



-ition, causing roll-overs to be "unrecoverable". You might check with John Moore on this because he has always told us to set the wheels to track straight or slightly toed out, but never in. But be sure to do the measuring with the ship fully loaded and the tail on the ground, as in a landing configuration. I did this on my ship this way (cut skins until I was blue in the face) but it is about as doable to land as any T-18 I know. Best regards, Chris.

Chris went on to say he'd been turned down on his medical by the FAA and was selling his T-18. (It later sold to Jim Hernandez, of Seattle, WA, and he wrote me a long letter telling me how much he loved flying it. Jim is an airline pilot, flying internationally, and also a sailplane pilot from back).

Thanks a million, Chris, for all the info. We are all greatly in your debt for all that outstanding super information. These things you laid out will make life a lot easier for the new T-18 builders and maybe it will inspire some of the older builders to jog their memories and write in how they did some of the things. Anyway, we'll all be looking forward to the flap and horizontal stabilator articles. Making the flaps was a bogger for me and quite a few others, too. Another builder told me of that method of alignment of trailing edges on the last set of flaps and ailerons I made (with a slight deviation in Chris's technique). I used a cleec in every other hole, but left them in there until I had driven a rivet in the adjacent hole. I had a bucking bar that had a round bar of slightly under 1/2" dia. inserted in it at one end. I drove the rivets very lightly. I then removed the remaining cleecs and put rivets in the rest of the holes. I used a hand rivet squeezer on these and finished squeezing the others. I did use heat treated rivets, but they were all relatively soft, as I had had them freshly annealed and heat treated and used them straight from the deep freeze. I got reasonably straight trailing edges, but probably not as perfect as Chris's. The same builder that gave me the tip had used an epoxy to bond all parts together, but for some reason I don't remember now, I chose not to use epoxy. It's self-evident that anytime you drive a rivet with a finish set that you are going to thin out the metal adjacent to the rivet. That thinned, rivets metal has to go somewhere and the only place it can go is in between the rivets. I used universal head rivets (not flush) for that reason. I have seen a lot of billers that expanded the parts together and then counterbore both sides of the .010 fillet strip and dimpled the .016 skins. They used 3/32 rivets and wound up with a flush head on both sides. Such excursions from the norm MAY be OK, but they may not be either.

**MORE ON FLAPS:** I finally got good results, but the biggest problem I found was getting the leading edge skin bond to fall in exactly the right place, with the proper radius of bend that matched the contour of the flap nose rib exactly. To bond up the flap skin correctly it takes quite a lot of excess material on the P.E. of both the top and bottom skin (even tho' it's all in one piece). An additional amount must be added to the bottom skin, just like we do on the wing skins. This extra amount, which is trimmed off after bending, makes the shape of the flap rib a symmetrical airfoil shape for the moment of bending (only). The trailing edges of the top & bottom are cleec'd together and the leading edge of the skin is formed as described in Chris's article on the flap in this N.I.

I believe it would be 100% easier to bend that skin if it was .020 instead of .025. Someone told me that they had talked to John about using .020 and that he felt that .020 would have been adequate for the flap skin, but that he had called out .025 so that an additional size of aluminum wouldn't have to be purchased for that one component only. I haven't had a chance to verify that with John, but will do so at the earliest opportunity. The much smaller flap segments on the folding wing make the whole operation much easier, even with .025 skin.

You may be interested in the dimensions I used to make a symmetrical airfoil

Chris says he'll get around to doing a piece on the flap and stabilator, too, so stay tuned. He says he'd do them right away, except that he claims he is lazy. Don't you believe it! I got a note from him the other day and he had recently built a whole new wing and tail group for serial #77, that had been bent up some time ago in a ground loop. He had just completed a new flight test program on it and here's his note in part: "Just finished flying off test time on #77 and it's going well. One problem is tail heaviness, which is due to

#### Q-200-G with wood prop: Lightest configuration

1. wood prop-lighter than metal
2. steel tail spring-3 lbs. heavier than aluminum
3. the battery (most important of all) is located aft of frame #571, whereas it should be located just behind Sta. 94, at the forward end of the baggage compartment.
4. Another contributor is the location of the EPP aft of frame #573.

We will move the battery pronto and that should take care of it. Altho' I am not a wood prop fan, this one works well except for slow acceleration on the ground (too much pitch) and the engine is very smooth. I built a new wing and tail for this one and James Berg (owner) has given me flying privileges, so now I can stay current. \* (Best attitude adjuster there is, Chris-Ed.)

Now if that isn't enough, I have part of another letter from Chris several months ago with several other sage observations on T-18 building:

1. **Seat upholstery:** Creature comfort can be greatly improved if the center seat and back panels are covered with cloth fabric material, not vinyl or nautical vinyl. This is because the cloth "breathes" where vinyl does not. It makes a significant difference in hot weather.
2. **AILERON HINGE GAP SEAL:** Most builders have sealed this gap with 3M tape, which is quite difficult to install properly. A better and simpler method is simply rivet an .016 or .020 aluminum strip to the bottom trailing edge of the wing skin. It should be about 2" wide and be 2024-T3. Paul White first did this to his "Komov", but he hinged the strip and spring loaded it. We found that this was not necessary however, as the 10' down throw of the aileron doesn't deflect the seal strip enough to warrant the extra hinge.
3. **CONTROL SURFACE TRAILING EDGE ALIGNMENT:** It has been my experience that the most dependable method of producing a straight trailing edge is to use two 3/4" extended angles of 2024-T3 .063 stock. Drill 1/8" holes in them to the trailing edge rivet layout. (2" holes will permit using cleecs in them) clamp them on EACH side of the P.E., back to back, with only enough cleecs installed to hold the P.E. together. Use only #40 holes at this point. After the angles are clamped in place, remove the cleecs. You will note that the #40 hole alignment won't be perfect, but will clean up when you use the #30 drill for final rivet size, next with the angles clamped in place (2" C clamp) install 1/8" bolt aluminum rivets with a hand squeezer, being very careful not to over-squeeze, as this will cause the P.E. skin to open up. DO NOT USE HEAT TREATED RIVETS AND DO NOT DRIVE WITH A RIVET GUN! Your trailing edge will be straight as a die!
4. **Landing light location:** Most of our T-18s located out here at Ferrance, CA, have the light mounted in front of the R.H. front cylinder battery, where it shines thru the prop. It does not restrict airflow intake at this location, gives good lighting and is very simple to install. No holes to cut, complicated wire runs, etc. Bill Warwick first told me about it and Bill Smith made the mounting bracket for my ship, so they might be able to furnish some dimensions, etc. (We'll have a dwg later-Ed.)
5. I was a bit baffled when I read about the discussion of wheel top out con-

out of the flap rib shape. Measuring from the center line of the trailing edge rivet holes on the top side of the skin to the center line of holes (punched for the express purpose of mating with a like series of holes on the bottom skin) I added exactly 10.00 inches. From the center line of the trailing edge rivet holes on the bottom skin I added 10.9 inches. I had a local sheet metal shop layout man verify these numbers before I made my template and I also made up a 6" wide piece, clecoed the trailing edges, and bent it up and the leading edge bend fell where it was supposed to. The whole procedure is identical in principal to what we used on bending the wing skins to properly locate the L.E. bend.

If you make a template and go the matched hole tooling route you will have to be exceptionally accurate in laying out all lines of rivet holes, or else you will wind up with a twisted flap, and you surely don't want that. It could plague you with lateral trim problems from now on out. Be sure that all lines of rivets in one direction are absolutely parallel to each other (tram) and that the other lines are exactly 90° to the other lines.

Actually, in my opinion N.H.T. is more trouble than it's worth for the flaps. The simplest thing is to just order your flap skins and ribs, etc. from Ken Knowles, he has already done all the tedious layout work and everything is already center punched, ready for you to drill and assemble. Here again as Chris pointed out on the fin, etc. it's recommended you first drill with a #40, assemble, then drill out to 1/8" or #30, as the case may be (depending on whether you flush rivet or not).

If you're the stubborn type and insist on making it all the above method of skin bending will work well for you. You should lay out the two "dummy" lines of holes the very last thing and I would recommend you clamp a transfer strip (about 1.5" wide) under the top line of holes when you drill, so that you drill both parts at one time. When you use the transfer strip to lay out the 2nd set of holes...CAREFUL...be sure to keep the strip in the same plane as when drilled. Don't flap or flop it or your holes will not match. Label it before you unclamp it. I would also review all older write-ups on flaps, in N.L. #15 and #17 in particular. Incidentally, as I was using our new index in N.L. #51 some of the quoted page no.s didn't jibe with the pages in the N.L.s, but I found the info at some other page in that N.L. Anyway the index is a BIG help to all of us, even if it does nothing more than identify the # of the N.L. that the subject is in. I still like to review a complete newsletter when I have occasion to look up something.

UPDATE ON THE NEW JAVELIN FORD ENGINE: I was able to put Dave Blanton in touch with an Austin firm (Jet Industries) that buys new cars, takes out their engines and installs electric motors, (for leasing thru their dealers) and they had just finished with two new Ford Escorts. Dave bought both of them and says he will have the conversion running on his dynamometer by March 1st and the other one flying in the Cessna 150 test bed by May 1st.

The first engine will be unaspirated and he feels that it will put out 110 to 120 hp. (Since John Thorp has repeatedly said you shouldn't put less power in a T-18 than 125 hp let's not even consider this version in a T-18, please?) Dave is confident when a turbo is installed that he'll easily get a 50% power increase and we can safely plan on it being a 160 hp engine...that will burn 35% less fuel than an air cooled engine of like hp.

Ford has scheduled this engine to be produced with a factory installed Porsche supercharger in late '81. Whether current economic conditions will affect this projection significantly isn't known yet, so don't rush out and buy one just yet.

What will it cost? Dave paid \$800 for new engines and he feels you soon will be able to buy low mileage engines from insured "totals" for less than that. A complete engine (converted) shouldn't cost over \$2000. The savings don't end there, tho'. First of all, you won't need a \$100

prop extension (it's built right into the reduction unit). If fuel goes \$2/gal. as forecast soon, it'll save you at least \$4/hr.! That'd save enough to buy a complete avionics package in a couple or three years... pay for your insurance, etc. In fact, if this little engine lives up to expectations, I can foresee people removing their gas hog engines, selling them installing the Javelin engine for the considerable economy of operation (most people right now that have drastically cut back on the hours they because of fuel costs). As to overhaul costs, they obviously would be g. You could even scrap the block assembly and get a new one for far less would cost for an aircraft engine major overhaul.

What will it weigh? The whole package, with all accessories, plus coolant system, will weigh LESS than a Lycoming O-320 of comparable hp. Lyc will weigh 278# dry, the Javelin engine wet, will weigh 270#!!!! Th of the Lyc as given may not include accessories (source, Jane's), but t of the Javelin includes everything, even the radiator.

You can safely produce 5 hp/cu. in. in a liquid cooled engine (1.7 in t Javelin), but an aircooled engine's top limit is only .5 hp/cu. in. jus of the potential of the liquid cooled engine!

You might be interested to know that the complete weight of the radiator coolant, and hoses is only 18 lbs.

With the present T-18 tank you could have the option of extending your by about 1/3, or you could add 35% less fuel to keep the present range save about 50 lbs. in the process...the wt. equivalent of starter, alt and coolant systems combined.

Will it be reliable? Won't turbocharging strain the engine and degrade. On the contrary. A turbo-pressurized intake manifold maintains a constant pressure and greatly reduces recip leads on all internal parts. An engine air pump and it has been found that sucking air into an engine is the wrong way to do it. Thousands of trucks are supercharged and pull 25# or with far greater reliability than unsupercharged ones. The Escort engine operate with only 6# of boost for 1/0.

Temps are higher, yes, but the turbo engine not only has the finest quality valves and other parts, but also has forged pistons. The real difference the liquid cooled engine's advantage in hp is the ability to cool all ps the engine evenly, while hot spots (i.e. valve guides) limit the air cool potential and require much extra fuel just to cool them.

The engine will have quad solid state ignition (one as standby) which is least 4 times stronger than the best mag. By the FAA's own figures, the of magnetos are responsible for 30% of the internal failures of aircraft

If you are interested in this engine I'd suggest you write Dave and get complete story. They have an excellent info book on the subject and it's 50 pages of excellent technical information. Write Javelin Aircraft, Box Wichita, KS, 67218. It'll be one of the best five bucks you ever spent. I education in itself and it's written by one of the most highly respected in the business. His motive is to bring out a good, low cost engine for homebuilder, not make a lot of money. His other business interests bring in a comfortable income and he has invested quite a lot of time and money the research program and he hopes to eventually break even. We'll all owe a big debt if this engine proves out like it looks like it might.

I will have an article on this engine in the April issue of "Homebuilt A magazine, describing it in a little more detail and my observations on the Javelin powered Cessna 172 test bed. There will be a follow-on article about mid-summer when I fly the Escort powered Cessna 150 in early May. I want copies of that issue you can write them at 606 Wilshire Blvd., Suite Santa Monica, CA, 90401.

As you are more than on the jaw air engine, the excess engine is in narrower than the big and 3rd shorter. I calculated there would be an additional 3000 sq. in. of space available inside the present 1-10 cow. That would allow more than adequate room to put the radiator next to the firewall, via a fan and shroud just ahead of it. All cooling air could be taken in via a flush back type air scoop on the belly and exited via the present gills. The solid state ignition packs lend themselves to a variety of mounting spots.

With a turbo installation you won't need a carb air box, as no carb heat is needed. The standard air cleaner is acceptable, as is the oil filter, if a full flow by-pass is installed.

I was pleasantly surprised by the lack of noise while flying the javelin. There is a turbine like whine of low intensity that comes from the turbo itself. The prop itself is the quietest noise producer and a four-bladed prop would cut that down considerably, too. It acoustically treats the inside of the cow. I believe you would have a cockpit noise level that would be no higher than the average auto at highway speed. You'd certainly pay a lot more attention to air leaks in the canopy.

An cooling drag is a significant part of total airplane drag, closing up the present intake air openings in the cow (or greatly reducing them) would seem to suggest that there could be performance gain.

I have had a new instrument on the Gerson. I flew a coolant system pressure gauge that read in psi. A big red warning light was also hooked into the line a loose filler tap. It would give one plenty of time to get down someplace with greatly reduced power. They should put it on automobiles, or at least make it available as an option.

WOOD PROP TIPS: Crawford Hendricks, Seattle, WA: After more than 400 hours

my 100 Hendrickson wood prop needed a new finish. I sanded forward, one piece, brass leading edges 2 1/2" long and sanded them on (no rivets). These look neat and have been tested 4 hours. (Sanded July '83). No other details. I assume he means epoxy when he says "glue". How about an update, Ford? How thick are the brass pieces, how wide? Did you recess the wood so that the brass fits snug with the prop blade? How many hours since then, Eric? Did the brass give you any tips? Previous reports on brass tipped Sensenich wood props indicated there was approximately a 100 rpm loss, as compared with a flush fiberglass 210.

UPGRADE ON CABIN HEATER BOX. From Gale Adams, 1226 Pennsylvania, Butler, CO 80329

Due to the rather limited space available on the firewall for the heater opening (below gas tank, above landing gear reinforcement bar, either side of tunnel, away from gascolator and etc.), I strongly recommend that the firewall braka links be positioned first. These are determined by the positions of the brake cylinders and the fact that aerquip hoses from the cylinders to the fire wall fittings don't flex in a torsional manner very well.

The heater valve can be located between the rubber petals on either side of the tunnel, and the heat gets around pretty well without additional ducting.

I recommend that the heat valve and housing be jugged together using a 5/8 x 9/16 pc. of .025 alum. to simulate the fire wall. Check for clearance and ease of operation, then remove the 5 x 9 pc. and use it to position and as a drill jig on the fire wall.

The following is an excellent example of a good description of the airplane and the builder.

(1)

Flight Report Serial 845 - W880 - Walt Griffin, Co. Under, Ohio

Construction of W880 (Red River) occurred between Sept. 1972 and June 12, 1979, the date of the first flight. All critical structures are stock 7-16 including the bullet cone/canopies on the tail, standard length gear and tail-mounted pilot-static system. Much of the interior details and non-structural items reflect my own ideas.

The engine is a Lycoming O-290 (22.135 hp) standing a good Senenich W85WH prop. The plane is equipped with a full gyro panel, transponder, 720 channel com, 40R, glidecone, marker beacon, wing-tip sensors, and landing lights. It meets FAR requirements for both instrument and night flights. The paint is red, white and black (over with a sunburst design on the wings). The empty weight is 923 with the empty c.g. at 61.77 in. (19.518').

The airplane handles beautifully. It will cruise 170 mph (135) at 2500 rpm at 6500 ft. Top speed at full throttle (2550 rpm) at 2970 ft. net with OAT 70F as determined from recorded runs were a 4-69 mile measured cruise averaged 182 mph. The airspeed indicator has been calibrated by flight test and is exactly correct at 160 mph IAS with approx. 4-5 mph error (near fast) at 100 mph. The accuracy speaks well of the tail-mounted pitot-static system. At 30F and 1070 ft. 45H solo it will per the rate of climb at 2000 rpm. The lowest sustained measured ROC was at full gross on an 80F day from 111' to 7000 ft. net over the average was 1000 fpm. The best rate of climb observed appears to be about 1100 fpm, although a cruise climb of 130 mph is nearly as good. Cruise climb gives a very flat attitude with over-the-nose visibility excellent. Stall occurs clean at 70 mph IAS with plenty of tail rotation prior to the break. The stall is abrupt but straight ahead. The wing-root fairings installed on this plane may contribute to the pre-stall tail buffet. The aircraft has been spun with normal recovery and flows through a basic cross sequence. Max roll rate appears to be about 150 degrees per second.

My normal approach speed is 100 mph slowing to 90 mph with full flaps over the fence. One can approach slower but the plane feels more comfortable to me at the higher speeds. My usual landings are 3-point. Moderate crosswinds are no problem with a wing down, one-wheel type touchdown.

W880 was shown at Oshkosh 1979 and her picture is on page 36 of the January 1980 issue of Sport Aviation. I now have over 90 hours on the airplane with no major squawks. Myel consumption over that period has averaged 7.5 gal. It is a very responsive airplane which demands your attention but rewards you with unexcelled performance. It easily meets all the aspirations I held for it during the construction years. I have repeatedly thanked John Thornp for assigning such an extraordinary project and for his indulgence of my many questions during construction.

About the builder

I am a Professor of Industrial and Systems Engineering at The Ohio State University. I rebuilt an Aerocraft 740 as a teenager and earned my Private license in that aircraft in 1953. That effort was made possible by my airport manager father. Since then I have owned several different

(Walt Giffin story cont'd)

(2)

aircraft, including a 1940 Culver Cadet. I have also added to my ratings and now hold a Commercial License with Instrument and CFI ratings. At the time the T-18 was completed, I had no recent tail-dragger time; the last being logged in the Culver Cadet in 1960. I prepared for the T-18 test hop by shooting two hours of touch and goes in a Citabria and taxiing the T-18 for nearly four hours at a variety of wind and speed conditions. In my view the high speed taxi tests were great preparation and were probably more demanding than the first landing. My wife Bev is a Private Pilot with about 350 hours but no tail dragger time. We are cautiously checking her out in 78WG. She should be ready to solo as soon as the flying weather in Ohio improves.

#### Canopy Vent Control

Saw an AN155 barrel (turnbuckle) in half. Rivet the two pieces to opposite ends of a proper length .25 in. tube. Attach one end to the canopy cross member and the other to the hinged vent door cut in the rear of the canopy with appropriate forks or eyes. The tube can be easily reached and turned from the pilot's seat to adjust to any desired vent opening.

#### Carb Air Box

The carburetor air box from a Grumman American AA-5 was adapted to fit my O-290-D2 under a Rattray cowl. The front of the box must be trimmed at an angle to accommodate the engine mount offset and cowl opening. A foam filter element was attached by a holder of my own design. The foam element contacts the cowl opening for a positive seal.

#### Arm Rest

A padded arm rest hinged at the rear has been attached to my rear tunnel. The arm rest is lifted exposing a skid resistant step on top of the tunnel for clean and easy entrance and exit from the cockpit. The tunnels are all constructed in three pieces from sheet and angle stock with removable tops for control system inspection.

#### Dual Brakes

The brake hook-up suggested on p. 12h of Aircraft Spruce and Specialty Co. 1979 catalog was accomplished after the airplane was assembled. Scott cylinders with built-in reservoirs were used on the pilot's side. Cleveland cylinders salvaged from a Cherokee were used on the passenger side after milling appropriate mounting tabs from their normally cylindrical base. It would have been much easier to install during construction, but the resulting system works fine.

#### Breather Line

To keep oil off the belly and reduce the number of tubes exposed, I like many others elected to run the breather tube down a gear leg

(3)

fairing. However, rather than run the tube all the way down and past the interfering clamps, I ran the tube only a short way into the top of the fairing. The fairing itself provides a trough for drainage the rest of the way down. Air flow and wheel pant plate are such that no oil accumulates on the brake drum.

#### Floater Repair

A careless fuel attendant knocked the float off my fuel gauge sending unit. (Since then I do my own refueling.) In order to avoid removing the tank to replace it, I relied on two thermos bottle corks, some epoxy glue and my wife's thin arm. The two corks were glued together with an appropriate wall carved at their juncture. The assembly was given two coats of clear shellac. After the wall was filled with fresh epoxy my wife was able to reach through the filler neck and jam the whole assembly over the exposed float arm. The arm was held horizontal overnight for drying by means of a welding rod hook. The aircraft has since accumulated over 75 hours flight time and the fuel gauge works fine.

#### Seat Design

My seats are constructed from 1x1x.062 aluminum angle, aluminum honeycomb and foam cushions. The angles forming the frame are riveted together with corner gussets. The backs and seats are square but of the same overall dimensions specified in Thorp's plans. They are adjustable and tip forward for baggage access by use of the fittings designed by Thorp. The upholstered cushions snap onto the honeycomb slabs used for back and bottom. The slabs are attached to the frame by plate nuts and screws. This permits either cushion to be removed to accommodate an appropriate parachute. The entire assembly (2 seats) weighs 11 pounds.

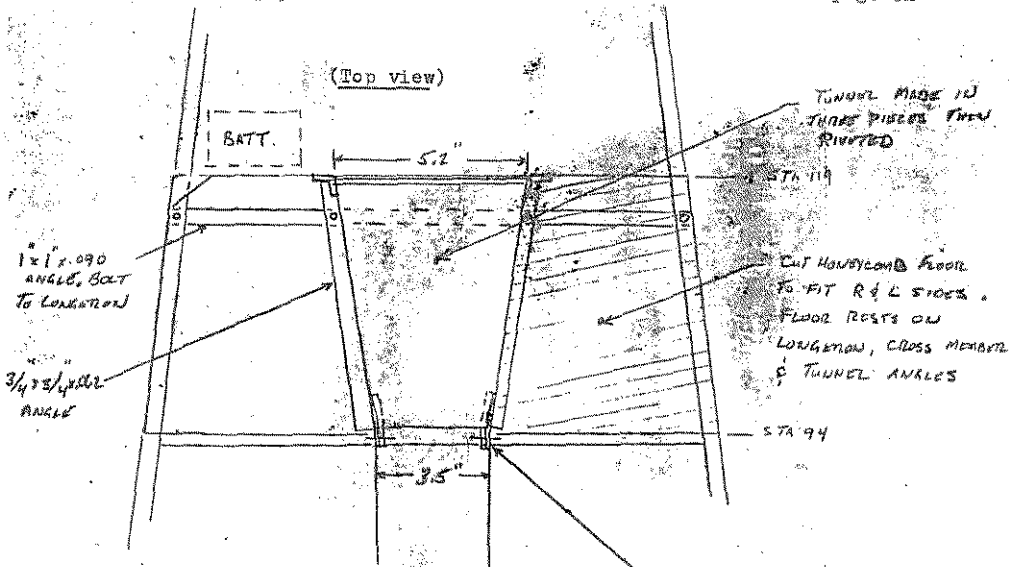
#### Wing Construction

My wing skins were bent in the manner described in earlier newsletters then were pulled over the spar-rib framework by means of 4 gear pullers working against a 2x4 placed against the rear spar. The pullers were attached to slots cut in the excess skin overhanging the rear spar. The nose ribs were held in position by a threaded rod with nuts and washers on each side of each rib to guarantee proper alignment. After carefully adjusting for zero twist all rivet holes were line-drilled through skin, ribs and spar. After drilling, the skin was removed for deburring and dimpling (and the threaded rod was removed). After re-assembly and riveting the resulting wing panels had virtually no twist and a drum tight skin. This approach was suggested to me by Larry Larcom of Delaware, Ohio, an early T-18 builder.

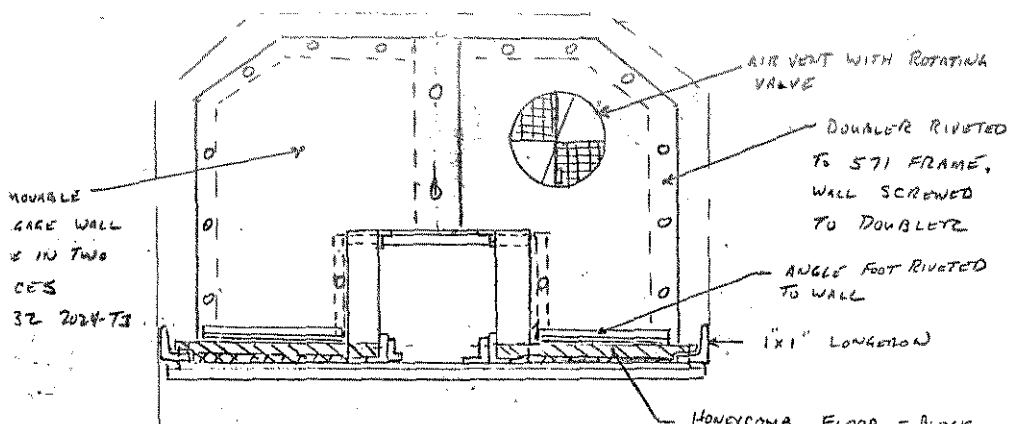
#### Baggage Compartment

Details are explained on the attached sketch.

JIG METHOD



(End view)



FLOOR CARPETED, TUNNEL, BARR WALL  
& SIDE WALLS UPHOLSTERED.

BAGGAGE COMPARTMENT - WALT GIFFIN - N78WG.

Paul R. Shifflett

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December 13, 1980

USE OF THE IO-320-B1A, B1B, B2A, B1C & B1D 160 HP ENGINES

These engines require a dynafocal ring whose dimensions are different than generally found. Lycoming Specs refer to this as Type 2 Dynafocal mounting.

Recalculation of the X, Y, and Z location dimensions as given for the 733-2 jig pads is necessary because of differences in engine dimensional and angular specifications. Also the engine mounting points are recessed, 1 1/2" diam. surfaces requiring four 2" x 1 1/2" .750" thick, round spacers, drilled for the 7/16" diam engine bolts. Lycoming refers to these as Lord mounting adapters.

### 733 JIG CHANGES

- 1) The 733-2 pads are inclined 18 dg instead of 30 dg.
- 2) The 5/16" hole centers ( at -2 surfaces) are raised .722" from 2" to 2.722".
- 3) The 5/16" jig hole centers ( at -2 surfaces) are located on a 15.308" diameter circle centered .22" in the Y direction ( towards the top of the 733 drawing, from the engine thrust line intersection point on the jig surface.
- 4) On the 733 jig drawing, the 5/16" holes in the two top -2 pads and the two bottom -2 pads are displaced up and down respectively from the center of the 15.308" diameter hole center circle, as located in 3) above.
- 5) On the # 733 jig drawing, the 5/16" holes in the two right and the two left -2 pads are displaced left and right respectively from the center of the 15.308" diam. hole center circle.
- 6) Above dimensional changes are taken and derived from, J. Thorp T-18 drawings #733, 727, and Lycoming IO-320 B1A installation drawing # 66197, and are for use with dynafocal engine mounting bushings # #50401-3 as supplied by Ken Knowles for T-18 aircraft and Aircraft Spruce and Specialties for HOME BUILT AIRCRAFT with 2 3/4" ID retainers.

Bushing compressed dimensions affect the jig -2 pad locations. A different compressed dimension will alter the required pad location in all three dimensions, X, Y and Z.

Due to different mounting dimensions, different length engine mount bolts are required. With dimensions detailed above and on my IO-320 B1A wide deck engine, I need AN7- 44A bolts with 3 15/16" grip and 4 19/32" long.

After welding up the -1, -2 assemblies per dwg # 727, I bolted them on the modified jig 733-2 pads with a layer of asbestos paper between pads and spools. I bolted, cut and ground fit the 727-4-5-6 tubes to fit the 733-1, -2 spool weldments. I tack welded tubes to the spools. I removed the tack welded ring from the jig and completed welding. After welding I refit the ring to the jig pads by heating and bending the top -5 tube to correct welding distortion as required. I bolted the two spools on either end of the -5 tube to the 733-2 pads and reheated the -5 tube to a cherry red in center to relieve any tightening strain. With the two -5 tubes still bolted to the pads I made similar corrections in the -4 and -6 tubes to bring the spools at their ends in alignment with the other two pads. I bolted these last two spools to their pads and finished by heating the -4 and -6 tubes to relieve any bolting strain. After the above procedure the ring was a perfect fit, first try, on my engine.

Jig dimensioning is critical and calls for a precise layout on the flat plate surface. The surface is leveled and any elevation irregularities, ( bumps, dips etc) noted. The 733-2 pads were located over the scribed layout at the proper 18 dg angle. I used temporary side lugs on the pads to hold them in position in the tedious location process. With table level I used a small plumb bob with fine thread ( I made it) hung above the pads and down thru the 5/16" pad holes. The support must be stable and adjustable, up and down and sideways, to permit positioning the plumb bob point at proper location. Then center the 733-2 pad hole symmetrically around the thread ( the upper surface of the hole is the one centered and it is an ellipse because of the 18 dg angle. Patience! the 2.722" vertical dimension and 18 dg angle were EXACT preadjusted into each pad with the temporary side lugs mentioned above. They were checked and dimensioned to obtain the 2.722" dimension. It is important here to have precisely cut or machined the pads so that the hole occurs precisely at 2.722" above the plate at a pad angle of 18 dg. The slant length of the pad from the sharp ( acute angle ) end to the center of the hole is 8.809", which is (2.722") / Sin 18 dg. If the plate is perfectly flat this is the correct length. However you will probably find you will have to shim or file to accommodate surface irregularities. Some point on the plate will be your zero elevation point from which all vertical measurements should be referenced. Welding Pads in place; make welds short in length & time; check dimensionally until securely tacked. Don't let the plate get hot; tack corners first; arc or hell arc weld it. I have not built the engine mount yet. My landing gear is not back from the heat treaters yet. However I have the 733-3 post and lug welded in place on the jig, also located with the plumb bob.

-end-

See dimensioned sketch on page 7B

Thanks very much, Paul, for a very complete report. I know of several builders that have had a great deal of trouble getting an engine mount to fit in that series engines.

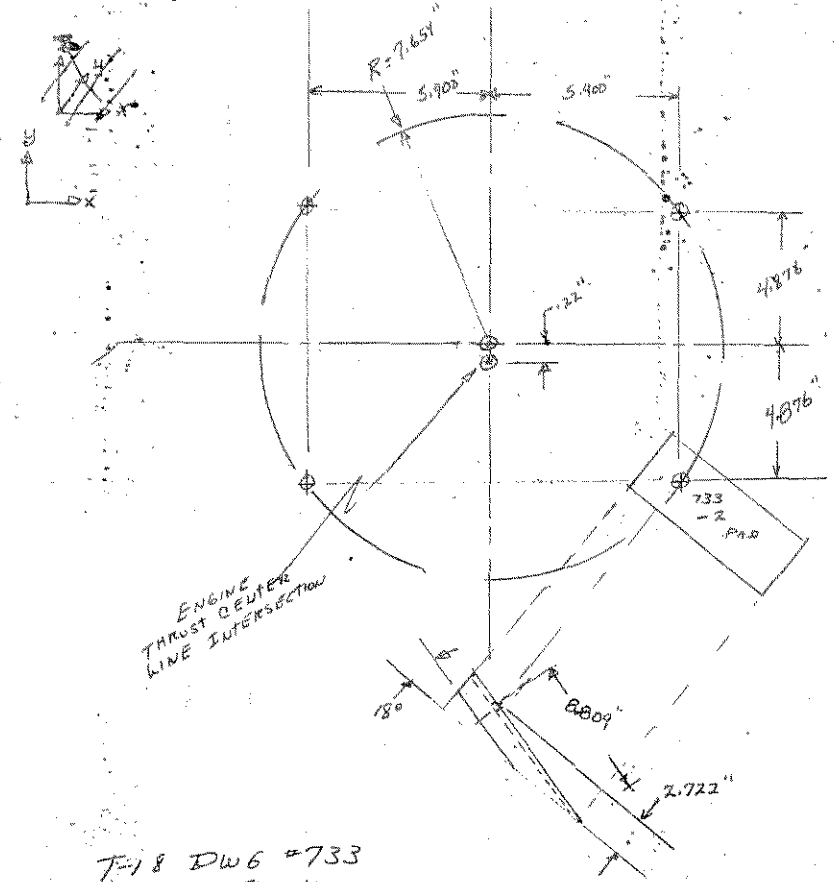
To answer your unspoken question, no, I do not know whether Paul would be willing to build a complete (or tack welded) engine mount for anyone else. If he sends me further info on the subject I'll be glad to publish it, his phone no., price, time for delivery, etc.

TYPICAL ELECTRICAL SYSTEM SCHEMATIC: See page 8

This one was sent in by John Walton, 5726 Boyce Springs Dr., Houston, Tx, 77066 John said he worked this one up from the one shown in Tony Bingelis' fine book, "The Sportplane Builder". He originally sent me a drawing that was two pages, but we couldn't readily reduce it in size and make all details clearly readable, so John re-drew it to fit our N.L. page and we are printing it full size so everything is readable without a magnifying glass. Thanks, John.

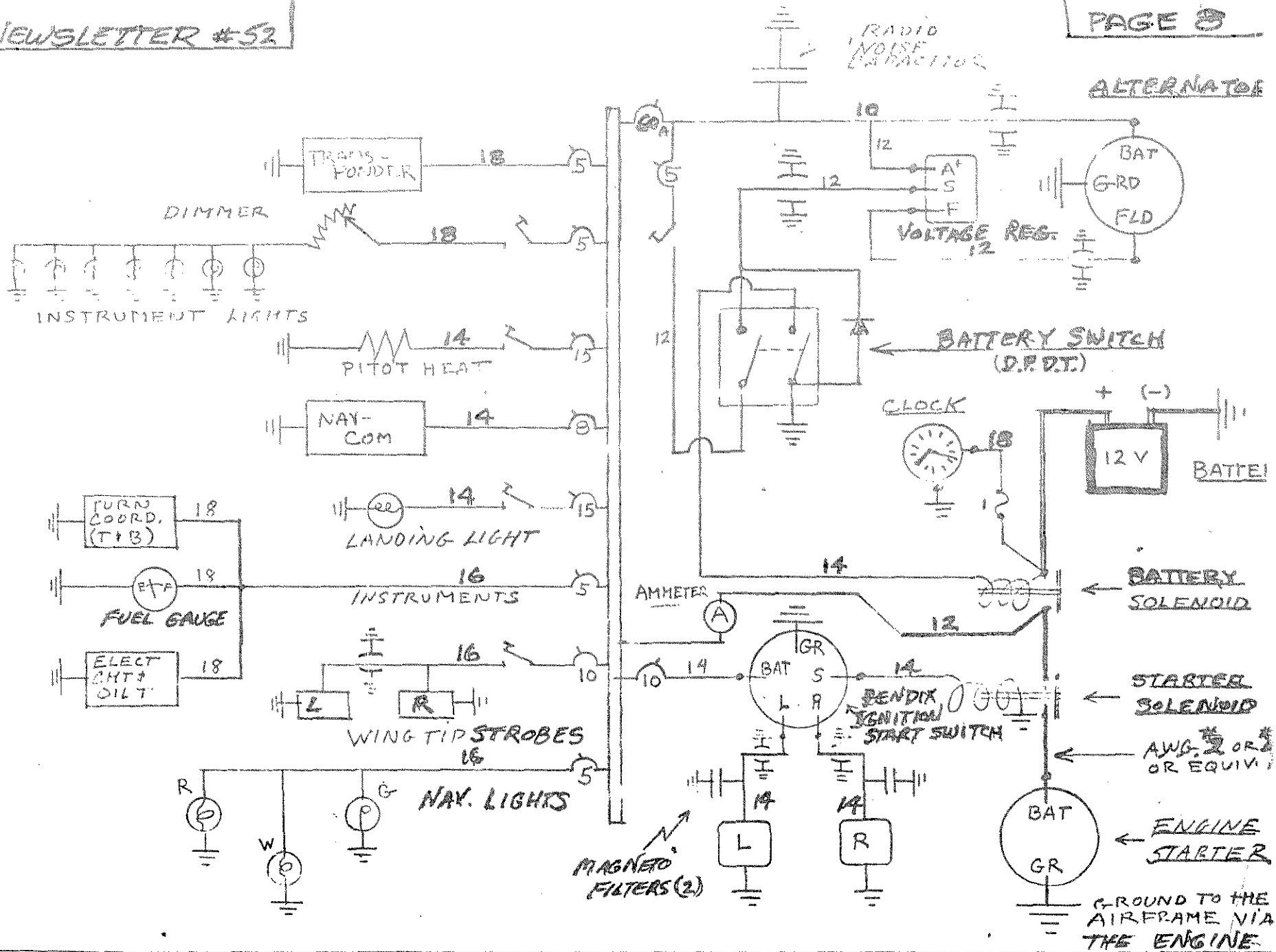
And thanks, Tony, too. Tony is also a member of our M.A.S. and his fine article each month in Sport Aviation is a gold mine of information. His book is even more so. I would strongly recommend that each one of you have a copy of his book in your shop library. It's an authentic reference on a wide range of subjects and is profusely illustrated. It's no 3rd hand re-hash of some WWII training manual. Give yourself a birthday present of Tony's book if you've been wanting to do something nice for somebody lately.

(SEE TONY'S AD IN SPORT AVIATION)



T-18 DWG #733  
MODIFICATION  
DIMENSIONS FOR 160HP  
IO-320-B1A, B1B, B2A, B1C & B1D  
DYNAFOCAL RING FABRICATION  
- USING 50401-3 MOUNT BUSHINGS

CHECKED BY B. C. ROEMER & JOHN SHINN



- CIRCUIT BREAKER
- FUSE: 1 AMP
- SHIELDED WIRE
- ALTERNATING ARC DIPOLE
- S.P.S.T. SWITCH
- MAIN BUS: 3/8" COPPER
- WIRE GAUGE: AWG

T-18 STANDARD WIRING  
 12V ELECTRICAL SYS  
 JOHN WALTON .. ..



How many times you wished for an inspection  
pening to your straitjacket trim screw track  
ssy or to lubricate it.

WITHOUT DISTURBING YOUR STRUCTURE INTEGRITY,  
THERE IS NO NEED TO REMOVE RUDDER & FIN  
TO INCORPORATE INSPECTION OPENING.

USING ACTUAL SIZE SKETCH SHOWS FOLLOWING  
THE SEQUENCE OF OPERATIONS LISTED YOU CAN  
AVOID MISMATCH HLS.

MAKE DETAIL DOUBLER FROM .032 2024-T3 TO  
OUTSIDE PERIPHERY & INSIDE CUTOUT ONLY.  
MAKE DETAIL DOOR FROM .032 2024-T3 TO  
OUTSIDE OUTLINE & (4) #40 HLS FOR NUTPLATE SCREWS.

POSITION DETAIL DOOR ONTO DOUBLER, SPACE EQUALLY  
ALL AROUND CLAMP & DRILL THE (4) HLS THRU DOUBLER.  
TAKE DETAIL DOOR ONLY, POSITION ONTO 510-10 FAIRING  
ABOUT MIDPOINT BETWEEN STAS 191.75 & 199.75, WITH  
PENCIL MARK OUTLINE OF DOOR CUTOUT.

TRIM CUTOUT TO PENCIL LINE USING #40 DRILL A CHAIN  
OF HOLES, CUT THRU WITH HACKSAW, RASPERED BOTH-WAY STONE  
OR HALF ROUND FILE, FINISH WITH FINE EMERY CLOTH.  
POSITION DOOR TO CUTOUT TO MATCH OPENING, SHOULD  
NOT BE MORE THAN .002 CLEARANCE. ALL AROUND.

LAYOUT & DRILL (14) #40 RIQUET HLS ON 510-10 FAIRING  
ONLY FOR DOUBLER ATTACHMENT.  
WITH DOUBLER & DOOR ELECTED TOGETHER POSITIONAL  
TO FAIRING CUTOUT, SPOTMARK FROM FAIRING TO DOUBLER  
(14) #40 RIQUET HLS.

REMOVE DOUBLER & DOOR MESSY TO BENCH & FINISH DRILL  
FROM SPOTMARKS (14) #40 RIQUET HLS.  
DIMPLE (14) #40 100° ON FAIRING & CRYS ON DOUBLER.

OPEN (4) NUTPLATE SCREWS HLS TO 5/32, ATTACH NUTPLATES  
WITH 8-32 SCREWS & FINISH DRILL (4) #40 EA. NUTPLATE THRU  
DOOR FOR RIQUETS, REMOVE NUTPLATES & CRYS  
CLEAN UP, PRIME & RIQUET NUTPLATES TO DOOR.  
POSITION & RIQUET DOOR TO SKIN.

ON DETAIL DOOR OPEN (4) 5/32 SCREWS HLS  
& DIMPLE ATTACH DOOR TO FAIRING WITH  
8-32 FLAT HEAD SCREWS.

SEE SKETCH PG

FOR SALE ITEMS: Pete Beck, 5972 Jan Mar Dr., Falls Church, VA, 22041 (703/  
578-0484) has a 2.5" longer gear, tapered version, split gear (2 pc) design  
as per Lu Sunderland, Heat treated, welded together, ready for mounting.  
\$350 +shipping.

Darwin Franklin, 510 Oxford Park, Garland, TX, 75043, has a  
standard width fuselage (skins and formed bulkheads only, clecoed together)  
and an unused set of plans for sale at his cost. No time to complete because  
of his new business. \$600 call him at 214/ 270-8393 evenings or weekends.

Pat Keller, 5446 Connecticut Ave., La Mesa, CA, 92041  
now has a 180 lbc & c/s prop in his T-18, so no longer needs the Sensenich  
motor finish 67x68 prop he had on it when he had a 125 GPM in the airplane.  
Will sell for \$395. He also has a Narco transponder for \$150.

John Phillips, 3130 S. Rose Ellen Rd, McAllen, TX, just  
bought a flying T-18 so he now wants to sell his project and plans. Has mailing  
address is P.O. Box 546, Allen, TX, 76516 and I don't have his phone no., but  
it can be gotten from the McAllen opt. (see P.S. note for price & details)

John Henry, Box 292K, Natchitoches, LA, 71457, has installed  
electric flaps in his T-18, so he has a complete flap handle assembly that  
he will sell for \$65. His phone no. is 318/ 352-5702.

Kevin rudder cables outboard: Steve Rite, 5208 Astoria, Amarillo, TX, 79109.  
writes: "Dear Dick, Here is a sketch of how I hooked up my rudder cables when  
moving them outboard. I slipped a 5/8" O.D. tube inside the rudder pedal tube  
and will hold them in place with two long rivets. I drilled a hole thru the  
tube at an angle, so that the cable will be in a straight line to the pulley  
behind the dash frame. I welded a piece of bushing stock into this tube and  
fitted it with an eyebolt (A143-11). This eyebolt connects to the rudder cable.  
I did use a longer barrel on the turnbuckle (AW-153-16L). The standard cables  
Ken Knowles supplies are fitted with short barrels. The extra length (about 2")  
is just about what is needed when moving the cables outboard. (See Fig. 1)

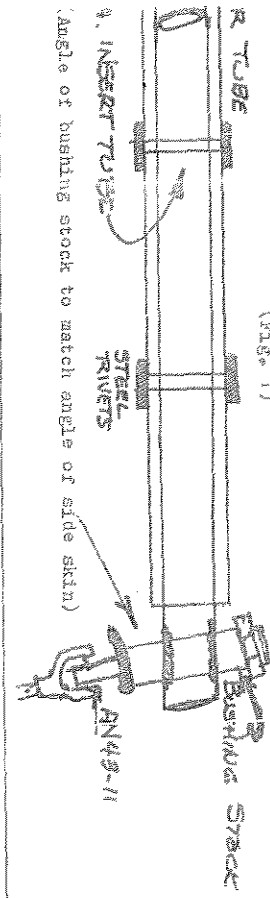
At the rear bulkhead (#574) I used three pieces of 3/4 x 3/4 x .063 angle  
extrusion to make the pulley brackets. (see Fig. 2)

where the cable goes thru the rollover frame I used a bored nylon rod for a  
bushing (fairlead). The paper fairleads have such a large dia. that I felt that  
a hole that size thru the frame would weaken the frame too much in the event  
of a rollover. I drilled a 9/16" dia hole thru the center of the 1/2" dia nylon  
rod. I then turned down one end of the rod to fit then a 3/8" hole in the  
frame.

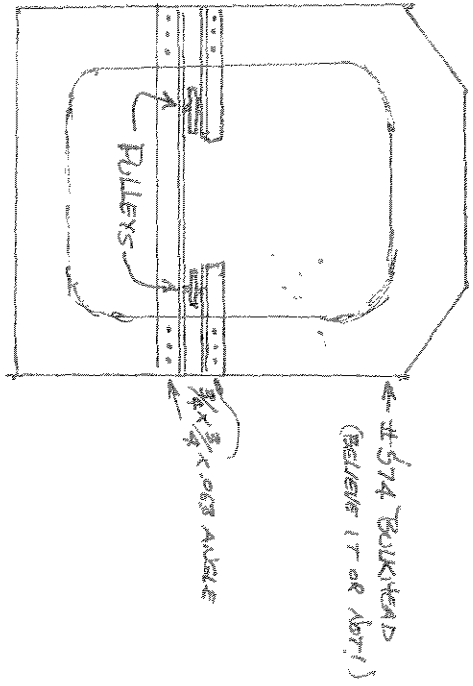
In mounting a pulley just aft of the seat frame, I discovered the cable needed  
to change direction in two planes at that point, turning inward and down, too.  
This required tilting the plane of the pulley downward about 30°. I attached  
the bracket to the side skin with only one cleco and left the pulley seek out  
its correct plane of movement before drilling the second hole to lock it in  
its proper position.

Hope this will be of some help to those moving their rudder cables outboard  
(You'd better believe it will, Steve-Ed.). I remember now why I had such a  
terrible time in drafting...hope the sketches aren't too bad. I think it's  
much easier to make the part than to draw it."

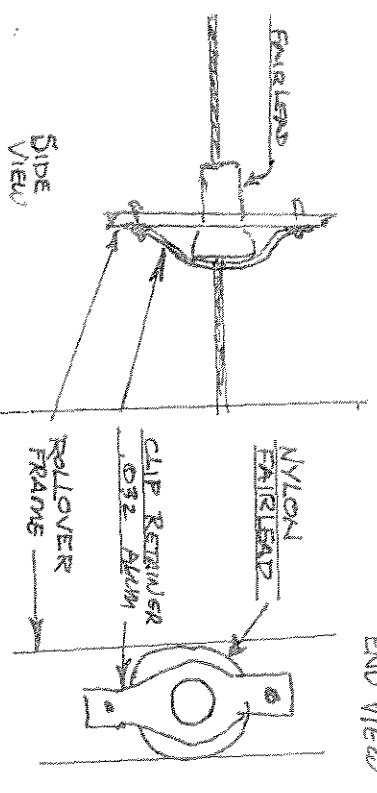
Thanks a million, Steve, and the sketches were very good. You're much too  
modest. (See page 10A for the sketches)



(FIG. 2)

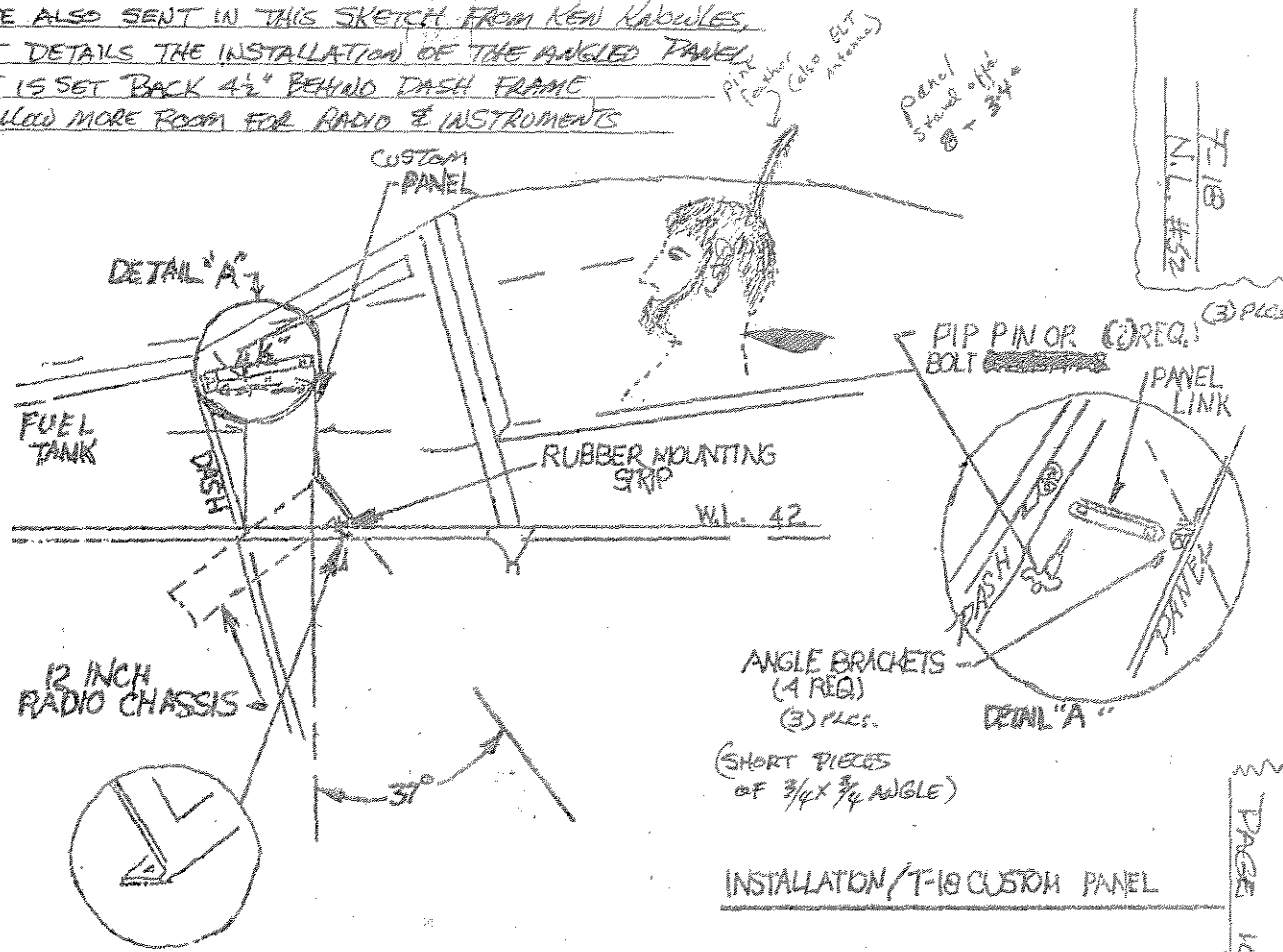


(FIG. 3)



BY STEVE RIEBS

STEVE ALSO SENT IN THIS SKETCH FROM KEN KALOWLES THAT DETAILS THE INSTALLATION OF THE ANGLED PANEL THAT IS SET BACK 4 1/2" BEHIND DASH FRAME TO ALLOW MORE ROOM FOR RADIO & INSTRUMENTS



INSTALLATION/T-19 CUSTOM PANEL

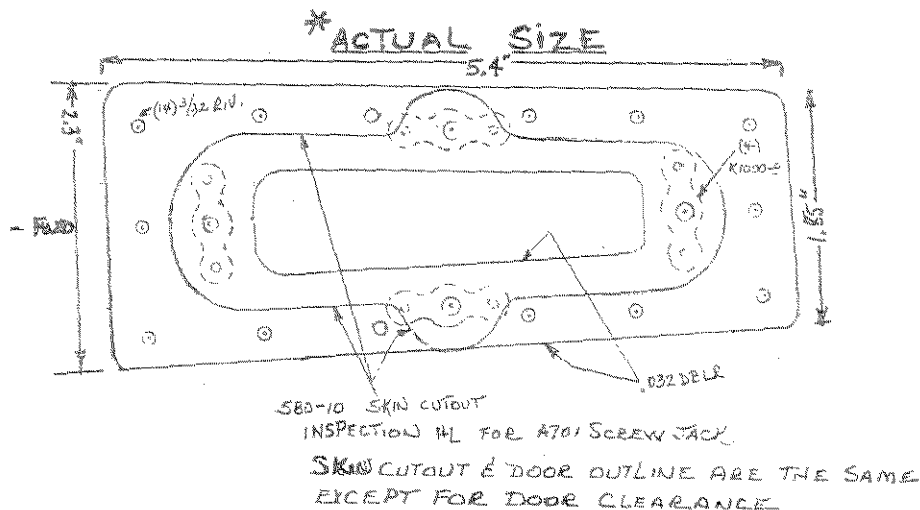
Comment .032 would any go back up to make double

MOVING RUDDER CABLES, CONT'D: Note that Steve's sketches are not to scale. He will soon have a follow on article on what he did about mounting his fuel shut-off valve now that he's eliminated the front tunnel. He was concerned that a shut off valve mounted in the bottom of the tank might cause cracking of the tank around the fuel outlet, due to the weight and vibration. Perhaps an "L" shaped bracket of .040 attached to the firewall would do the job. Bob Dial, and others of you that have moved your rudder cables outboard, what did you do?

Obviously it's a whole lot easier to move the rudder cables on a project when it's being built, and you can get the bottom skin off, than after it's flying. John Hardy's was all nailed together when he decided to move the cables, so he measured the height of the rudder "bar" above the lower corner extrusion and marked it on the outside of the skin. By tying a string to his rudder mast and bringing it forward to the mark for the rudder bar and taping it in that position he could accurately locate the height of the pulleys at the various stations. He allowed for bringing the cable on top of the #592 and #596 bulkheads, of course.

JOHN KENTON'S DRAWING FOR INSPECTION DOOR: (cont'd from page 9A)

\*Note: John's drawing sent to us was labeled "Actual Size", but since we have to reduce the dwg. size we have added some of the dimensions. I believe you can determine other dimensions by comparison with those shown.



ALMOST READY TO FLY? How many of you out there are reasonably close to being ready to fly? Some that I know of are John Hardy, Natchitoches, LA; Paul Kirik, Moline, IL; Ken Rhoads, Peoria, IL; Frank Spedecker, Honolulu; Stan Billotte, Excelsior Springs, MO; Bob Roper, Garland, TX; Dan Culhane, Windsor, CT; Lou Falconi, Seattle, WA; John Ford, Grand Prairie, TX; Harlo McKinty, Lincoln, NE; Ed Poe, Phoenix, AZ; Lea Skillman, Parkersburg, WV; A. H. Sivaslian, Newport Beach, CA; Rik Keller, La Mesa, CA; Fred Swafford, Arkadelphia, AR; Tom Kerns, Arlington, TX; Francis Richardson, Denison, TX; John Kenton, Renton, WA.

There probably are others. Would like to hear from you if so! PLEASE!

T-18s recently flown: Curtis Kreps, Willmar, MN (date?); John Walton, Houston, TX, (Jan. 3rd); Harlan Cavin, Miami, OK (Dec. 18), Randle Woolaway, Cassville, MO (Nov). Anyone else? Robert Furrer sent me a note some months back that his had flown for the 1st time. Also, Lee Reilly, Wagoner, OK flew in early fall.

People item: Dan Culhane came down to Dallas several months back and bought Keith Cobb's project after his ins. co. settled with him and he was delighted to find a project so near to completion with such excellent workmanship. Keith and Judy made a contribution of \$100 to our MAS fund to show their gratitude for the newsletter getting the two parties together. We, too, are grateful for their generous contribution. That'll buy about 3 boxes of the paper we use.

Comparing Insurance costs with other builders: I found my costs of insurance were relatively low. My liability coverage is 100,000-300,000 and I also have comprehensive coverage for fire, theft, windstorm, etc (not in motion) and the whole thing costs \$360/yr. How does that compare with premiums in your area? About a dollar per day. If you are interested in getting a quote, let me know and I'll put you in touch with my agent. I called the co. that EAA had written about in Sport Aviation and their quote was 'way over \$500 for the same thing.

Good Guy Award: My nomination for the good guy of the year goes to my old friend, Dean Cochran, of Broomfield, CO. My one and only wood prop got damaged in the hangar just before OSH and knocked me out of flying my T-18 up there. I almost made, tho'. Dean generously offered me the use of his spare prop and if I had had just one more day to work on re-fitting the spinner I could have made it. I did get to go to the SW regional at Kerrville, tho'. We've got a lot of good guys in our T-18 MAS. Steve Eby, Wichita Falls, TX, is another. He sent his prop down to as soon as he heard about it, too. My old buddy, Ray Hegy, of Marfa, TX, repaired my old one, so I now have a spare. A lot of the prop makers run from 6 to 9 months behind on orders, so a spare isn't too bad an idea. That's one thing that appeals to me about wood props. The other is the price. You can have two or three wood props for what one metal one would cost.

"Don't Do" Item on the #526 Fitting: The #526 fitting is the "backbone" fitting that goes down the center of the airframe on top of the gas tank. It receives the top hole of the landing gear at the front end and ties the roll bar frame to it at the rear. It's a good idea NOT to pre-drill the hole that mates with the landing gear until you have the landing gear in position, or you may likely have a mis-match of holes. Center punch the hole location and then when the gear is in position you can peek thru the hole in the gear and check for alignment. If you've already drilled it and the holes don't match all isn't lost. You can drill the hole well oversize, make a steel plug to a press fit in it and then drill the hole in the plug, using the gear itself as a drill guide. (The hole in the plug would not be in the center of the plug)

Most everyone now agrees that it makes a much neater job to bend the flange on the skin over the tank and slip the windshield in behind it, instead of putting it in front and making a separate flange piece to install in front of the plexi. There's only one problem with doing it that way: There's not quite enough room between the center tube of the rollover bar and the over-the-tank skin to accommodate the plexi and seal. The solution is to move the center tube down and back to allow clearance. To make this work you'll have to re-make the little angles that fit on the aft end of the #526 fitting, so the holes that mate with the roll bar are moved downward (about 1/2"). Or maybe you can come up with something clever to keep from remaking the little angle.

Coming up on the next page is an article by B.C. Roemer that'll raise T-18 stock a few more points in your esteem.

News Letter Item?

B. C. ROEMER

Let's talk about the "Hot" landing T-18.

A lot of the builders probably have the same feelings that I had when building -- that perhaps I was building an airplane that I couldn't handle -- Just too much for my experience level and that I'd never be able to hack it. My advise -- Forget that line of thought. This doesn't mean to go out, hop in, fire up and off you go when it's time. No. 1: Have some one experienced test fly the airplane. Then get your self checked out in it before you solo. I did this and it sure beats the high pucker factor -- Wet palm route. T-18's are very easy to fly -- when you know how. Anything that goes 200 MPH sure is going to fly different than a J3 that goes 80 MPH. And another thing -- After you had your dual in your T-18 and you make your first solo takeoff -- concentrate on only one thing. -- Flying the airplane away from the earth, period. Get altitude and then feel it out and play around a bit -- I definitely wouldn't advise take off, getting 15 to 30 feet high and landing again. Pulling the power creates a vast control feeling change and gets you slow, sloppy and settling all at the same time. This is not the place to be learning how to fly a T-18. Try this in the airplane you are used to flying and see how you like it. Sure, some people may disagree but it just ain't the place to be learning about anything. Add to this the unknown of a new machine (and anything can go wrong -- I had the elevator control jam at 20 feet on take off, because a mike fell in between and blocked it- was flying with cover plates off) and you really have to do a lot of sorting out in quick time to save everything.

How hot is the T-18 landing?

Let's take some cases. Landing normally full stall is no sweat. Wheel landing are fine -- they burn up a lot more runway and you got to be more precise as to feeling for the ground or you get bounding expecially with hard tires but works well when you get it down pat.

How about landing with only one brake? A number of people have done this -- Most times there was not a problem. Of course, landing with no brakes will use a lot of runway but should give no unusual problem.

What's the worse condition possible to land a T-18?

How about one wheel locked dead and one wheel zero brake? Want to ride through that condition? First you're probably saying how could that condition ever exist in real life. Rest assured, it can and did.--

I landed with zero brake on the left and locked brake on the right on bare blacktop.

The result was one worn out tire, a mild ground loop and the tying up of the main runway at downtown St. Paul, (a jet port) in Minnesota.

Our home port is grass and is not plowed for snow. We had about 5" on the ground and normally this is no problem, however, the snow gets in the drum brakes we have and the water soaked linings give no braking.

I knew the wheels were full and figured they would freeze in the air. (Temperature was below freezing), but they always broke loose upon landing in the past but not this time.

The left wheel broke as expected but was iced up and the zero brake.

The right never broke and created a nice curved black skid mark until we ground looped. Not violent, but mild (1/4 turns). The wing didn't even come up. I had to find some heat to warm up the brake drum to unfreeze it before I could move off the runway. When I did, the locked wheel was worn through 3 plys of the 4 ply tire.

So now, no one has to be afraid of the "hot landing" T-18.

There's not a lot you can do in this situation except opposite rudder and wait for the ride.

*Doesn't that make you have even more confidence in the world's finest sport plane?*  
Dick

Sincerely,

B. C. Roemer

**MORE FOR SALE ITEMS:** John Chandler, 12513 Madely Ln., Bowie, MD, 20715 is reluctantly having to sell his T-18. (serial #645, N5SP). Some of you saw this beauty at OSH, painted cream and yellow in polyurethane paint. Here's the vital stats: Powered by IO-320 fuel injected B1A, 160 hp, 140 hrs. since 1st time overhaul. All new parts in engine except crankshaft, has Dean Cochran cross-over exhaust. Prop is Sensenich 68 x 78, wood with metal L.E.s, will turn 2900 rpm, Rattray cowl, Brock spinner. Has brakes both sides. Strobes. Ken Knowles wheel pants and fairings. Landing lite in wing. Electric trim. All new gyros (will certify IFR). All vernier controls. Avionics: 720 ch. King 175B, 360 ch. King 170, King KA-20 switching panel, 3 lite marker beacon, transponder. King 201C and 201B VOR heads in panel; G meter, fuel flow meter, manifold pressure ga., EGT, plus all other st'd inst'ts. Interior is vinyl suede with velour trim, tan and white dash, all post lites. Has 70 lbs. lead-vinyl sound-proofing tape installed, plus vinyl-foam in cockpit. Price is \$17, 950, which he says is negotiable. His phone # is 301/ 344-6787 or 262-9769. (That's a good price for an airplane as well equipped and built as this one, friends)

**John Kleber**, 215 Sheffield Dr., Danville, Ind., who also flew his beautiful N58K to OSH last year, is building a folding wing for his bird and will sell his present wing (standard) for \$3000, plus crating & shipping. It is complete, ailerons, flaps, etc., just like it came off the airplane. It is also painted. (That's another good buy, chums. If you have a fuselage pretty well under way this could help get you in the air a lot quicker, too).

**Frank Lanier**: P.O. Box 195, Colorado City, CO, 81019, has a Cessna flap motor for sale for \$30 plus shipping. He's decided to use an American Yankee flap motor instead. He also has a set of fuselage form blocks that he'll let anyone use, as well as part of the rib form blocks. Frank just retired and is building a house and 2 T-18s and really enjoying life in the mountains.

s another enthusiastic testimonial to the performance of the T-18 by a pilot who recently flew his:

light report from Randle Woolaway, the owner of Timberline Airpark, Cassville 5625, dated 11/4/80. Randle is a semi-retired FBO, with his home and shop on the very edge of the Ouchita Nat'l Forest in SW Missouri. He is a "one-way" for John Thorp and formerly built and flew a Pitts off his strip, which is a one-way turf runway that slopes upwards about 20°, so unless the wind is 25 kts. you takeoff downhill and land uphill. Randle is also well known for his fine work rebuilding engines, and airframes. Near Dick, I have just now gotten the airplane so it will fly handoff. I flew it 2 1/2 hrs. to date. First it was nose heavy and left wing heavy. I had an engineer friend figure the wt. & balance for me and I had to add 8 lbs. in the tail, which took care of the nose heaviness. My E.W. is 1026 lbs. and the G.W. is 1632 lbs. (He has an O-360 Lyc. & c/s prop).

gets off our field in 300 to 400 ft. and climbs like a homesick angel. It takes 180 easily and will indicate 210 wide open and it stalls at 60 IAS. It doesn't have any soundproofing in it yet and the noise is terrible, but my ears fit good and doesn't seem to be leaking. The air vents work great and so does the heater. I have landed it with a tail wind and also in cross winds. It is very easy to handle on the grass strip or the pavement either. The main prop is 72" dia. and has 6 1/2" ground clearance with the airplane in its flight position (standard gear). Has about 14" clearance taxiing. This is about 1" further forward than most Thorps I have seen.

don't have any fairings made for the landing gear yet or any wing fairings. I got some from Ken Knowles, but they didn't fit over my brake line fittings. I'm very proud of the airplane, prop, and engine combination. I also have a lot of trim and so far I'd say it's a "must". I am sending you a picture of it and wish you could get back up here and see it. I wrote John Thorp a letter about the airplane, the weights, and changes I've made, but I haven't had time to here from him yet."

His N # is 5585X and I'm sure you'll see it at OSH this year. He has a beautiful paint job. It's basic white, with deep royal over the cowl back to the windshield. The royal blue stripe flows back to the tail in a gradual taper. A light blue tapering stripe just below goes back as far as the seat and begins at the front of the cowl, with the dark blue diamond at the front. Another tapering darker blue stripe runs from the tip of the prop forward and around the front of the cowl under the spinner and it's the lighter colored stripe. Matching stripes on the top of the vertical stabilizer and wheel pants set it off.

PAINT SCHEMES: While I was writing this, a good friend dropped by, that is an industrial designer and commercial artist and illustrator and I was showing him various T-18 pictures. He was highly complimentary of quite a number of them. He explained the basis for his reasons and in the process of explanation led me into the basics of art, as applied to modern industrial design. It's all about fooling the eye as to what it sees. The idea is to draw the eye away from the parts of the airplane where lines and mass are not truly pleasing and toward the eye to areas that the eye sees as pleasing. Being a pro at the time he instantly picked up things that most of us aren't really aware of. The basic profile of the T-18 comes thru as too short for its depth, the major areas of mass out of proportion to adjacent areas. That the nose looks too long and out of balance with the area from the firewall to the baggage compartment. He said that this was why a wide stripe (or group of stripes) beginning at the very front of the cowl breaks up what the eye sees as it runs back the full length of the airplane, tapering in proportion

to the vertical thickness of the fuselage, makes the entire profile appear perfectly balanced to the eye and makes it appear longer and lower as well. The miniature stripes on wheel pants and the top of the vertical tail are in the same horizontal plane and complete the illusion and help the eye to not see them.

It was quite an interesting session and very educational to me. He also told me how the pros use combinations of color to soften or accent what the eye sees. In the process I found out why my own paint job always looked so ugly to me. He said a very few people have the natural ability or training to design an aircraft paint scheme and he's probably right. As he put it, "You didn't choose a rank amateur with his first ever design when you chose the designer of your airplane you chose to build, did you? Well, don't do that with your paint job, either. At least go to some art teachers, (artists) with the blank profile of your airplane and get their ideas on stripes and colors. Above all, don't throw a sketch at your wife or girl friend and tell them to whomp up a paint scheme for you. If you have a local aircraft painter go get his ideas, too. At least get his comments if you have several schemes you're considering. He is a pro, also, and experienced in colors, proportions, etc. And when you zero in on what is perhaps your final design or two, show them around to several friends and get their honest opinion--only don't tell 'em its yours, if you want their honest reaction. Tell 'em it's a friend's airplane. He also said that if you have a model builder friend, have him build you a model and take colored paper and paste on stripes, etc".

There was much, much more than what I've put down here. I tried to get him to sit down and write a few pages and do some object illustrations, but he said he didn't have time and besides that the people that already had paint schemes different to his suggestions would probably get their feelings hurt if he pointedly criticized certain points. He's probably right. Anyway, maybe I can corner him again one of these days and fire up the tape recorder for more of his observations. Sure wish I'd talked to him before my airplane got painted.

Speaking of those with natural ability, John Walton's 12 year old son, Lee, designed the paint job on John's airplane and it truly is excellent. It also is basic white, with two contrasting shades of blue used to make a wide tri-color stripe running from the very front to rear in a gradual taper. Very simple, but most effective. Oh, well, some of us have got it and some of us don't. Guess I'll have to get young Lee to design my next paint job.

Most of the builders with very attractive paint schemes I talked to at OSH have used either DuPont's "Imron" or Sherwin-Williams "Acrolid". Both are polyurethane two-part paints and retain the "wet" look without chalking. What other brands and types of paint have you out there used and what are your comments? I'm told that paint and related materials for a T-18 paint job (with either of the two brands above) will cost about \$400 at today's prices. What about some of the acrylic enamels that some of you have used. They are almost universally used on automotive applications it seems and are probably less expensive. In our area a professional aircraft paint job on an airplane the size of a Cessna will run from \$1200 to \$3000. I think this is too steep for most homebuilders and a lot of them do the prime coat themselves and get it all ready for the final spray coat before taking it to one of the pros, thus cutting the cost very drastically. If you haven't done a considerable amount of paint spraying it's not recommended that you cut your teeth on the final coat on your T-18. A good many boys go to a local body and paint shop and make a deal with one of the pro painters and that makes pretty good sense to me. They'll have their own production type spray gun, too, not one of the Mickey Mouse ones you get when you buy a compressor. That's \$125 to \$150 you won't have to invest, too.

DON TAYLOR DOES IT AGAIN! No doubt most of you have either read about it or heard about it by now, but just in case you haven't..... Don and his T-18 arrived back safe and sound on the Big Island of Amur-eeika, as we used to say when sighting the west coast. You really can't comprehend what a tremendous feat it was to fly and navigate an airplane of that size over that distance unless you've flown out there. In many ways it was more impressive than his round the world flights. The distances involved on some of the legs and the challenge of hitting a tiny target hundreds of miles away is no little cut and dried thing. When I flew out there we used Doppler to navigate by and periodically checked our position and updated the Doppler by taking Loran fixes at 300 mile intervals. Don had no means to detect his deviation from track until he was within ADF reception range of his target and ADF reception in the Pacific is about  $\frac{1}{4}$  on a scale of 1 to 10. We had to maintain a compass accuracy of one tenth of one degree. No light airplane compass system comes within one or two degrees of accuracy and it certainly is not possible for the world's best pilot to fly that accurately for hours on end, much less be making constant power adjustments, tuning the radio, plotting positions, figuring fuel burn and reserve, and a dozen other things. There is no accurate way to check the wind effect, drift angle, and ground speed. It's all just a guess until you get close enough to pick up the beacon or VOR and little errors can add up to a big miss. One degree is 1 mile wide at 60 miles, so a 1° error on a 1200 mile leg is 20 miles. If your error is  $\frac{3}{8}$  you miss by 60 miles. Stir in a bad guess on wind direction by metro and you could miss by over 100 miles! If the ADF or VOR went kaput about that time it could get pretty sticky.

I called Don a short time after he had gotten back from Australia and I told him my hat was off to him for even being able to sit in the airplane for 17 straight hours, much less do everything else required. His last leg from HNL to the U.S. was a cliff hanger. He had 15 gallons left, but it was spread out so that he didn't have an accurate indication and he was afraid to push it the last 40 miles and so landed at Half Moon Bay instead of OAK.

The U.S. denied him permission to use Johnson Island (west of HNL), so he flew to Fanning Island, and then to Penrhyn, Pago Pago, Fiji, Nandi, New Caledonia, to Brisbane, then flew to Sydney, Melbourne, and back to Sydney. While in Australia he received word of his mother's death, so flew home for her funeral and then flew back to Australia to begin the return trip. His route home was over the Tasman Sea to New Zealand, to Tonga, Pago Pago, and then to Penrhyn, Fanning, Honolulu, and the U.S. Whew!!!

Don said some of those ADF "beacons" he hung his neck on were frequently a wire strung between two palm trees, with a wire running down to a shack in the center. A gasoline powered generator was the power source in several cases. He said he could usually pick them up two to three hundred miles out (unless precip static drowned them out) and one he was able to get 1000 miles away. Some of those islands are pretty tiny and very hard to spot when there are lots of cumulus clouds about to cast shadows, making it easy to miss seeing it. Don said he nearly did miss one and he was only a few miles away. Wake Island is one of the larger ones out there and you could put the entire airport inside of Wittman Field OSH.

Weather becomes more of a factor as you approach the Equator. The Inter-tropical Convergence generates widespread thunderstorm activity at certain times of the year.

Don's going to write a book about his trips and it should be a real pulse pounder. I thought Clive Canning's book about his T-18 flights to England and back and around Australia was the most exciting thing I'd ever read and I'm sure Don's book will be equally gripping.

Anyway, Don, our sincere congratulations for a tremendous achievement.

You might or might not know that Don's seat was a gas tank. He was over at Ken Brock's plant to have a tank made to go under his seat. Describing the tank to Ken, he said, "Make it stick up about this much above the carry-thru bulkheads in that area", and he held up a thumb and forefinger to illustrate. Ken didn't remember just how much Don wanted, so he made it a wee bit bigger. That tank held 15 gallons, the amount he had left at Half Moon Bay! And he said Ken refused to take any pay for the tank ...one of the many fine EAA types that pitched in to help Don.

I understand that Don's plane may go to the Smithsonian Museum, to join other famous planes of history and it rightly should.

Perhaps some people don't quite understand how such flights demonstrate the exceptional quality of the T-18. For one thing it shows that the T-18 is a rugged airplane, is a stable instrument platform, is capable of flying in almost any kind of weather, can carry a huge overload of fuel, climb to altitude, etc. It confirms what we all know, that the T-18 is truly one of the great airplanes of our age. When we stop and remember this little airplane was originally conceived as plain jane little open cockpit airplane, that was designed to be powered with the O-290-G engine, with no gear fairing, no pressurized cowl, canopy, or flaps close to twenty years ago. Now it has evolved into a high speed, sophisticated airplane capable of spanning oceans and continents. The fact that it was capable of accepting these major changes is quite a tribute to John Thorp's skill and knowledge of his craft.

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They Never Get Too Old Dept.: Here's a letter from H. E. (Ace) Hibbard, of Fayette, ID, that you'll enjoy.

"Since I am out of the crop dusting business and just turned 72, I am trying to get started on #1313. Even tho' I have known John W. from the time we started engineering, I have been too busy with my own flying business to get into EAA. Thorp and I spent many hours in my Valie Monocoupe back in the early '30s looking for backing to build some of his outstanding designs. I have flown his Skyscooter and have found nothing that flies any better. (Just wait until he flies a T-18)

I have found a fine group of EAAers here in the Treasure Valley and we are planning on forming a chapter." Very truly yours, H. E. Hibbard  
His license no. is 16050, A & P # 15314

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Lord Mounts: Note from Harlo McKinty, Lincoln, NE. "Dick, re the numbers for the Lord mounts for the Lyc 180 for those using the larger size ones, the number is J-9612-8-6-69. I assume the last two numbers are the year of mfg. These mounts come one side smooth, the other side "stepped" (in other words, two different diameters on the same rubber biscuit). The stepped side goes where the stress is...backside of the ring on top and frontside of the ring on the bottom. These mounts have a jelly type bushing that fits inside. Geo. Leider told me that John called these out for use in the Derringer and John Thorp told me that the engine probably would have less vibration.

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I stopped off in Moline and sat in Paul Kirik's bird....he sure helped things by lowering and rounding the tunnel. It almost seemed like a wide body.

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Making Templates: We've covered this before, but we continue to get letters indicating some of the builders don't quite understand. In making the template size a rib or bulkhead (for the purpose of making an exact size duplicate form block) you must take off the skin thickness of the part being formed and you must take off this thickness completely around the entire form block (and template).

VOLTMETER-AMMETER: Don't know whether you noticed the article in the Oct. '80 issue of Sport Aviation about the miniature voltmeters and ammeters that are available from Radio Systems Technology, 10985 Grass Valley Ave., Grass Valley, CA, 95945 for \$16 for the kit. I just received mine and am delighted with them. They take up practically no panel space and are feather light. I would strongly recommend you read the article again, particularly paragraph #2. Most A & Ps nowadays agree that you probably need a voltmeter worse than an ammeter, now that we have alternators and transistorized voltage regulators. I am going to leave my present ammeter in the panel, but rewire it, so that it functions as a loadmeter. Incidentally, the pictures of the little meters are very close to actual size (about 1" x 3/4"). I plan to mount mine vertically, side by side.

Clocks: Aircraft and auto clocks are notorious for going sour pretty quickly. I just bought one of the newer liquid crystal type clocks. It's wrist watch size and can be attached to the panel with velcro tape. It's battery powered and costs about \$30. I make mine do double duty, also using it in my airport car. When I fly I always set my wrist watch to 12 o'clock just before rolling on takeoff. This gives me a quick and easy check on elapsed time to compare fuel burn with gauge indication and for ETA's, etc. If any of you want one of these and don't know where to order it from, drop me a post card & I'll order one for you. The size is about 2" x 1" x 3/16". (Don't send me any money, Plz).

T-18 Annual Dinner at OSH: John Walton sent me a copy of a letter that confirms our reservation at Butch's Anchor Inn again during the 1981 convention at Oshkosh.....Date is Tuesday, August 4....If there are any questions after you get to OSH, contact Stu Tribbey at Butch's Anchor Inn (414) 233-1733. We had a full house last year, so get your reservations in early. Send Geri Knowles a card and tell her how many of you will be there. Her address is 5398 Trail St., Norco, CA, 91760. We all had a great time getting acquainted with other T-18 builders last year, so don't miss the fun. We'll again have the T-18 'Family Album' there. This year we'd like to start an album that has a color picture of each T-18 with its builder beside it. If you have a good shot of you and the airplane please send it in, whether you'll be at OSH or not.

Cockpit size: I continue to get letters from builders (or prospective ones) that wonder how they'll fit in the cockpit. Some are well over 6 ft. tall and weigh over 200. Some are very short. Put your doubts to rest, gents. There are several tall and big guys flying their T-18s and they have no problem fitting inside. I also know of several that are around 5'6" that simply moved their rudder pedals back a little and made a bigger cushion for the seat.

Flight Report: James T. Ciciora, Box 1202, Vineyard Haven, Mass, 02568, writes "I first flew my T-18 on 11-28-78 and am very pleased with it. I have a Lyc. O-290-G with a Sensenich prop (66 x 74). It is too much pitch for the engine. I'd like to change props with someone that might need more pitch and would like to trade. I'd like to go back to about a 68" pitch."

In March of 1979 he had 5 hours on it and liked it better each time he flew it (who doesn't). His paint scheme is basic white. It has a double stripe down the side of the fuselage, one blue and one red. Both stripes sweep upward at the tail and widen out. His N no. is 64628. At that time he didn't have wheel pants installed. The canopy was tinted green and the cowling appeared to be a Thorp type. His pitot tube is mounted in the vertical fin. The prop he spoke of was wood, with what appeared to be fiberglass tipping. Each of the outer wing panels had a fore and aft stripe. His comm antennae was mounted just ahead of the fin on the top skin, which seems to be a nearly standard location. He had an OAT gauge protruding from the windshield and an external canopy latch handle. A Key canopy lock is located at the front left corner of the canopy.

Another Flight Report: Ed Rogers, 2512 S. Mulberry So., Sioux City, IA, 51106 has serial # 674. He writes, "I finished my T-18, N71ED, in July of 1978. As of Sept. '80 I have put 54 hours on it and I love it. I spent 10 years building it. It just flies beautifully. It's powered by a Lycoming O-320, 160 hp. and I have a Sensenich wood prop (#W66LM). Top speed in level flight is 164 mph at full power @ 2700 rpm. True airspeed at that power is 174 mph. My empty weight is 948 lbs. It has a full panel, with 2 comms and 1 nav and I also have a transponder."

Ed also has his pitot tube on the top of the fin and his comm antennae just in front of it. He appears to have the modified tail and a Scott tailwheel. He has a Rattray cowl and wheel pants and his spinner is unpainted. Most of his airplane is unpainted except for a very wide red stripe around most of the cowl, which tapers back to a narrow stripe at the tail. A wide whitestripe goes over the tank area and it also tapers back to the tail on top of the red stripe. He has very neat looking gear fairings (also unpainted). His external canopy latch looks like the one in the plans.

Earl Ody: who lives at 28903 Gunter Road, San Pedro, CA was serial #480 and his airplane is N8952. He wrote about another great trip that he and Ollie Smith (IN N104X) took in their T-18s. They went from Los Angeles to Austin, TX, then over to Houston. Then it was up to Oshkosh for the Fly-in. After that it was over to Cleveland, OH, back to Rapid City, SD, Logan, UT, Seattle, WA, then down the Pacific Coast back to home plate in Torrance, CA. All of that in two weeks! Can you imagine how long that would take in an auto and what you'd feel like after it was over? He also says, "We'll be forever grateful for this beautiful flying machine that John Thorp designed for us". That's the way we all feel, Earl. I'm sure many of you have seen Earl's airplane. It's been around quite awhile and still looks superb. He, too, has a very eye-pleasing paint job and interior.

Cliff Matthews: 7832 Olive St., Fair Oaks, CA, 95628 has serial #712 and in early 1980 had put over 100 hours on his bird, N6CM. He wrote that he had just received his Repairman Certificate and had gotten it with no delay from the FAA.

I remember having a nice visit with Cliff at OSH in '79 and having him show me various features of his bird. He had an O-290-G engine in it and a Hegy 68 x 70 wood prop. This gave him a 75% power cruise of 160 mph and it would climb 1500 ft./min. solo. His battery was mounted forward of the firewall. He had an MA3SPA carb on it, too. I remember that, as I had an MA4SPA carb on mine when I had the O-290-G in it. I also remember he had an extra center bar at the rear of his canopy, as an extra guide and hold down I think. He also had it insulated with 3M and that's about all I remember about it, except that it was a fine looking airplane. He also had a Jack Haines fiberglass cowl and he had made his wing root fairings himself, using water based clay for molds and he also had made a nice little fairing at the base of the fin, using the same technique, and he had made a nice little fairing for the tail spring. I also recall his using Ditzler polyurethane paint and his saying something about it being very fast (to apply?). I also dimly remember something about him having a clamp plate for the throttle and his having a Garland Root canopy cover. (I remember Garland telling me out at John's birthday party that he still made 'em, for about \$40 I think). How about an update and a complete report, Cliff?

LEE REILLY: Rt. 3, Box 198A, Wagoner, OK, 74467, is one of my nearer neighbors with a flying T-18 and his report follows. The Cassidy 68 x66 prop is really the equivalent of a 68 x 71-73, as Cassidy measures pitch differently. He must be doing it right, tho', as a T-18 gets with it with his props.

Nov. 17, 1980

Dear Dick,

Thanks for the invite for a fly-in visit. I was going to do just that on Sat. 2 weeks ago, but after several phone calls decided you were gone for the weekend.

I've got 50 hours on the bird now and am enjoying it more each time I fly it. The flight characteristics are much the same as I've read in many pixeps on the T-18.

The plane has an O-320 E2D engine (150 H.P.) with a Cassidy 68X66 prop. (made from a kit) It checked in at 904 lbs. that was with an M-74 blade. It's 15 lbs less now with the Cassidy Prop. That includes all instruments and radio (one KX-145). It's equipped for instrument flite although I don't intend to use it that way. (I like to keep in practice).

I've checked my airspeed using the sectionalized cow pastures around here and it seems quite accurate. So based on that I get a corrected airspeed at 5000 ft. of 188 mph all out. Top rpm is 2700. I generally cruise at 2350, which gives me 158 mph corrected. I burn about 7.5 gph. I would say I'm using about 65% power. It's quieter and more comfortable at this speed.

As everyone says the first flite is a real thrill. I had'nt flown a taildragger for 10 years, being a happy Mooney owner. So I spent several hours of taxi work getting the feel. Then I took it out on the runway for tailup taxi runs. You guessed it I had'nt gone a hundred yards or so and I was flying, even at half throttle. I figured it would have been more difficult to land it from 2 ft. than from a full approach, so I took it on out. At 3000 ft. I felt it out, stalls with and without flaps, etc. It felt as though I had just taken delivery from the factory. No problems. It stalls at 65 and with plenty of warning and straight ahead. The stall characteristics are as good as the Mooney's.

The two things that impressed me most is the climb, initially 1800 fpm full gas and no passenger, and the stall. From some pixeps I had read I expected no warning and a nasty break. It never happened. With full flaps and power it gets tricky but then you have to stand it on its tail to get it stalled.

About the only thing I could say about handling this aircraft that might be difficult for first time operators, is the rollout. Half way through it would swap ends if you're not quick on the rudder pedals. This of course is true on any short coupled taildragger.

The only problems I've had to take care of since first flite was to warp the ailerons, the left wing was heavy, the out side bracket on the wheel fairings, pulled the rivets through the fiberglass and I have yet to make a tailpipe snubber that lasts more than 10 hours.

That's about it Dick, its all been said before, but then anyone who builds (took 5 yrs.) and flies one himself cant help but say it again.

Regards:



P.S. Here's a picture. That paint job was done in the garage. It came out pretty good for a novice.



Lancaster, CA is a hotbed of T-18 activity, with about 9 of 'em flying there now. Here is a flight report by one of them:

Allen Chivers (N18AL) 45103 11th St. West, Lancaster, CA, 93534, writes, "My T-18 has been flying for about 4 1/2 years and I am very happy with it. The comment I might pass on is that the performance is somewhat compromised at both ends of the speed envelop by the 150 hp O-320 and the 68" x 76" pitch prop. I only can get about 2200 rpm (100 hp +) on the takeoff roll, while at cruise I have to throttle back to keep the rpm under red line. I could probably use more prop pitch, but I don't want to compromise the climb performance any more than it is, due to the high (and hot) country I usually fly in.

Cruise works best at 7500-8500 ft at 2600 rpm, which gives 175 mph True, which isn't too bad, but it could be better if I could use all the available manifold pressure at altitude. If I stay up with the T-18s with 180 hp engines and 85" or 86" pitch props I will use as much fuel per hour as they do."

Al didn't say what type of prop he has, whether metal or wood. There are so many variables in a situation like that that it's hard to know where to begin. I was recently having lunch with a pretty savvy FBO friend and telling him about differences in various T-18 performance with same engines, different props, etc. He surprised me by saying he'd found many factory airplanes that supposedly cruised faster or slower than the norm and the very first thing he did was to pull the tach out and check it and in several cases the problem ended right there. If the pitot/static system checked out he'd then swap props. Seems that there frequently is a considerable difference in supposedly identical props, even tho' the pitch at stations checked out pretty closely. His next approach was to go into the induction system and then the baffles. The airframe was the last place he checked out, with high or low aileron rigging the first place he'd look, with flaps next. He said he had no easy answers to any of those questions, but if he had any sage words to pass on to homebuilders it would be to get all engine instruments certified accurate and don't skimp by buying used instruments. Makes pretty good sense, doesn't it? Thanks for the report, Al, and how about an update if you swap props or...? That would be interesting to the troops, even if nothing changes.

Calibrating Indicated Air Speed: I've talked to a lot of T-18 builders in various parts of the country and one thing that surprised me a little was that very few of them have ever run a low altitude check on their IAS vs TAS. A lot of them tell me I verified airspeed by flying alongside of a Bonanza, etc. That's not too bad if you know for sure about the accuracy of the Wichita type, but there's an easier way to check it out wide open or at various crz rpms. The Bonanza method isn't a bad idea to see how close they compare near the low speed end of the dial, as both airplanes stall about the same.

To run a measured course you should find a stretch of highway of about 5 miles in length preferably. It should be oriented crosswind and have a prominent intersection or geographical feature at each end (radio or water tower). Next, run it a couple of times in your car and note the mileage carefully. Then take your dividers and measure the course out accurately on either a county map or a sectional chart. Stick a piece of tape on your canopy as a sighting point and also one on the L.E. of the wing for an accurate gunsight effect. Begin the run about a mile away from the first point in order to stabilize the speed, then with the airplane in trim maintain your altitude within 20 ft. Record your time to the exact second on both ends, reduce power to cool the engine a bit and then do the same thing in the opposite direction. You should make a minimum of four runs, add up the total and then divide by the no. of runs to get a good average that allows for small errors in timing. Don't forget to put max weight in your baggage compartment. An airplane will fly a little bit faster if the CG is farther toward the aft limit, you know.



A recording stop watch that measures fractions of a second is essential if you want to be accurate. A 1 sec. error on a course in the 5-6 mi. bracket can make an almost 2 mph difference in A/S. Also, to be most accurate, use your little calculator and plug in the formula:  $\text{Speed (in mph)} = \frac{\text{Distance} \times 3600}{\text{Time (in seconds only)}}$

Measure and record distance in the formula as accurately as possible, to the nearest tenth of a mile. (The 3600 in the formula is the no. of seconds in 1 hr. in case you are wondering). When you get all thru, ask your Bonanza friend to let you go along with him on the same course and calibrate HIS A/S. You may be surprised at what his TAS actually is, and I'm sure he will be.

You may feel (and rightly so) that you don't really need to know how accurate your airspeed is. You find a number on YOUR dial where it will stall, and a no. where it's safe to approach at, to make steep turns at, etc. and for most every day use that's good enough. This may be good enough even in planning a cross country, but if you do aerobatics it's not good enough, nor is it really good enough if you fly at high altitude at high speed. Remember... flutter is a function of TRUE airspeed, not indicated A/S. The T-18 can pick up A/S superfast out of a busted aerobatic maneuver or spin recovery and you might be using up your safety margin without realizing it. Besides, it's a lot more fun to really know how fast this fine little bird goes.

Hank Steiginga, 45528 Newtree Ave., Lancaster, CA, 93534, (805/ 942-3046) first flight of his N512S (s/n 512) was on Sat., 13 Oct. 79, very early in the morning, a chilly and windy morning out at Fox Field in the desert, but even at that hour he had quite an audience. His wife, Frances, was prepared, tho'. She had baked cakes, banana bread, cookies, etc. and gallons of coffee and cold drinks. By noon the 60 assembled spectators had watched a successful test flite and polished off all the goodies. Hank said the more people arrived the more nervous he got. Finally it was go fly time and he bit the bullet and went, with T-18ers, Lyle Fleming and Al Chivers flying chase. All 3 A/Ss matched very closely and it went perfectly for 50 min. Dan Dudash had flown his T-18 up from Whiteman Airpark, Lyle and Shirley Trusty flew in from their ranch. Howard and Elaine Ginn would have T-18ed in from Mojave, but their Datsun slung a rod on the way to the airport, so they drove to Fox later in another car. Hank had'n't flown in 6 1/2 yrs., so Al, Lyle Fleming, and Howard Ginn gave Hank a lot of dual in their T-18s in the weeks preceding test time. Needless to say, Hank was very grateful for their patience and help.

Hank's T-18 was about 9 yrs in the building. Lyle Fleming got him stirred up to build when he gave him a ride in his T-18. He said Lyle has now been flying his T-18 for 11 yrs. and has over 850 hrs. on it. The 1st year was spent at John's shop using templates and making parts. Eventually it all went together and he has powered it with an O-360 (180) Lyc, C/S prop, Thorp metal cowl, with Narco 11B comm, Nav 12, & transponder. It has an aux fuel tank under the deck (no details on this), a beautiful white paint job with a yellow gold stripe with a spear in the front.

There's quite a colony of T-18s out there at Lancaster, including John Thorp's N18UT that John sold to Larry and Barbara Lilly, and they have a ball going interesting places together. I got acquainted with most of them at the surprise birthday party for John in '79. Hank was getting close to flying then.

I got a letter from Hank in Dec. '80 and he had just annualled N512S and he said he's convinced the T-18 is the most trouble free airplane in the skies. He and Frances have had several really nice trips, where they went in formation with others. One trip was to Coalinga for 'horny Toad' races, another was to Watsonville & Santa Cruz. Also Merced, Porterville were on their ports of call.

LYLE FLEMING: All the Lancaster people agree that Lyle Fleming is the chief T-18 fomenter and agitator in that area. Here's some excerpts from a letter from him:

"I first flew my T-18 in January 1968. As you can see, it's been flying 13 years now. In 1978 I had 900 hrs. on the tach. That's a low per year average, but I have been traveling 3 months each summer for several years, which has cut into my flying time.

It has been a lot of fun and satisfaction. I was at Rockford in 1968 and flew 20 hours there in 5 days, giving rides to future T-18 builders. I believe I have given 500 rides in my T-18." (From what his buddies tell me, it's probably closer to 900).

Anyway, it's obvious that Lyle is a very generous man, that's pleased to share the joys of T-18 flying with his fellow pilots. Lyle has 180 hoeses in his T-18 and the way a 180 snatches a T-18 off the ground right into a 2000'/" climb and an indicated cruise that is up close to 200 IS impressive. I can still well remember my impressions of my first T-18 experience with Bill Warwick in the early '60s. It was so impressive that I raved about for several pages in Air Progress magazine. Can't you just imagine how it affected Lyle's T-18 guests that had never ridden in anything more exciting than a Cessna? Wonder how many new T-18 starts Lyle is responsible for?

Lyle has an in-flite adjustable aileron trim tab on his left aileron. It is at the outboard end of the aileron and is an integral part of it. Maybe Lyle will favor us with a short story and drawing about it soon. To my way of thinking, about the only things that the T-18 needs to make it perfect is trim tabs for the aileron and rudder. They are such an important part of flying to airline pilots, that it's almost unthinkable that all airplanes don't have them. Of course, such tabs aren't to be approached lightly, because of the ever present flutter monster that's always lurking just around the corner to bite the unwary or careless.

If you are out Lancaster way, stop by and say hello to Lyle. He lives at 46035 20th St. E., 93534. His T-18 tail No. is N252F.

Still another T-18 family in Lancaster are Howard and Elaine Ginn, 44140 No. Gillan Ave., Lancaster, CA, 93534 (N11HG). When I talked to Howard at John's birthday party and we were watching Elaine slick their T-18 in on a landing I asked him how they decided who in the family would fly the T-18, he answer, "Well, she lets me fly it occasionally, very occasionally. She spends half her life in it. I think she has flown it about 400 hrs. herself now". Elaine very certainly qualifies as Mrs. T-18, with that much time in it. I watched her T/O and landings very closely and she's sharp with the bird. Her story of flying the T-18 ought to make some magazine editor flip.

Elaine is from Hawaii originally, so guess what very logically is painted on the vertical fin of "Son of a Ginn"? Why, a Hula Girl and a pineapple, natchery. They've made 3 trips to Oshkosh in it, plus many other very enjoyable trips. Besides their T-18, there are 6 other T-18s flying at Fox Field and 5 others under construction in Lancaster. Bob Hovey's N6651 is the other one I haven't mentioned (Bob is the designer of the Wing Ding & Beta Bird). All in all, I'd say they have quite a gang there and really know how to enjoy their T-18s to the very fullest. The social angle of sport flying is a very important part of it and making good friends in far flung places is one of the most rewarding parts of it, too. The T-18 people generally enjoy an almost fraternal relationship and are a much more closely knit group than any other group of builders that I know of. To begin with, we respect the judgement and good taste our fellow builders have in selecting one of the world's best airplane designers ...

CONT'D

Naw, let's scratch that statement and say what we all REALLY think ...He's the world's best, not one of the best, and I'd be hard pressed to think of a personal type airplane that is any better, wouldn't you?

Hank Steinginga sent another letter a few days back telling of still another trip they and several others had made over to Marana, AZ, and on the way back they stopped in Eagles' Roost, AZ, where Bill Warwick and some other T-18 ers from Torrance are planning to do their roosting in the golden years and he said there are some beautiful homes and hangars there already and that it looks great.

Hank also pitched out an idea that he wanted to see what kind of response it generated in the N.L.s. He says, "Has anyone tried to form some kind of overnight lodging system for T-18 travelers? We have an extra bedroom that would be useful for this purpose and I have an idea most everyone has one, too. I'm sure most T-18ers would be interested in such an arrangement. It would be a great way to get to know other T-18ers well and would be a great service to those that enjoy traveling in their T-18s. At today's motel prices, one night's lodging bill would buy a full tank of gas (and who of us wouldn't rather buy gas for our T-18 instead of paying so much out for just a place to hang our hat? Ed.)"

Well said, Hank! Sounds like a good idea to me. What do you guys think? Talk it over with your hausfrau and drop a line. Either sign it or don't sign it, as you prefer.

Several people have advanced the idea that there ought to be a T-18 owner's association. What do you think? Nearly all the factory built have sizable owner's associations. Would there be any particular value of a separate ass'n for owners of flying airplanes only? We now get a certain amount of input from owners of flying T-18s in our HAS N.L. I frankly don't know whether this would increase or retard the flow of info and I'd like to hear some of your ideas on the subject.

**RIVETING TIP:** A good many people have used a strip of masking tape to pre-insert a long line of rivets prior to driving. This not only holds all the rivets in position until you are ready to drive 'em, but it also keeps the set from jumping around and provides some cushioning between the skin and the set, thus preventing marring. Glass filament tape, which is commonly used in commercial shipping, is even better. It requires less clean up after riveting and is much stronger and more cohesive.

Harlo McKinty called last nite to ask a question and in the course of the conversation we discussed his aux tank in detail. It's a 15 gal. tank and is mounted underneath the seat. Harlo is the one that had the booth at OSH this year to demonstrate Explosafe fireproofing home~~comb~~ material for inerting fuel tanks and also Temperfoam, that great new controlled resistance foam that drew so much favorable comment for its use as a seat cushion foam from OSH visitors that tried it at the booth. Harlo has agreed to write a complete report on both the aux tank and the seat material, so you can expect this in N.L.#53.

**Great News from Javelin:** Dave Blanton called last nite to tell me some exciting news about the Escort engine. Ford engineers had called him to tell him that the Escort engine had just been tested on the dynamometer (un aspirated) and it had put out a whopping 182 hp...not the originally estimated 110-120 hp!!!! This was at 6500 rpm, the rpm that previous estimates were based on. Dave said to think in the terms of SWEPT VOLUME, not cubic inches.

The other news he had concerned the resumption of Ford in the racing program and the institution of a class that fits the Escort engine exactly. What it will mean, he says, is that 700 race car owners will have Escort engines in

their race cars all season long and at the end of the year there will be thousands of hours of the cruelest sort of treatment an engine can stand to pour in the experience pot. You can well imagine what kind of testing that will give pistons, valves, gears, crankshafts, etc. when those guys turn 'em 10,000 rpm and more.

#### INSTALLATION, OPERATION, and MAINTENANCE INSTRUCTIONS

\* **WOOD PROPELLORS FOR INTEGRAL FLANGE CRANKSHAFTS:** By Robert Bristol, propeller engineer for Sensenich Corp. (from Aviation Mechanic's Journal, Nov. 1980)

*Editors note: This month's Tech Library is Part II of the additional information supplied to the Journal by Mr. Robert Bristol, propeller engineer for Sensenich Corp.*

Sensenich wood propellers are manufactured from aircraft quality Yellow Birch and the laminations have been bonded with high strength, water-proof resorcinol glue under closely controlled conditions. Assembly of Type Certified propeller-engine-airplane combinations must be accomplished by personnel holding the appropriate FAA license.

Installation of the propeller will require a front face plate of adequate stiffness and with an area approximately equal to that of the engine crankshaft flange, a flange adaptor in some cases, and a set of attaching bolts of the proper length. Also, confirm that the crankshaft flange drive bushings will project into the counterbored holes in the propeller a distance approximately equal to their diameter and that they will fit snugly (i.e. 5/8" diameter drive bushings should project 5/8" into counterbores). If the drive bushing length and fit is not correct, contact the engine manufacturer to obtain the proper bushings.

An aircraft engine imparts its driving torque to a wood propeller through the static friction which is available between the steel flange and the face of the propeller hub boss. Therefore, maximum engine torque can be transmitted if the wood hubboss has been pre-loaded

to the maximum compression which it can withstand over a long period of time. Although the drive bushings provide a back-up system, they are capable of carrying the driving torque loads for only a short period of time.

Forest Products Laboratory<sup>(1)</sup> data for Yellow Birch wood shows that the optimum compression pre-load of the propeller hub is 0.006 inches per inch of hub thickness (i.e. a propeller hub which measures 3.375 inches thick before installation should be compressed 3.375-X-0.006 equals 0.020 inches, or to a thickness of 3.355 inches when installed). Knowing the hub thickness and the number of threads per inch of your attaching bolts, it is possible to calculate the number of turns required to tighten the attaching bolts the correct amount after they have

begun to compress the wood. For the above example, 3/8-24UNF bolts should be turned 0.020-X-24 equals 0.48 turns after the front face plate, the hubboss, and the steel flange are in contact. See the examples below:

Generally recommended wrench torques to achieve the same compression are shown in the following table. However, the table assumes clean, dry threads, and does not allow for variation in thread condition nor for the differences in hub compression area:

**CAUTION:** Over-tightening propeller attaching bolts will cause the wood of the hub to crush. This may break the moisture seal by cracking the finish and slightly reduce the drive-torque capacity of the insulation.

Hub Thickness	Bolts	Total Compression	Total Wrench Turns
3.375	3/8-24UNF-3	0.02025	0.486
5.375	3/8-24UNF-3	0.03225	0.750
5.375	1/2-20NF-3	0.03225	0.625

AIRCRAFT BOLT Specification	Diameter (inches)	RECOMMENDED Wrench Torque (in.-lb. ± 25)
AN6	3/8	200
AN7	7/16	250
AN8	1/2	300

Wood Propellers, cont'd:Installation:

The following installation procedures are recommended:

1. Locate the propeller on engine crankshaft in most convenient position for hand cranking.

2. Remove a spark plug from each cylinder, chock wheels.

3. Install propeller attaching bolts "finger tight" (so that the front plate, hubboss, and steel flange are snug, but compression of the wood hub has not begun). Check track of the blade tips by rotating the tips past some fixed object on the floor. The tips must track within 1/16-inch of each other when the installation is completed.

4. Track should be corrected to within limits at this time by snugging up the bolts nearest the blade which is forward. This will result in a common starting point for all the attaching bolts.

5. Proceed to tighten the attaching bolts in small increments, moving diagonally across the bolt circle. It is good practice to check track frequently during the bolt tightening procedure. Take care to tighten bolts on opposite sides of the blade axis evenly so that the propeller will not be pulled out of edge alignment (conformity of angles blade-to-blade).

6. Since a small part of the compression of the wood hub is plastic, it is good practice to loosen the bolts, and to allow the wood to relax for an hour. Retighten following the same procedure.

7. Install safety wire through bolt heads in pairs (not a continuous length) twisting the wire between bolts.

Operating Tips:

The following practices will add to the service-life of the propeller:

1. Do not use the propeller as a tow-bar to move your aircraft.

2. Avoid running-up in areas containing loose stones and gravel.

3. Place the propeller in a horizontal position when parked.

4. Inspect frequently for scars, bruises, or other damage to wood and metal tipping.

5. Protect your propeller from moisture by waxing with an automotive type paste wax. Check the drain holes in the metal tipping to be sure they are open.

6. If your propeller is subjected to any kind of impact, do not operate it until it has been thoroughly inspected by qualified personnel.

7. Inspect and check bolts for tightness at least every 100 hours or annually. More frequent inspection may be necessary when climatic changes are extreme.

8. Have all wood and metal tipping repairs accomplished by the factory or by an approved propeller repair station.

9. Check balance of the propeller whenever there is evidence of roughness in operation.

10. If your propeller begins to show any of the following marks, it should be retired from service:

- Cracks in hub bore.
- A deep cut across the wood grain.
- A long, wide, or deep crack parallel to the wood grain.
- A separated lamination.
- Oversize or elongated hub bore or bolt holes.
- An appreciable wrap (discovered through inspection or through rough operation).
- An appreciable portion of wood missing, or
- Obvious damage or wear beyond economical repair.

Refer to FAA publication AC 43.13-1A for further information.

- (1) Forest Products Laboratory  
U.S. Department of Agriculture  
Madison, Wisconsin

## Wood Propellers For Integral Flange Crankshafts

### Installation, Operation, And Maintenance Instructions

More For Sale Items: Hank Steinging, 45528 Newtree, Lancaster, CA, 93534, has the following items left over from his project (1) 2 6" Cleveland wheel brake cylinders. (Cassna) \$125 (2) Two Cleveland master cyls Mod 10-4, 6 5/8" long \$50 (3) Two Scott master cyls Mod. 4408E, 7 3/4" long \$50, (4) 5" wheel pants 38" x 10 1/2" deep with mud baffles, pair \$60 (5) 12 volt Bendix fuel pump (new) \$35 (6) Comm antennae, plastic base, new rod type \$30 (7) Pitot assembly #796 \$25 (8) Fin tip #570-4 hydro-pressed alum \$20 (8) Walking beam #551 \$30 (9) Carb air box, valve, intake, complete with cone shaped Filtron element, like round the world, Don Taylor's \$180 (10) Prop extension for Lyc. O-360 #1072 \$135 (11) C.H.T. gauge "Westline" new \$20 (12) 1/8" Nyloflow tubing for brake lines, 2500 psi bursting press, 10¢/ft. (13) Flex shafting .200 & .150 \$1/ft. (14) 3/16" Nylo-flo tubing 12¢/ft.....Item # (1) is model 30-55A

Leroy Holt, Box 238, Savanna, OK, 74565, (918) 548-3812 has a few extra parts for the folding wing. He's a machinist for the Naval Arsenal and he made up a couple of extra sets when he made his. . He stopped by and showed me his work and it's first class. If you write him, plz include a s/sa envelope.

Garland Root 3863 Mission Ave., Carmichael, CA, 95608 (Sacramento area): Has an O-20 150 hp. Lyc with 50 hrs. SMOH for sale. It's the one he removed from his T-18 when he installed the O-360 and is complete, excluding the exhaust system. He also has the prop extension and a "Derrick" (?) 68 x 72 prop, with face plate and spinner. He would like to get \$2500 for the engine, but would make a deal for the whole works. He says, yes, he is still making the canopy covers and will continue the \$75 price until the present material is gone. You can call him at 916/ 481-5483 between 10 am & 3 pm his time (no collects, of course).

He mentioned that he'd talked to John about a gear leg-tire alignment problem and John again said to not have any toe-in at all. Have wheels set straight forward with the airplane in the 3 point position.

John Walton, 5726 Boyce Springs Rd., Houston, TX, 77066, (s/n 46), N51863 flies! 7 yrs. a-building, this beautiful airplane flew in Jan. '81 and flew absolutely perfect the first time. He sent me an excellent story on it and we will run it in N. L. #53, which I hope to get out in about a month after this one.

Ed Kempkey II, 1044 Lorraine Drive, Napa, CA, 94558, sends this excellent and well written report: "Dear Dick, I am really ashamed of myself for taking so long to write and send my money for the news letters. I really enjoyed your first news letter. It was a real production. I just talked to Bill Cardoza the other day and he tells me the 2nd letter is out. I just hope everyone else is not as bad as I am about writing.

I know you are getting a lot of feed back mail, so I am sure it can get confusing as to who and what their T-18 looks like. Our T-18 (Bev, my wife, and I) is serial no. 658, I.D. no. N118EK. It has a 160 hp. engine, with constant speed and has been flying since '74. We missed going to OSH this summer ('79), but were there last year and also in '75. Last year we flew in a group of 3 T-18s from Calif: Bill Cardoza, Jim Baarlaer, and mine. I enjoyed meeting you then and was delighted to hear you would be getting out the newsletter again.

Also! I make no claim on being a good letter writer I have been faithfully working on T-18 parts for another one that my son is building down in Redlands, CA. It is really great for me, as it is like having a second chance to build with hind sight to help make all the improvements and changes that you wished you could have done the first time. I am committed to the game of building all metal. It is not the fastest way of getting in the air, but to me it is just more satisfying. Besides that, I am a metal shop teacher and it seems only proper that I go the all metal route.

Ed Kempkey, cont'd

When I talked to you at OSH you were interested in my baggage compartment. I mentioned it to you again at John's birthday party and you still were interested in it, so I started to get the details together on it, but just can't get it all together for this letter. This is the 2nd baggage comp't I have built & it seems to supply my needs. It is light, made in 2 halves, R & L, has floor (bottom skin) to deck space, and can be removed completely in a couple of min's with hand turned cam locks. This quick, easy, and complete removal is amust for me, as the battery is way back and not easy to get to under the best of conditions. I will try to get some pictures and a drawing as soon as I get organized back at school.

About Exhaust Gas Temp and Cyl. Head Temp gauges: I have not had very good luck with the cheaper ones. They have been erratic and not dependable. I have also talked to other people that have reached the same conclusions.

I once took a ride in Oats Tokle's T-18, in which he had a K&S EGT. I was very impressed with the magnitude and instant response it gave to leaning the mixture. It is driven off a 12 v. system and seems to be very effective. I have just finished replacing the EGT and CHT gauges with K & S equipment. Their factory is in Hayward, which is close to me in NAPA and I was able to visit and talk with them. They are a small enough company that when you talk instrument needs, you are talking direct with the president of the company. They gave me about a 25% discount. I made the suggestion that other T-18 builders might be interested in purchasing instruments at a discount. They would prefer to extend a discount to a single shipment, but said they would extend a discount to anyone who writes in saying he is a T-18 builder. If any are interested, write to K.S. Avionics, Inc., 25216 Cypress Ave., Hayward, CA, 94544, Att: W. V. Simpkinson.

Mr. Simpkinson is the president and makes all decisions on what the discount will be, based on the size of the order. Just tell him what you want and that you would like a Thorp T-18 builder's discount quote.

Again want to say I sure enjoy the newsletter and am enclosing \$10 for a subscription for myself and my son, Edwin Kempkey III, 1444 Elizabeth, Redlands, CA, 92373. He has plan #1175.

In your last letter you talked about electric trim tabs for the aileron. I am wondering if you have talked to John Thorp about this? The reason I ask is that I was talking electric trim tabs to him about a year ago and he really was not too happy with the idea. He figured someone would sooner or later do it, but he didn't want anything to do with it for fear of possible flutter problems. I have looked at Lyle Trusty's system and thought it looked very good and am looking forward to any future information on them.

One more time, I'd like to say I think it's great you are taking on the news letter project. I look forward to reading them more than any thing else that comes in the mail. I just hope it doesn't become too much of a burden to you. I appreciate your attitude about accepting information and ideas in practically scratch pad form. I'm sure that it will make more of us more willing to write and share ideas. Thanks again."

Thanks for all the kind words, Ed. I hope your letter will stimulate some of the other builders to take a few minutes to sit down and scratch off some reports of some kind for the N.L. If everyone just sat and waited for the other guy to send in material, the Newsletter would go down the drain pronto for lack of material. If you & you know of a T-18 flying or under construction in your area it would help if you'd send me their name & address. I could then send them a complimentary copy and perhaps they'd respond.

From T-18 Newsletter

10/25/80

#### Aileron Control System

When the T-18C plans were first drawn, the original Aileron Mast was retained. This required that the rear spar, outer wing be notched for clearance. A new Aileron Mast, drawing 331, has been made which moves the actuator tube attachment hole (#12) forward 0.6 in. This provides rear spar clearance without a cut-out.

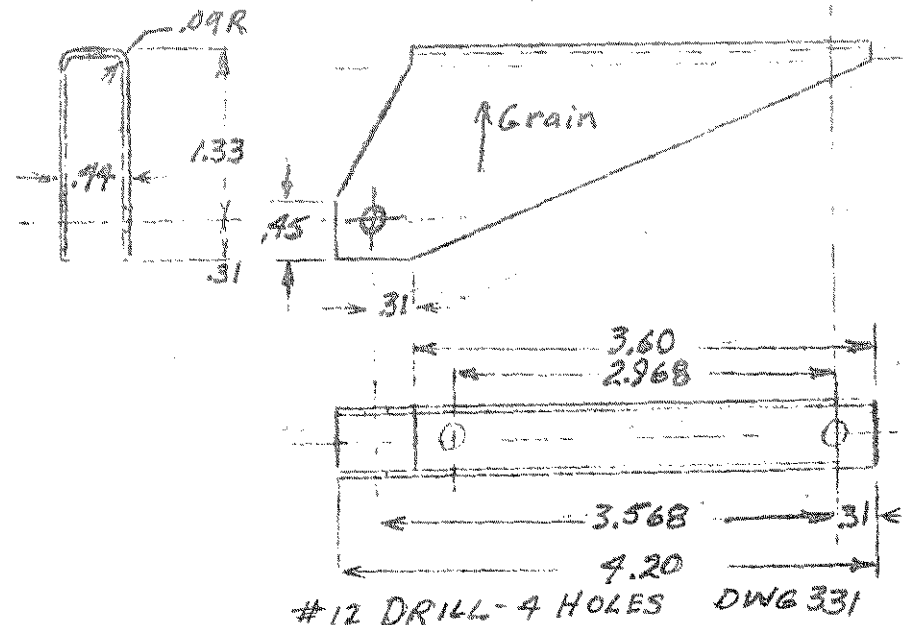
Also, the 498 Bellcrank had a slight interference with the main spar web requiring that a clearance hole be made in the web. On January 1, 1980 rib drawing 320 was changed to move the Bellcrank pivot aft from sta 74.0 to 74.25. These two changes require changing the length of the 501 aileron actuator tube. from 24.625 to 23.77 inches.

These changes are not mandatory, but if you do not have a new Aileron Mast 331 drawing and would like to have one, just send me a self-addressed stamped envelope and I'll mail you one free.

Please note that the length of the #106 Aileron Actuator Tube should not be changed. It should be 32.06 inches. Several of these drawings were sent out incorrectly changed.

#### New Airfoil Test Results

The new LDS-4-212 airfoil has been flight tested by Ken Knowles and it proved out just as the computer predicted. With this airfoil on the complete wing, the stall speed was lowered 10 mph. Stall was very gentle with about 10 mph of buffet warning. There was no secondary stall. Top speed was the same as for the original airfoil. Tests were conducted with Ken's wide body T-18W fuselage. When making the leading edge skin bend, be sure to use a template and get a good fit. Use something like plexiglass for the template so it won't scratch the skin.



The preceding was a bulletin from Lu Sunderland, the designer of the T-18 convertible wing (CW) and the wide body modification for the fuselage.

Metal Cowl update: I have not rec'd anything new from Marc Bourget in regard to progress on the metal cowl project. His last letter was about a year ago and at that time he stated that efforts were continuing and that the new cowl price would be within the old cowl price range of \$600-\$800. In a recent phone conversation with John I asked him if he knew of any progress that Marc had made on the cowl and he replied that Marc had been very busy on his law school studies. To recent, the new cowl design would have a single opening under the spinner, similar to the Derr-Garrison effort, and would be all metal.

Fitting and Shaping the 4580-2 skin over the tank: I've gotten several reports from new builders of their difficulty in getting this skin to fit correctly. Apparently some of the new builders aren't aware that this skin requires a fair amount of pre-forming. It must fit the radius of curvature of both the firewall and the dash frame, which requires that a segment of a cone be formed on each side of the skin. Here's the way I've done several of these skins and altho it's a little time consuming, it's a safe and relatively easy method:

- (1) After the skin has been cut to size and trimmed, I turn it over on the bench, with the inside surface up.
- (2) From the previously located B.L.O point at the firewall and dash frame locations, measure outward to the point where the "flat" ends and the curvature begins and make a mark with a 'Marks-A-Lot'. Pick off these distances from your firewall & dash frames for accuracy.
- (3) From the beginning point of the curvature, measure the amount of the curvature at each location until the "flat" begins again on the vertical part of both frames. Again make a mark.
- (4) Draw fore and aft lines that connect the points where the flat ends and where it begins again. You have now defined the shape of the cone segments. Make a mark in the approx. center of each of these areas to be curved.
- (5) The next part requires at least 2 people to avoid possible buckling.
- (6) Using a thick cardboard tube of 3" to 5" dia., lay it across the center of curvature marks you made and carefully hand form the skin around the tube a little at the time.
- (7) This 'wrapping' of the skin around the tube requires allowance for the considerable amount of springback and after each wrapping operation the skin should be positioned on the two frames and checked for conformity to the curvature of the frames. DON'T HURRY IT!
- (8) When approaching the proper radius of curvature of the skin, pay particular attention to the area between the two frames, as this area is more resistant to bending than the ends.

Before starting step #6 I find it helps to initiate the process if we hold each end of the sheet and "shoe shine" the area to be curved over the soft edge of a wooden work bench. The bench edge should be rounded and free of any thing that might mar the skin. With hands on each side of the curved area, use moderate downward pressure as you shoeshine it (in unison). You can achieve a considerable amount of stretch forming of the metal in this manner and thus reduce the amount of hand squeeze-wrapping around the tube. Just be VERY careful to avoid too much pressure in localized areas and thus avoid buckling. Don't get careless and you'll come out with a perfectly fitted skin.

The first couple of these skins I made I had access to a sheet metal roller of 5 ft. capacity in a commercial metal shop and it was a simple matter to tighten the roller a little more at one end to get the required radius. I took my firewall and dash form blocks along and used these to check with.

Next issue we'll show you a simple way to lay this skin out in the flat.

I've had quite a few requests for lists of builders near them. This would be much too time consuming on an individual basis, but as time and space permits I'll publish lists by states of MAS members. If I know the person has an airplane flying I'll underline his name and address. Be aware there are quite a lot of airplanes flying that we have no record of. I'll try to print the Calif. builders next time, as they are the most numerous, by far.

#### Alabama:

Mac Booth, P.O. Box 580, Daleville, 36322  
Gordon Cronin, 1800 Panorama Blvd., Mobile, 36609  
Jerry Findell, Rt. 1, Box 68, Pansey, 36370

#### Arkansas:

Donald Collins, 2000 Reservoir Rd., Apt. 66, Little Rock, 72207  
Sylvan Kaebler, 121 Pebble Beach Dr., Little Rock, 72212 (N99SK)  
Fred Swafford, 205 Forest Park Dr., Arkadelphia, 71923  
Lloyd Toll, P.O. Box #303, Hazem, 72064 (N)

#### Arizona:

Hal Navang, 3612 Camino Blanco, Tucson, 85718  
J. S. Chocolas, 1216 W. 20th Pl., Yuma, 85364  
Rob't Deering, 7637 Jupiter Way, Chandler, 85224  
Roy Fonk, 2419 Whitton Ave., Phoenix, 85015 N7HRF  
Ed Poe, 402 E. Braeburn Dr., Phoenix, 85022  
Chas. D. Pressman, 11823 N. 76th Way, Scottsdale, 85260

#### Alaska:

John Cooley, 2231 Lord Baranoff Dr., Anchorage, 99503

#### Colorado:

Kendle Willson, 30643 E. Barnett Rd., Pueblo, 81006  
Frank Lanier, P.O. Box 195, Colorado City, 81019  
Pete Gonzalez, 1318 Server Dr., Colorado Springs, 80910  
John Evans, 1530 S. Valentine Way, Lakewood, 80228  
Dean Cochran, 255 Hemlock, Broomfield, 80020  
Gele Abels, 3100 6th St., Boulder, 80302 N23GA  
Guy McSheffrey, Tall Timbers, Boulder, 80302

#### Connecticut:

Rob't Lanoue, 72 Mattabasset, Meriden, 06450  
Richard Keyt, 6 Black Walnut Dr., Newtown, 06470  
Joe Gauthier, 9 Kowal Dr., Cromwell, 06416  
Geo. Durkota, 629 Wilcoxson Ave., Stratford, 06497  
Dan Cuihane, 146 Hillside Dr., So. Windsor, 06074  
H.E. Combs, Jennings Rd., So. Kent, 06785

#### Kansas:

Norman Buehler, Rt. 3, Scott City, 67871 N1500Z  
Steve Egbert, 2332 S. Greenwich, Wichita, 67207  
Wm. McCoy, 613 Farmington, Derby, 67037  
Steven Mead, 7901 E. Lincoln, Apt. 408, Wichita, 67207  
Norman Spillman, 4735 SW 17th St., Topeka, 66604

#### Louisiana:

Larry Bulot, 122 Lake Park Dr., Belle Chasse, 70037  
John Hardy, Rt. 1, Box 292K, Natchitoches, 71457  
Tony Russell, 406 Cardinal Dr., Slidell, 70458

Also be aware that not all names are bonafide T-18 builders. Some may be subscribers to the N.L. only. Before planning to visit any of those listed, common courtesy would suggest a telephone call well in advance for permission

*Dick Cowan*

END N.L. #52