts. If necessary, stop the cut before it is complete and fasten the cut portion together with safety wire or aluminum rods before cutting it off completely, in order to not lose the relationship of the layers to each other.

4. After cutting, shake batt to get out small particles.

5. Templates - Where one batt must slide next to another, cut a template the size of the first batt to act as a divider. After placing second batt, slide template out, of course. A slight compression of the batts is desirable, but do not deform them. Single sheets may be layered, rolled, or fanfolded as necessary.

6. Filler Openings, Quick Drains, Fuel Pick Ups, and Float Areas

It is necessary to isolate the float travel area so that the float at no time can come in contact with the Explosafe. Form a round or square box or tube of .016, aluminum or equivalent and fasten it securely to accomplish this. Several 3/8 or 1/4" holes or slits may be placed top and bottom to allow an ample fuel flow. Allow 1" minimum clearance for all moving parts, drains, and access openings.

While small loose Explosafe particles are not a major problem, a 16 mesh fuel pick up strainer should always be used, as well as a fuel filter in the line.

As long as Explosafe fills at least 90% of the volume of the tank, the safety features are not compromised, but of course it is best to fill the tank as completely as possible.

Prior to fastening your last access panel in place, be sure you have your fuel tank signed off by the FAA inspector.

You now have a tank that will not build up static electricity, (it is wise to be sure all fuel tanks are grounded externally) and one that provides a slosh attenuation by a factor of forty, besides providing a tremendous safety factor in the event of fire.

Explosafe batts are manufactured by Vulcan Industrial Packaging, Explosafe Division, 414 Autwell Drive, Rexdale Ontario, Canada M9W5C3, to homebuilders through Explosafe, 1310 Idylwild Drive, Langdon, Nebraska 65503

EXPLOSAFE: There is an article coming out soon in Homebuilt Aircraft that explains the installation fairly well. It is an unbelievable product from the standpoint of rendering your tanks absolutely safe against an internal explosion. You can even put a rifle in the tank with a cutting torch that is half full of fuel, without worry of an explosion. It is far superior to the previous foam type of protection in that there is no static electrical build up, and it doesn't break down chemically. It is a .021 expanded aluminum foil product. It is most easily placed when the tank is constructed, of course, but it can be retrofitted. The cost is about $3.00/gallon based on the square measurements of your tank. There is quite a bit of waste due to the shape of the 29 gallon T-18 tank. It only displaces 1% of the volume, and weighs 2.2 lbs. for 7 gallons.

SAD NEWS DEP'T: Dr. John Shinn, of Ormond Beach, Fla., was stricken with cancer in early June and passed away July 5th. John was a frequent contributor to the NLs from the very earliest days and one of the most enthusiastic builders. His T-18, was #100 to fly in early 1973. John also wrote an excellent article on aircraft painting in Sport Aviation and has been a regular instructor in the T-18 workshop. He also conducted the T-18 Forum at OSH last year. John also taught both of his sons to fly the T-18. We will all miss John and his friendly, cheery manner and his ever-present willingness to help others with their building problems. We'll also miss seeing his T-18 at OSH. On behalf of all of us that have known John all these years, we'd like to express our sincere condolences to the family.

From TONY SCHISCHKA, 7 HALL ST., BLENHEIM, NEW ZEALAND: I got a letter thisspring from Tony, just prior to his trip to Marietta, GA, in June in A NZ AF C-130, which will be there for two weeks. Tony said his T-18 is about 99% finished, so he hopes to be able to fly in a very few months. He also said that they have two other T-18s flying in NZ. The first flew about 3 years ago (ZK-EDF by Greg Mc[illegible]) and the second just before last Xmas (ZK-ROD by Rod Davis). He says Rod only lives about ½ mile away from him and that he flies another Thorp designed airplane for a living, the Fletcher FU-24-400 Ag aircraft, and that this must be first to fly two a/c for work and pleasure, both designed by the same man. Rod's T-18 [illegible] was some 3½ years in the building and is absolutely standard apart from the personal touches in the cockpit and a non-standard [illegible]. [illegible] O-320 [illegible] 150 hp and prop is a Sensenich 76EM74. Tony also has the same prop and says they prefer less pitch to get out of small grass fields that they have in NZ. Empty wt. is 9[illegible] lbs. It performs almost exactly as per specs. Cruise is 131 kts (150 mph) at 2400 rpm, climb is 1200 ft./min, stall is 5[illegible] kts. ([illegible] mph). Tony planned to buy a radio for his T-18 while here in the US.

[illegible]: Just talked to Ken Knowles and he told me Don Taylor [illegible] just given him his biennial flight review a few days previous and they did [illegible] flight and many stalls. The more they flew the new airfoil the more [illegible] with the stall characteristics. He said that with power the airplane was still flying with the airspeed down close to 40 mph (indicated, which would not be accurate at that angle of attack)! He said the nose is REALLY high then but that when stall break comes it is not a violent pitch down, a much gentler stall than before. He said it also acted the same in turning stalls and had practically no tendency to roll. I believe the larger radius leading edge is what accounts for much of the improvement. I also believe that it can very likely be flown at several degrees higher angle of attack before separation occurs, as he also said it was (too) easy to get the tail wheel on first in the three point landing. This same characteristic was observed in airplanes with the "Tripod" gear, indicating the wing was below the stalling angle in normal 3 point attitude. The longer gear cured this little problem. (Now don't run out and put an extension on your longer gear). In my opinion, the greatest virtue of the new airfoil is the ability to fly it slower(safely) in the pattern, on turns, and a slower final approach....not a slower touchdown speed. It will give the pilot a little more margin of safety in the landing phase and this is good if his attention is distracted, or he is tired, or maybe hasn't had had a chance to fly too much lately and is pretty rusty, etc. If it truly has a larger coefficient of lift,as indicated, its load carrying ability and rate of climb would also be improved.

Ken also told me he a nearly completed airframe for sale. Workmanship by the builder he acquired it from is excellent, he says. It's up on the gear, controls are in, and everything nearly complete from firewall aft, and would be a good chance for someone to get airborne in pretty short order. Call him for price and specific details. Would save the average guy about two years work, at least.

FROM THE T-18C NEWSLETTER

By Lu Sunderland

T-18C Rear Beam Fitting Correction: A dimension on Rear Beam-Outer Wing Fitting #317 was erroneously changed 26 Feb 78. This change should NOT have been made. It should read 1.812 rather than 1.712. Also, the center line of the ball-lok should be at W.S. 41.563 on #102R Drawing and the end of the rear beam fitting should be at WS 41.175 on drawing #314, rather than WS 41.263. Make other necessary changes to the #314 drawing where dimensions are referenced to this wing station. If anyone has any questions about these corrections, Sunderland Aircraft will replace the affected drawings......End.

JOHN'S BIRTHDAY PARTY '81: Talked to John the other day and he said his latest fly-in birthday was again a very happy occasion. There were 16 T-18s there this year, the same as last year, and about the same number of people, too. [illegible] John, we wish you many happy returns, even tho' we couldn't make it this year.

John Phillips, [illegible], bought an early T-18, that [illegible] a lot of work a few months back. He had also bought a project started in this area in the early '70s. He called me the other day to say that he had finally made his first T-18 landing and he was walking ten feet tall. He has the other project moving into the final phases, also.

OSH '81 [illegible]: Last year we had a "COWLINGS OFF" period that began at noon on Monday and lasted until 7 pm. It set off a [illegible] torrent of [illegible] comment, not only from the T-18 builders, but also from many other type fans as well. Several said they hoped to get their groups to do the same. It was such a hit with new builders. T-18ers led the way with the first newsletter and the cowlings off bit was another first. Let's keep it the best too, by having 100% participation. "Cowlings Off" will again be on Monday, [illegible]. Also, the annual T-18 Dinner will again be on TUESDAY evening at [illegible] and let Ceri Knowles know as soon as possible if you can attend, [illegible] in your party, etc. We will bring the T-18 "Family Album" again and will again take photos of each couple. If you have a good color print of your T-18 please bring it so we can put it in the other album of airplanes only. ..The T-18 Forum will be held in FORUM [illegible] #2 at 10:30 to 11:45 .(Don't wait until 11:30 to [illegible] which tent it is. 2) Lu Sunderland will again be the forum moderator - if he can make it there (somewhat doubtful at this time). If he can't make it, Bob Dick and I will hold down the fort.....Above all, let's remember to fly safely. No more low and slow turns to final on RW! Make that turn to final no lower than 500 ft. and plan to land on the last half of the runway. If you're too high or hot-punt-go around and do it right the next time or the next time after that. Keep your head on a swivel all the time...and you can keep your head intact. We want everyone to get back safely to their families. Don't gamble on the weather up there. Usually if you'll just be patient a couple of hours it'll change. When weather blocks your direct route it's surprising how many times a deviation of a couple of hundred miles will give you clear sailing and actually cost only a few extra minutes enroute. Simulate some of these on a map and then put the computer to it for the time factor. It'll surprise you. .

I've got a lot of goodies on tap for NL 54, which I'll try to get out as soon after OSH as possible. I have a good article on an Angle of Attack Indicator system, Pete's 3 page "Scrounge" list, another article on [illegible] gear, a good article with drawings for a cabin heat box, some info on turbo-charging with water/alky injection for T/O, some dope and drawings on seats, more state by state listings of builders, an article on the care and feeding of batteries,(probably)an article on the first flight tests with the Lycoming engine, OSH/T-18 news, and a story about a new CW T-18 that the builder regularly pulls behind his pickup, to and from the airport, on its own wheels. See you at OSH!

Dick