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OSHKOSH 1979 is now history and I'm hoping to get this issue out by around the 1st of Sept. and hopefully you will have it in your hands by around the 10th. I mailed #46 out on 16 JULY 79 and most of you had rec'd it prior to OSH, but if you didn't please let me know. I printed up quite a few extra copies of #46 for late joiners, etc. I'm sorry I can't get these things cranked out a little faster, but I'm having to be a one man gang for writing, typing, printing, collating, folding, stapling, addressing, mailing, zip code sorting, and a couple of other things(that Lu & Marilyn did for several years), so you'll have to be a little patient with me until I get up to speed. On issue #46 I ran into a week's delay in using the chapter printing press and the delay came at a time when it was already close as to whether 3rd class mailing would get them delivered to you before OSH.

OSHKOSH HAPPININGS: Our T-18 turnout for this year was well below '78 and '77 in numbers, but it was a banner year for the T-18s in the award area. I had to leave on Wed. morning, so didn't have time to gather in the official results, but B. C. Fosner and BOB Dial teamed up to clock 208 mph on the high speed leg of the 500 mile contest course of the Lowers-Fulton-Baker Efficiency Race! The contestants were allotted 22 gallons for the race and if they exceeded that amount they were disqualified. With Bob flying B. C.'s airplane they only used 20 gallons! (At low altitude,too). That's 25 miles to the gallon! After the high speed dash was over they flew the rest of the course at a lazy 130 mph for max fuel economy. I don't know how the other contestants came out, but Bob said they were far ahead of Kent Faser's fast Mustang II-by about 20 mph. Perhaps others in the race had a different game plan, but 208 mph and 25 MPG isn't too shabby in anyone's book , is it? You'll read all details in Sport Aviation, so I won't dwell on it at further length except to say congratulations to Bob and B.C. Very well done!

Just prior to leaving I learned that two other T-18s there were top awards winners but my informant wasn't quite certain what for. Richard M. Schaefer, 5842 West 98th, Los Angeles, CA, 90045 (S/N 82) fielded his magnificently appointed N41RS to deservedly win top honors for the best T-18 there. It would be hard for anyone to come up with a finer custom built airplane than Richard's. I had seen it earlier at the Chino Fly-in and had admired it then. Its conservative, classic elegance gave it the look of a distinguished thoroughbred, which it truly is.

The other winner was really a surprise! It was officially listed as an AT-19 and was built by Gale Abels, 3100 6th St., Boulder, Colo. 80302 (S/N 766) . Strictly speaking, it is not a T-18. It was based on the T-18 design, but it has a Vee tail and had extended, tapered outer wing panels. Each outer panel appeared to be nearly 2 ft. longer than std and in addition had an extra flap segment about a foot long. The extra segment was actuated by the inboard wing flap, like the T-18C wing. The fuselage appeared to be stretched a few inches also. It was a beautifully built airplane, with excellent workmanship.

I lost my notes on it, as well as the details on Schaefer's airplane, but I do remember Mr. Abels telling me he was a high country sailplaner and considerations of high altitude and sailplane design practices strongly influenced his changes. I was admittedly a little dubious of the crosswind capability in a strong wind, but Mr. Abels said he was quite pleased with its response in a 25 mph X-wind. He said it indicates 214 mph top, but that his airspeed system hadn't been calibrated as yet. You'll see details on both these airplanes in Sport Aviation and probably in a future newsletter,too, so I won't elaborate on specs at this time .

JUDGING T-18s: Perhaps a word of explanation on T-18 judging at OSH is in order. This year 3 experienced T-18 builders were chosen to act as Judges. None had an airplane at OSH. LLoyd Toll, Bill Cox, and Paul Kirik served this year and each scored each airplane independently, so tha they couldn't influence each other's

scoring. 19 items were examined and given a score of 1 to 10. Spinner, cowling, air scoop, exhaust, gear fairing, cabin fresh air intake, windshield fit, canopy, etc.- in fact, every independent item on the airplane was judged for fit, appearance, workmanship, originality, and harmony with the complete airplane. Items like wing tanks or mufflers scored extra points. Previous year winners were ineligible for judging, so Paul White's great "Wong" and Bill Cordoza's beauty couldn't repeat this year, according to the ground rules.

An award for the T-18 there with the most hours was given to "Doc" Cottingham, a Nebraska radiologist, who has flown his T-18 for 2475 punishing hours into the most primitive and roughest strips,in all kinds of weather, for about 90% of those hours. N299V looked a little worse for wear in chipped paint and grime, but structurally it didn't appear to have suffered. Rough fields are hard on airplanes. Probably more than any other factor, but Doc's bird didn't have any loose rivets easily detectable. (Don't get the idea that I'm saying for you to not do a thorough pre-flite, just because the airplane is rugged!)

Our 2nd Annual T-18 Dinner was arranged by Sandy Cordoza again this year, with pre-convention work by John Walton, too. It was a great success. About 150 very enthusiastic T-18ers and wives wre in attendance. After dinner we were treated to an account of the day's race by Bob Dial and B. C. Fosner. Don Taylor gave a short account of highlights of his two round the world flights and Clive Canning also gave an abbreviated commentary of his flights around the perimeter of the Australian continent and also his round trip flight from Sydney to London.

I'd like to recommend Clive's book ("Charlie Mike Charlie") as one of the most interesting and exciting books you'll ever read. He's a tremendous author. His book literally puts one inside his head, with YOU inside his T-18 cockpit for an incredible series of high adventures. Perhaps you've heard a bit about his set-to with 4 Syrian Migs, bent on shooting him down. You'll fly thru monsoons, desert sandstorms, fog,over oceans, jungles, deserts, thru thunderstorms so bad he could just hang on. I think you'll agree that not only is he a fine pilot, but that he also has the rare gift of painting a word picture that is so completely absorbing that you won't be able to put it down, once you start. You'll have an even greater appreciation of what a fantastically fine airplane the T-18 is. Clive's book was published in Australia and he had a booth at OSH, but I don't know whether there will be further distribution of the book in the U. S., but I certainly hope so. If it's not advertised in Sport Aviation I'll get details on it from Clive. His address is 2 Leon's Court, Blackburn, Victoria, Australia. By the way, Clive was also a multi-Ace in WWII, one of three at OSH this year. He's also a fine gentleman, a man you'll instantly like.

My old friend, Peter Hodgens, was there again and he says the T-18 is being built in considerable numbers in Australia and New Zealand- about 60 projects added to the 30 now flying there, I think. Pete's on his 2nd T-18. Ron Hallen, of Middlesex, England, was also present at the dinner and he said that at present he is the only active T-18 builder in Great Britain, altho' there are other plans holders. When his T-18 flies there'll probably be a rash of new starters, as the sight of a real live T-18,on the ground or in flight, seems to always start a prairie fire of sorts.

AUTOPILOTS AND WING LEVELERS: Autopilots and wing levelers will be more and more important for builders in the future. Last year Bryant Fowland, (1007 Shell St., Midland, Tex., 79701) fielded his T-18 with a Century autopilot installation at OSH. It was very simply hooked to the walking beam by using a longer bolt thru the rod end bearing, thus tieing the actuator arm of the AP to the AC control system.

This year Howard Henderson, displayed a different approach to the problem in the fluidic wing leveler he had built up from scratch. A true "Fly-by-wire" system,

(Handwritten margin note:) Know of anyone flying with an A/P or Wing Leveler?

it bypasses the aileron control system and actually "flies" the aileron by the means of an electronically actuated servo-tab, that is added to the trailing edge of the aileron. The 1.5" x 9.5" servo tab is positioned by a tiny, featherweight model airplane servo (reversible DC motor), that is mounted on the backside of the aileron spar. A tiny bellcrank and push-pull tube apply the muscle to move the tab. The tab itself is balsa, with .016 alum epoxy-boded on both sides for a more durable unit in its exposed position (to ground-pounding type gawkers). He and Sylvan Keebler have both installed these units on their T-18s and both found the present tab size is the minimum size needed for control authority. Howard promised to write a full report on the installation for the N.L. "soon".

Howard's master control panel for the W/L was a tiny 1" x2" piece of laminated plastic mounted at the bottom edge of his ins't panel in add-on fashion. It had two miniature toggle switches: one was power on & off, and the other was a selector switch to command either automatic wing leveling or simply to use it as an aileron trim tab to pick up a heavy wing. The latter mode is called "manual". He also had a couple of little rheostat knobs. When in the manual trim mode a wing can be raised or lowered by making the desired motion with the knob. (i.e. to lower the right wing, turn the knob to the right). This knob is labeled "trim" and the other labeled "gain". The gain knob increases or lowers the rapidity of response to either manual or automatic signals. The beautiful part of the whole system is its weight and cost. The whole thing probably doesn't weigh much over a pound, and I believe Howard said the whole thing could be built from a kit supplied by (?) for well under $100! (At present I don't know the name of the supplier or any other details, so if you can't wait until the next N. L. to get going on one, you might call Howard for details). He lives at 444 Bryan Ave., Kirkwood, Mo., 63122. Howard is doing some further testing, tho', so I'd recommend you curb your curiosity for a little while longer.

Howard let me pick up the sensor (which he mounts under his seat) and rotate it to the left and right , simulating the yaw to the left and right of the nose. I watched the tab as I did this and the servo reacted immediately in proportion to the movement of the sensor box. The box itself is about the size of a cigar box.

I am most enthusiastic about the little wing leveler and its potentialities in the T-18. It will be invaluable for normal VFR XC flight to permit the pilot to study his maps more often, etc. Althó' Howard says it is not adequate for true IFR flight (i. e. tracking radials, flying an ILS, and other very precise turning) it wouldbe a valuable "co-pilot" to permit the pilot to use both hands in routine radio work, chart study, etc. Its manual aileron trim function makes it worth its weight in gold, particularly for those with electric flaps. The same trim system could be applied to the rudder for centering the ball and fatigue on longer flights would be practically eliminated. By eliminating the front tunnel and using the electric trim for the stabilator, one can move their feet and legs around for comfort. You can well imagine how automobile passengers or drivers would howl if they had to keep their feet and legs in one position for hours on end. The T-18 is a really super XC machine, but that doesn't mean we should sacrifice all the creature comforts in the process, does it?

Still another benefit of a wing leveler that most people don't want to think about is the possibility of in-flite incapacitation of the pilot. Obviously our passengers should be qualified to land the airplane for maximum safety, but we all know that very few are. Think for a moment about how a non-pilot would attempt to fly the airplane while simultaneously trying to tune the radio and call for help. There would then be the problem of navigating to an airport , etc., but at least it would buy them some valuable time and enhance their chances of survival. Frequently an incapacitated pilot will revive after awhile and take over for landing. We recently lost a local T-18 when the pilot lost consciousness just after breaking ground on a takeoff(solo). He might have survived if

(Handwritten margin note:) How did you make your seats & what would you do differently now?

he had had a wing leveler and had time to recover consciousness, altho' this is pure speculation. He might have even survived the impact if he had worn a shoulder harness. The airplane made a 180° turn after takeoff, impacting in soft ground. The turn and pitch angle (down) gradually increased in the classic spiral mode and the airplane hit on the right wing tip, gear, then spinner. Mr. Clardy's head struck the dash frame well to the right of center, strongly indicating he was slumped to the right at impact.

Survivability: Such lessons as above highlight the importance of wearing shoulder harness. Admittedly, it's somewhat restrictive, but it's something you'll get used to. We used to compain about them in airline work when they were first made mandatory, but we soon got used to them.

As we pointed out in #45, the A-frame gear is a tremendous plus in an impact, in that it not only prevents penetration of the engine into the tank and cockpit, it also absorbs a huge amount of energy in the decelleration process.

More on seats: In the area of survivabilty, don't overlook the importance of the seat. Several years ago a T-18 pilot suffered a broken back when his seat collapsed on impact. A dust devil got him a few moments after t/o. His daughter was uninjured, except for bruises made by shoulder straps, but his seat failed downward. His additional body weight failed bulkhead #592 in compression. His fix on his next T-18 was to add short pieces of vertical angle on #592 just below the 2 hinge points (that allow his seat to be tilted forward for baggage comp't access). You might want to take a long hard look at this item.

Several years ago I wrote an article in the July '77 Sport Aviation, entitled "A Discourse on Seats", in which I described a super-comfortable seat design and also described certain features that make seats modern torture racks. The very worst type of seat is a slab of foam with sheet metal or plywood supporting it. We had this type of seat on the Electra and it caused a rash of spinal and rectal injuries when turbulence was encountered. The foam scarcely slowed up the pilot's body before it hit the sheet metal "pan" virtually unchecked. The ideal seat I described was basically a canvas sling, attached to a special tube frame via nylon lacings thru eyelets in the canvas. The back tilted forward about 15° at the mid-shoulder blade area, thus supporting the entire body from the knees to the head. Such a seat eliminated local pressure points under the thighs, etc. that cause discomfort and cut off circulation on long flights. The frame and sling used a sculptured foam and material slip-on "sack" for maximum comfort and eye appeal. The springing effect of the foam and nylon lacing made it pure luxury. The dimensions and angles shown in the article got mixed up somehow, so if you refer to that article just use your protractor to get the right number, as the drawing was correct in scale and angles shown.

To that seat I would add a woven barrier below the seat for crash-worthiness. The seat sling would normally never touch the ½" wide woven strips of aluminum pop riveted to a tube or extrusion frame. Its only function would be to stop the vertical movement of the body if impact forces were high enough to fail the sling and lacings. I, too, would add vertical support legs for the barrier frame.

An outstanding feature of that seat design was the tubes at the juncture of the bottom and back were not a single, common tube, as is normally used. The bottom tube of the back was well below the level of the bottom tube frame and also the rear tube of the bottom was well aft of the back frame plane. Thus one's sensitive tail bone area never came into contact with a hard point and the effect was like being suspended in a hammock,

MORE COMMENTS ON OSH T-18s: While at OSH I got a chance to talk with several builders and go over their airplane in great detail. I wanted to do so with each one of them, but unfortunately I couldn 't always locate a lot of them when I

was in their area. I guess they were tramping up and down the lines when I was around.

While T-18 airframes conform quite closely to plans in most cases, I was surprised to see how widely other details varied from plane to plane. Several builders graciously opened up and no two of them were alike forward of the firewall. There were actually 5 different types of cowlings. I expected to find a wide spread in make of props and differences in diameter and pitch, which I did. I also did anticipate that there would be a wide mix in wood, metal, and constant speed props and there were, but I was really surprised at the variety of spinners there. Nearly every airscoop was different, ditto airboxes and air filters. Oil cooler location and installation varied widely. Some had oil filters, some didn't. The exhaust systems were all different, too. The exhaust exit tubes came out of the cowl in a variety of places at very different angles to the airstream, too. The carburetor and cabin heat systems were all as different as the N numbers on the individual airplanes. Internal exhaust support brackets and clamps were no exception to the rest of the items.

When I got to the electrical systems it was again the same story. There was an almost even division between generators and alternators. Battery and starter solenoids were all over the place. Most all seemed to agree that the voltage regulator should be at the upper right corner of the firewall. I was surprised to find that not too many had "blast-tubed" their mags or generators and very few had taken the trouble to baffle efficiently around alternators or generators. Everyone was a little different on their fuel filter. Also all throttle, mixture, and heat controls were secured at the mid-point in a different way.

There was one immediate benefit of all this eagle-eye routine: An inch long crack quite close to the flange was found in one exhaust system. That points out the value of a good pre-flight inspection of the engine compartment. That's one big reason I particularly favor John Thorp's cowling design. Removing or replacing the "cheeks" is quick and easy and the entire engine and accessory area can be inspected easily and there is plenty of light to see little things before they get to be big things. If you re-read the previous 4 or 5 paragraphs you can't help but come to the conclusion that as far as engine installations are concerned....each T-18 has a different design engineer and comes out of a "factory" that does things differently to the next one. It's most unlikely that all of these installations will be 100% trouble free. Therefore it follows that frequent, thorough inspections are called for. The Thorp cowl also allows a considerable amount of work to be done without removing the top and bottom parts. Incidentally I haven't heard from Marc Bourget re response to the feeler for a possible new production run of the metal cowls- or even an estimated price.

When we looked at brake systems and gear fairings it was the same story. Windshields and canopies (in particular) showed the individual touch. Antennae and pitot/static systems likewise. Treatment of floorboards and forward area soundproofing also ran the gamut.

Most all of these items have been covered in the newsletters, but usually only one way of doing things has been described. There are literally dozens of ways to do all of the above mentioned items and obviously most all of them are at least moderately successful and satisfying to their builders. If YOU and YOU will sit down and describe in detail how YOU solved the engine installation items it would give us enough material to keep the N.L.s going for years and it would really help the new builder. All of YOU know why it takes 6 to 9 months to make an engine installation, don't you? How about it, amigos? Will you do your bit to repay some of that free info you received thru some generous EAAer? Here's what I'd like: "Here's how I fitted my cowling and attached it....." and "Here's the airscoop design I chose and here's the way I fitted an air filter in it".. or "Here's my airbox design"....or "Here's the way I set up my cart heat muffs and cabin heat muffs and how I routed the heated air where it was going".

Anyway, you get the idea. Black and white pictures are great, too. If you talk about controls, mention what hardware you used, how long a flex control was, where you bought it, cost, etc. One of the most widely needed items is patterns for baffling. Most builders would gladly pay a reasonable fee to save all that time and trouble. If you have such patterns, make note specifically what model of engine it's for, as there is considerable variance between models.

1980 T-18 Fly-In: After talking to most of the builders present at OSH this year and tabulating the response to the trial balloon in N. L. #45, it was decided to forego discussion of a T-18 Fly-In at our annual dinner affair. It was felt that perhaps the number of people there probably wouldn't represent a true cross section of T-18ers and also any discussion and voting would be excessively time consuming. It was suggested to me that we send out an opinion survey sheet with the N. L. this fall and if a sufficient response resulted we would make plans from that standpoint. If the survey fell flat, we'd just have to forget the idea for that year at least. I'll try to add the questionaire to our next N. L. (#46), so please be thinking of it in the meantime.

As we mentioned in #45, it would be a great thing to have all builders remove their cowlings at the same time and the new builders could go down the line and see how every item that we mentioned on page 5 had been done and have the T-18 owner answer questions on each subject, etc. If an organized effort was put forth, I feel that we could easily have 50 T-18s on hand the 1st year, and we could likely have as many as 300 to 400 builders and potential builders. We could have forums and seminars on most every subject, as well as several workshops. We could have interview circles where the builder and his airplane could be introduced in detail and photographed and a scrapbook type of thing made up from this data. In short, we could have every feature of OSH, but all of it revolving around just one type of airplane! There is a big difference between pipe dreams about such a project and the actual planning and organizing that it will take. First of all it requires a definite commitment from the rank and file that they are in favor of such a Fly-in and that they will be there and support it. A place and a date must be selected, motels surveyed, campsites and other physical facilities checked out, etc., so let's start with Step #1 and see what the majority would prefer, via the questionaire.

Don Taylor (44155 Benton Rd., Hemet, Calif., 92343, phone 714/ 925-7404) the first person to fly around the world (twice) in an airplane he built himself, is looking for new worlds to conquer. During Chino Fly-in time he set a new record in class for Los Angeles to Las Vegas and return. He has now planned another long, long flight, but before he can make definite plans he has need of a new sponsor. There are a lot of expenses other than fuel to consider on such a venture and are beyond his personal budget as an Air Force retiree. Perhaps you might know of a company or even an individual that might sponsor such a flight? It never hurts to ask, you know. If you have some ideas along this line and need more details give Don a whistle.

As you probably know, Don's T-18 has integral fuel tankage in the wings (the so-called wet wings) to get the range that he does. Quite a few builders look wistfully at the idea of longer range for their T-18, but the specifics of the project are elusive to them. Don went to John Thorp for advice when he first built his wet wing and followed his recommendations with obvious success. Don has promised to describe in detail what's involved in an article for our N. L. in the very near future. Any other builders that have gone this route are also requested to write anarticle about it. Not only the specific steps in construction, but also their evaluation of it in service experience. .

Thoughts on fuel in the wings: One of the problems that can arise with fuel in the wings is that of lateral unbalance. if little or no fuel is in one wing and

the other wing is full, or nearly so. Obviously this could become critical on landing roll and could be compounded if a strong crosswind existed.

Airline aircraft have circumvented this problem with tank to tank transfer lines and dump valves, but their primary defense is fuel management. When a tank on one side feeds and the one on the other doesn't you've got a problem in your lap immediately. Proper fuel management on a single might involve switching from one wing tank to the other every 15 minutes, if you don't have the capability to feed from both tanks simultaneously, as Cessna does. The 15 minute bit would only produce an average 12-14 lb. unbalance, allowing a controllable and fairly symmetrical loading for landing. It probably would mean a landing earlier than that originally planned, too.

Fuel in the wings is "self relieving" in flite, as far as positive G's goes. In other words it doesn't increase the bending load on the spar in flite, like adding that much weight inside of the fuselage would do. However landing with a lot of fuel weight in the wings (negative G's) could cause structural damage if the landing was hard. The above statement is a generalization and isn't intended to be a specific guide. Some of these things are unknown "gray areas", in view of limited service experience and it would be wise to consult with the aircraft designer on the subject. At least until there is a larger reservoir of service experience to draw upon.

Slipper Tanks: One of the simplest and most trouble free extra tankage system could be a "slipper" tank, inserted spanwise in suitably shaped lightening holes in the nose ribs of the outer wing. The simplest form of this would be an irrigation pipe of some diameter less than the spar height. A 5" dia. pipe will yield 1 gal./running foot of length. I don't have any numbers on it, bbtt my feeling is that you should have about ½" of rib web above and below the pipe, along with a 90° flange around the lightening holes to properly support the tank. Such a tank wouldn't use but a portion of the available space in the nose rib and would be wasteful in added weight- especially so if the irrigation pipe is over .032. Additional nose ribs might be desirable. An abbreviated length of slipper tank could also be used in a portion of the outer wing on the rear side of the spar.

If you find the irrigation pipe idea wasteful of space and weight, perhaps a tank shaped like the leading edge area of the wing and made of .040 6061, with a single welded seam running spanwise would be a better alternate. How would you form such a tank? Easy. Use a brake. Bend the lower rear corner, leaving about 3" standing vertically (to be trimmed to size later). Then form the bend of the nose of the rib by a series of small bends of just a few degrees of bend and then wrap the top back until it contacts the vertical rear "tank wall". Trim and weld the seam. Prior to welding this seam insert a pre-fabricated "rack" of baffles. It's not considered good practice to weld baffles to a tank anymore, as the attach points are "hard points" and have been found to be a source of leaks. A better set up would be a series of under-size "nose ribs" joined together as a unit, via pop riveting to light weight stringers, which maintain spacing between the baffles. Tank ends are also under-size "nose ribs" welded to the ends of the tank. The filler neck should weld to one end, coming out flush with the wing tip upper surface. Don't forget to add an external tank drain at the lowest point of the tank.

Be aware that any airplane with fuel in the outer wings have a possible additional hazard in the area of spin recovery. A recent NASA spin tunnel report shows that the amount of mass and the distance from the CG was a more important factor in spin recovery than anything else---even CG location.

P.S. SEE N.L. #48 FOR CALLIE WOOD'S COMMENTS ON THE SLIPPER TANKS IN HIS "FORERUNNER"

FOLDING OF THE WINGS: A question has been posed about the possibility of folding a wet wing (in the T-18C version). Q. "Is there room for a flexible fuel line in the wing [illegible] area and could it be folded and unfolded without disconnecting or re-connecting the fuel lines? A. Yes, there is room and, no, you probably would have to disconnect the line to fold the wing. It would not be practical to fold the wing with any fuel in it and definitely not to transport it.

Folding VS Removable Wings: A few of the convertible wing builders have said that they plan to install the wing folding mechanism strictly for future use, when and if hangar space and costs get out of line in their area. They also said it would be an excellent item for future sale. Some others I know of will use the wing folding feature as a means of removing the wing easily and perhaps towing the airplane on its own wheels or a trailer (since it is of legal highway width with the center wing attached). If one wasn't able to fly often, the extra time and trouble of removing and attaching the wing probably wouldn't be too objectionable.

Folding The Standard Wing: One of the standard wing builders called me the other night and said he was contemplating making the standard wing foldable at the center-outer wing joint. It seems that it would be relatively [illegible] to find a hangar to share if he could fold the outer panels and reduce the span to 13'. His solution was to pull the bottom pin (bolt) of the fitting and fold the outer wing up over the center one, like a Navy fighter. He said he had worked out a quick removable gap cover and a quick disconnect for the aileron [illegible], but was in doubt about the fittings, whether to use the present ones or go to a steel fitting (for better wear resistance).

I'm not qualified to answer that question, but if I had an opinion I'd be inclined to NOT add around 15 extra pounds of weight in fittings for that type of wing folding. I'd be more inclined to consider a steel hinging at the rotational point, but I'd certainly have a professional opinion before I made any such decision.

#1051 FLIES: I got a letter from Clayton "[illegible]" Iverson, 115[illegible] [illegible] Lane, Hales Corners, Wis. 53130 a few days before OSH, telling me that his T-18 was signed off and ready for test hop, but that he was a tri-gear pilot only and he was taking tail dragger dual in a Citabria. It alarmed me to think of a barely tail wheel qualified pilot doing a test hop on a brand new bird that might possibly turn out to be a real squirrel on the initial go, so I wrote him back and asked him to defer the 1st flite until OSH time and that I'd do it for him if conditions were all favorable. He agreed.

He drove me down to Burlington, Wis., where the airplane was. On the way I plied him with lots of questions on how he built nearly every item on the airframe and I learned a lot about him and the airplane from his answers. On arrival at his airplane we gave it an item by item going over, with more questions until I was thoroughly satisfied that he had built an exceptionally good airplane. His obvious sincerity and conservatism made lots of points with me. There was only one little item I was dubious about: At the suggestion of someone else, he had given the gear a wee bit of "toe out" and when I did an eyeball evaluation of the airplane, standing about 100 ft. out in front of it, I was pretty sure that I could see it. This made me expect the airplane to be skittish.

While waiting for the ceiling to lift I did a couple of taxi runs with it and sure enough it got pretty touchy on roll out when power was cut, but it was controllable if you kept on it every second. I've flown several T-18s that would "dart" with you at around 40 mph on roll out and later found out that each one had toe out in at least one wheel.

After about a 3 hr. wait on the weather we finally got a little improvement, but still not enough ceiling to do the stall series, etc. I decided to go ahead and

[illegible] account of your TEST FLITE — IN DETAIL?

make a short flight with it around the field to check it for trim and engine cooling. I made still another taxi run with it and it felt so good I went back and got my canopy breaker (hammer) in place and lit the fuse. I took off west with a NW wind of 10 to 12 knots, swinging around to the north. This put me out over good, open country. By making a 30° turn to the right soon after I broke ground I began a teardrop pattern, of 180° change of direction, that could have allowed me to return to the field for an east landing (after 300-400 ft.) if engine or other problems arose. It also put me into the wind a little better if something turned sour under 300 ft. No such maneuver was necessary, as the bird flew very well and everything was solid. No temperature indication was out of the box, so I bent it around and came back to the field for an east landing.

On a purposely high final I very gradually pulled full flaps a few degrees at a time, ready to dump them if it started to roll. It was a little lady , so I left 'em down and went ahead and put it on the numbers. I always seem to luck out better landings with a little bit of crosswind to contend with. Perhaps I work at it a little harder to put it on the upwind wheel out of the forward slip approach. Anyway, Bud was one happy guy to find out that he had a good airplane.

His airplane is powered with the 160 hoss Lyc. and it swings a Sensenich wood prop of 66 dia. and 78 pitch, which is too much pitch and lugs the engine. I only got 2300 rpm on static run-up and in flite it was still far below the 2700 rpm where the engine is rated at 160 Clydesdales. That pitch would appear to be closer to right for 180 hp. I would guess that a 66-76 would be a better prop. Time will tell how well it works out.

I just got a letter from Bud and he said on checking wheel alignment that he had to add a 1/16" tapered shim to his right wheel and now it is a real pussycat for him to control on the ground, even up to 55 mph, so now he's even more pleased with N5184T.

Bud was supposed to get some dual on a local Mustang II, but his friend bent one of the gear legs on the first demo landing and wound up creaming it completely, but he and Bud didn't get hurt.

N4354A and Chris Fast: Excerpted from a letter Chris wrote me several weeks ago: "I have just completed a pair of outer wing panels (folding) for Kenny Knowles and Lu, built to the new airfoil coordinates. Will deliver them tomorrow so Ken should be able to fly them to OSH this year.

This is the 4th set of T-18 wings I have built and will say that the riveting sequence you described in N.L. #45 is accurate. Let the spars 'float' until any twist is removed (usually by shimming between the main spar and ribs as necessary), then drill the spar holes last. And, yes-the lap joint on the outer wing skins (T-18C) is no problem when overlapped.

One more thing you might discuss that may be bothering some of the boys is the preparation of the outer wing spar caps on the "C" wing. These have to be skil-sawed to size from the oversize angle, as furnished by Ken. The sawing relieves internal stresses and you wind up with a sizeable curve--both directions. I have found that the best way to bring them back straight is to "massage" them with a flush set in my rivet gun against a steel angle along the edge of my work bench-being careful not to overdo it and cause a curve in the opposite direction. You may also find that the spar is slightly curved after riveting the caps to the web- so straighten it again by the above method before skinning the wing. This is important if you want good wing alignment (Amen-Ed).

About my ship, N4354A

Weight-910# with C wings Engine O-290 GPU, converted by John Thorp with D-2 pistons, 7:1 Comp. ratio, 135-140 hp.

Prop- Sensenich M76EMS-8-71, 68" dia. & 71" pitch.

The prop was vibration tested to determine critical RPMs (test sheet encl'd). My O-290 turns this prop 2200 static at S. L., 2400 on climb out, which gives 1200 fpm with full load. Turning 2400 at 5000' and Man. Pr. of 19-20 the ship cruises out at 150 mph CAS (70% power) which is the power I usually use when in a hurry to get somewhere and it burns 6-7 Gal/Hr at this power. Top speed at S.L. was 180 IAS turning 2875 rpm with the standard wing. Haven't tried it with the new wing yet.

Instrument panel includes: Electric T & B, vac. gyro horizon and D.G., Genave Alpha 200A nav/com radio, wing tip strobes, etc.

About Chris: 66 yrs. old and still thinking and feeling young. Retired 3 yrs. ago after 40 yrs. with Douglas as Quality Control Administrator, transport aircraft. Now I'm enjoying my home workshop, building T-18 assemblies for my friends, mostly for Ken, and my A&P license and my private pilot license were issued in 1935.

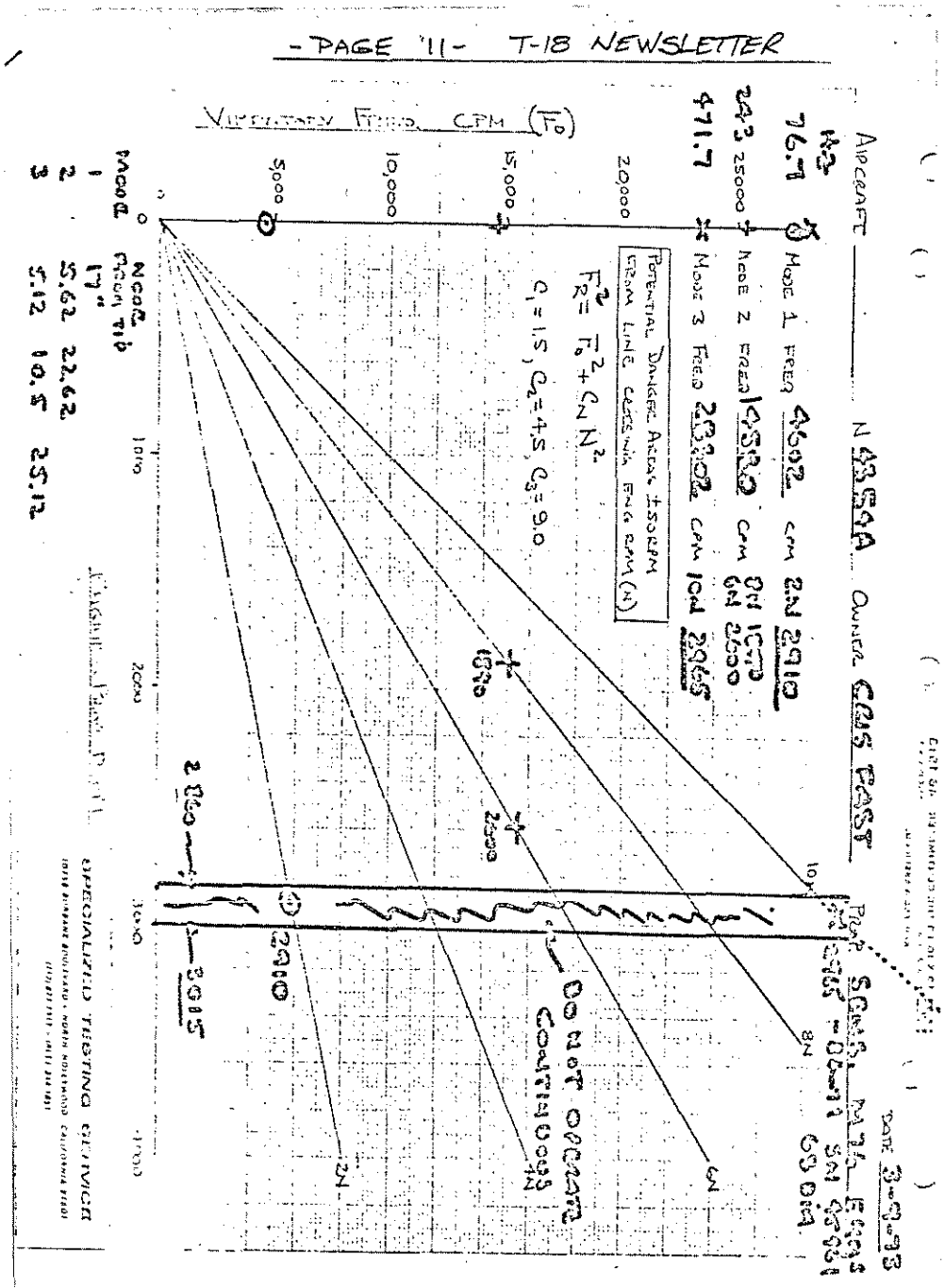
I had a preventative maintenance triple by-pass done on my heart arteries 2 yrs. ago, so my med certificate is still under "negotiation" with the Feds. I hope to get it back this yr. , as 2 yrs. seems to be the magic no. Also, I just passed all of the tests, including a treadmill test given me by the FAA cardiologist that sits on the review board in Wash. DC. I've lost track of Cats Tokle and I'd like to give him some of the info on this. In the meantime I take a pilot with me when flying, so as to not break the law. Hoped to make OSH this year, but a conflict came up and will miss it.

About the T-18 Fly-in you mentioned, but have no suggestions for the location of it at present." Best regards, CHRIS.

Thanks for a fine letter, Chris, and especially thanks for that tip about the straightening extrusions by massaging them with the rivet gun. Several years ago I used my rivet gun in a like manner to get the curve in the fuselage ext'n, with good results. I also had used it to straighten outer wing spars (C), but it didn't occur to me to do it on the caps. I I made up a little gizzy to straddle the rivet heads on the spars, so as not to overdrive them. I used a scrap piece of 3/4" thick alum, about 4" long and 1.5" wide and sawed a slot in it wide and deep enough to clear the rivets. Driving a long line of rivets stretches the metal a little bit around each rivet hole and the accumulated stretching will cause a part to "grow" noticeably, hence the curve. On a long line of rivets you should never start driving at one end and go down the line. Skip around in some sort of order, or else you'll find that pre-drilled holes won't match down the line.

That stretching of the metal around a driven rivet isn't a real problem if you are aware of it. Next time you're around a T-18 get well out in front of it where you can eyeball it for alignment and you'll see a tiny bit of dihedral in the horizontal tail. If you can't see it, measure it. It's there. It's due to one less rivet on the bottom of the fitting than on the top, so one side stretches more than the other. That's nit-picking, but it's a pretty good way to be aware of the results of stretching.

We're including Chris Fast's prop test sheet in this newsletter and I think you will find it educational. I would suggest you drag out a copy of the article about propellor fatigue, written by Lu Sunderland in the Nov. issue of Sport Aviation, pg. 25, and carefully review the subject if you are using, or thinking of using a cut-down metal prop. Your choice of a prop is one of the most important decisions you'll make in your life! Your very life can depend on it! Don't blindly buy a metal prop.



Note that page 11 is the chart on Chris Fast's prop vibration survey, as done by Specialized Testing Service, 10758 Burbank Blvd., North Hollywood, CA. 91601 phones: Office 213/877-7317, res. 344-1851

Note that the chart is a plot of Cycles per minute vs. RPM (or F_o vs. N, as they denote it. Modes 1, 2, &3 refer to where the nodes (non-vibrating points) are located with relation to the tip. Again referring to Lu's article, you can decipher the chart quite easily when you learn the meaning of the various symbols in the equations. If any of you do not have the Nov. 1972 Sport Aviation send me a dollar to cover costs of postage and Xeroxing and I'll send you a copy---or if enough of you request it I'll reproduce all 4 pages of Sport Aviation and run it in a future N.L. On second thought I'll do that, as that article should be a vital part of your reference file on the T-18, so scratch the Xerox offer.

You may note that due to less damping at higher altitudes, where the air is thinner, stresses on a prop can be as much as 75% higher above 10,000 ft. than those below 5000 ft. Be aware that on the "bad" M74 prop, cut down to 68", that the allowable stress of 4800 lbs. per sq. inch was exceeded by another 2000#/sq." when the prop was turning 2630 rpm.

These danger area rpms spread out to 50 rpms each side of the critical rpm, so it is absolutely essential that you have an accurate tach! To verify tach accuracy easily, run the engine at night with a fluorescent light near the prop. At multiples of 600 rpm the strobe effect from the 60 cycle current will cause the prop to appear to be stopped.

It's too bad the owners of the T-18 that crashed in Washington a few months ago weren't aware that this information was available. John Foy originally built the airplane, powered with a GPU, and he donated it to the EAA Museum several years ago. The museum sold it to Wag-Aero, who in turn sold it to a Mr. Christian in Calif. It had been re-engined with a 150 Lyc and a cut-down and re-pitched prop from a Cherokee was installed.

When the prop failed over Yakima with a loud explosion the vibration shattered the left side of the windshield and unlatched the canopy, sliding it back. Mr. Hallstrom, the pilot, was practically unable to see because of air blast and vibration and most of his vision was only a blur until he touched down. He cut the throttle and mixture and stalled the aircraft in an effort to stop the prop, and this almost succeded after two attempts, that also resulted in short spins. He spotted a plowed field and attempted to land there over a grove of cherry trees. He went thru a couple of small cherry trees and then over on his back. They later found he had hooked a steel cable on short final (a 3/8" thick braided power cable).

He and his wife had some difficulty getting out of the inverted ship, but he got out and tried to lift the wing to free his wife. By this time a fire had started and passerbys helped him get her out, altho' she suffered burns on her legs in the process.

John visited the accident site and inspected the wreckage in detail and he and the Hallstroms are convinced that only the rugged construction of the T-18 kept this from becoming a real tragedy and they all thanked John Thorn for such an excellent design.

I think this story should make one and all realize the seriousness of selecting a prop for an airplane. As we pitch props more and more to reach higher cruising speeds we are indeed tickling the tail of a roaring dragon, as Thorp says. To repeat, "Selecting a prop for your T-18 is probably the most important single decision you've ever made"!!!!

TELL US ABOUT YOUR PROP OR ENGINE INSTALLATION, PLZ.

Is a metal prop safe? Obviously it is or you'd see wood props on factory built

airplanes, but a metal prop is NOT safe if you haven't had a static vibration survey run on it. Don't let anyone tell you otherwise. Since most of the newer T-18s will probably have engines of 150 hp and up it's even more important. The formula that tells when a metal prop will fatigue and break is very simple: It's F x T, or Force times Time.

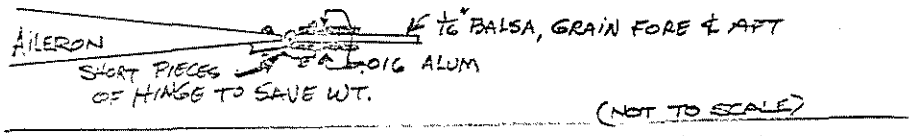
Many of the experts will say that a wooden prop is only about 90% as efficient as a metal one, but Bill Cassidy's wood Pacesetter prop pulled a Mustang II thru the traps at 225 mph on 150 or 160 hp. That same prop on my 160 hp. T-18 gives me a top of 196 mph TAS, as verified by timed runs. Show me a factory built airplane that will match that kind of performance, gear up or down. Gravel and rain are problems with any prop and more so with wood, but you can buy two wood props for what you'd pay for one GOOD metal one, and you can repair gravel damage on a wood prop. You file metal away on damaged metal ones. If you feel compelled to fly in rain, perhaps you'd better be thinking about a constant speed metal one.

UPDATE FROM HOWARD HENDERSON: Just rec'd a note from Howard after OSH and he said the wing leveler worked fine in smooth and rough air on way home from OSH. He only used it for short periods to map read, he said, as he thinks the servo has a somewhat limited life.

Howard and I had discussed the possibility of the servo tab becoming unhooked and fluttering and in turn exciting the aileron to flutter. He said he had talked at length with an experienced aerodynamicist with McDonnell/Douglas and that he agreed that by making the tab extremely light it would probably buzz at such a high frequency that the aileron would not respond. He said 1.75" x 9" would be a good tab size. 3 to 4 lbs. of stick force will easily overpower full tab.

Also, " Most of the troubles on my installation and Keebler's can be traced to variations in airflow. I use a small motor blower and Keeb uses a needle valve attached to his vacuum source. My original cheap motor was not stable and Keeb's needle valve needs to be changed to a model engine type valve."

This is one gadget I highly recommend! (Sure sounds good). He says he now uses a high quality motor and stability is now very good. He enclosed a sketch of the tab cross section, shown below.



A few pages back we talked about a long row of rivets distorting a structure. The trailing edges of T-18 control surfaces are a good example. Bud Iverson scrapped a couple of ailerons because of the curve he had on the T.E. He came up with a solution that worked pretty well for him: He bent up a piece of .040 into an angle, with one leg about ¼" and the other about 1" and used it as the filler strip between the skins, instead of the flat piece of .040 normally used. After riveting up the T. E. he cut the standing 1" leg off and dressed it down. The stiffness of the standing leg kept it from bowing.

A detail that may escape you is the skins and filler strip don't lay flat together, unless the top and bottom skin are given a slight "kick" in a brake before bending. Some builders have also epoxied the three pieces together before riveting and gone back after the epoxy has cured and riveted it up. This also minimizes curvature, especially when the "scatter" sequence is used. Be careful and don't overdrive rivets, too.

More construction tips from Bud Iverson: Bending Flap Skins : Bud got some skin buckling in the mid area of the leading edge when he bent up his flap skins. The center part of any skin will tend to bend less than the outer edges because of uneven stretching. Buckling may occur if one attempts to wrap a skin around the ribs. Bud's solution to this was to add three more nose ribs equally spaced. He does have a pair of super-straight flaps now, I can testify. The pre-punched flap skins that Ken Knowles supplies have nearly an extra foot of skin added to the trailing edge of top and bottom skins to facilitate bending and for exactly locating the center of the bend. The two rear lines of rivet holes are clecoed together and the skins bent just like the wing skins, by laying a 2 x4 across and shoving down on it. It is VERY difficult to get an exact hole match, because of the difficulty of bending an exact L. E. radius. I'm sure it wouldn't be as much of a problem if .020 skin was used instead of .025. Someone asked Thorp about using .020 and he said it should be okay and that he called out .025 so that the builder wouldn't have to buy a sheet of alum for that one purpose only.

Still another method of bending the leading edge is to put a 5-10 degree "kick" with a brake right at the very center of the L. E. prior to actually wrapping the skin around the ribs. Again, you should have extra metal at the T. E., to be cut off after assembly. The little bit of stretching at the L.E. done by brake bending takes most of the fight out of the skin. (You can't see or feel such a bend).

Rudder Assembly (Iverson): Bud had difficulty getting at the A-536 rudder rib to buck it. Someone told him to turn it upside down and he said that worked fine. I made a note on the top rib that I can't decipher. I wrote, "On top rib, one flange up, one down, riveted together", so I'll get Bud to clarify for use in a future N. L.

Rigging the stick to the stabilator (Iverson): Bud said he built an inverted "U" shaped jig out of wood that clamped to #601 and #592 bulkheads to clamp the stick to. The airplane was put in level flite position and the 7 degree angle was drawn on the jig to align the stick with. Another builder put masking tape on the fuselage sides just ahead of the L. E. of the stabilator to measure deflection

Steve Riffe, 5208 Astoria, Amarillo, Tx, 79109, came up with this one: In an area that was too small to use a hammer to tap the nibbed Whitney punch and leave a punch mark, he put masking tape on the other part and simply hand pushed the nib into the tape. It left an indent in the tape and accurately located the hole center. Very good, Steve. That's a handy one.

Pete Gonzalez, 1318 Server Dr., Colorado Springs, Colo. 80910 : Pete has an O-290 in his T-18 (N290E, s/n 350) and now has a Posa carb on it and has picked up about 50 rpms with it. He is in the process of changing props now and is installing a Cassidy Pacesetter wood prop. His home field is around 7000 above S. L., so it will be interesting to see how it works out. He was at OSH and promised to send me a full history on the ship....soon." Several years ago I had the RV-3 prototype, which had an O-290 GPU in it. It had a modified MA-4 carb on it, (which was a little too much carb) and I bought a Lake carb and flew it for awhile just before I sold the airplane. It performed better than the MA-4, but it had no in-flite mixture adjustment. Later, a mixture control for in-flite use was developed and worked quite well I'm told. MA-3 and MA-4 carbs are getting very scarce and quite expensive. I'm told that a used MA-4 will sell for $250 to $350. That makes the Lake and Posa a pretty good buy for the O-290 boys. I have a friend here that had a brand new Lake (for a GPU) that I think he still has, as he sold his airplane before he could install it. If anyone is interested I'll find out about it. It's new cost was $150, but if he still has it and you need one make him an offer.

How DID YOU DO THESE THINGS WHEN YOU BUILT YOUR T-18

ELECTRIC TRIM MOTORS: In N. L. #46 I made note of a low cost, light weight, DC motor that was just about ideal for electric trim. I just got notes from two builders that had ordered motors from the co. listed and they are out of stock and don't expect to have them later. Drat it!

At OSH Wallace Hunt handed me a Xerox of an almost identical spec motor made by Varo, Inc. It is available (I think) from their Electrokinetics Div., 402 E. Gutierrez St., Santa Barbara, CA., but I have no other info on it at present. Wallace also included a Xerox from Airborne Sales Co., 8501 Stellar St., Culver City, CA. (P.O. Box 2727, 90230) and they have new, surplus Varo motors for $10.50 ea. Their catalogue # is 3175.

How about one of you Calif. boys that live near Culver City going by there and checking it out as to the number they have on hand, how fast the shaft turns on 12V, etc. and let me know? Also if anyone else comes on a source for a cheap, light wt. 12V reversible motor with a gear box that turns very slowly let me know, plz.

ED BURKE, 250 Franklin, Pittsburg, Pa., 15241. is an old friend of mine from back in the early days of the T-18 in 1962. He bought plans #7 s/n, but because of his heavy schedule as an airline pilot for Allegheny and some 15 years as a member of ALPA's All-Weather Landing Systems Evaluation Team, he never found quite enough spare time or energy to finish up his project. Persistence pays off, tho', as he now has a T-18 to fly (and pet) until he gets his finished. Ed bought the T-18 that you saw advertised at OSH for 10K and he jumped in it and flew it home. He got a real bargain, too, as it very well built.

It turned out that it was the 2nd T-18 built by Bob Kaergaard, who lost his 1st one in a hangar fire. Anyway, I'm delighted that Ed now has a T-18 after all these years. He called me the other nite to tell me how much he and his son are enjoying flying it and to thank me again for telling him about it.

+++++TRADING POST+++++

Project For Sale: Bob Lanoue,13 Mattabassett Dr., Meriden, CT, 06450 has gotten some bad news about the amount of his upcoming retirement income, so he has to put his project on the block. He has the two outer wings (st'd) finished and signed off by the FAA in Oct. '78, entire fin, rudder, and stabilator from parts supplied by Ken Knowles, a wide body canopy frame from K.K., #522, #537-5, and #602 fittings (4 sets) from Dewberry, plus aileron weights and #499 bushings and pivots. He also has a new set of plans, in which only 2 sheets have been used, all back newsletters, and reference file for material. Wings are flush riveted with Monel pops that were press fit after original drilling of 3/32 and dimple and drilled out to #30 (good). Wing fittings were also press fit. He has $1310 worth of 1st class parts and assemblies that he'll sell for $1000. That's a darn good buy for someone.

Fuselage for sale, Milton Mershy,12107 Drujon, Dallas, Tex., 75001,214/387-0445 has an unriveted fuselage for sale(st'd width) and also a fin, a set of Ken K. wing ribs,wing skins, wing beams (unassembled), clecos, etc. He was informed of backlogged "Honey Do" projects that came before airplane building and so he gave up and bought into a factory type ship. Milt is very busy and hard to catch and I know he wants $650 for the fuselage and fin, but I don't know about the rest of the items. If you are interested give me a call some nite and I'll get the dope on them in the meantime.

List your left-overs: If you have decided to sell your project, an engine, a prop, instruments, radios, plans, newsletters, major or minor airframe components ....in fact anything that a T-18 builder might use...yes, even tools. If you have finished your airplane and want to sell your clecoes, compressor, rivet gun, etc., just list it here. If the N.L. sells it make a little contribution to the fund. No junk,please...and please, fellows, let's take pride in the fact that the T-18 M.A.S. is an outstanding example of the Golden Rule in action.

Q and A: "Why are actual dimensions shown on some parts, while on most of them you'll have to subtract one water line or one station line from another? A:... The parts that are NOT in a purely vertical plane, such as the fire wall, the dash frame or seat back frame require actual dimensioning, as all water lines, station lines, and butt lines are in planes perpindicular to each other. Anything not in these planes of reference would correspond to the hypotenuse of a triangle.

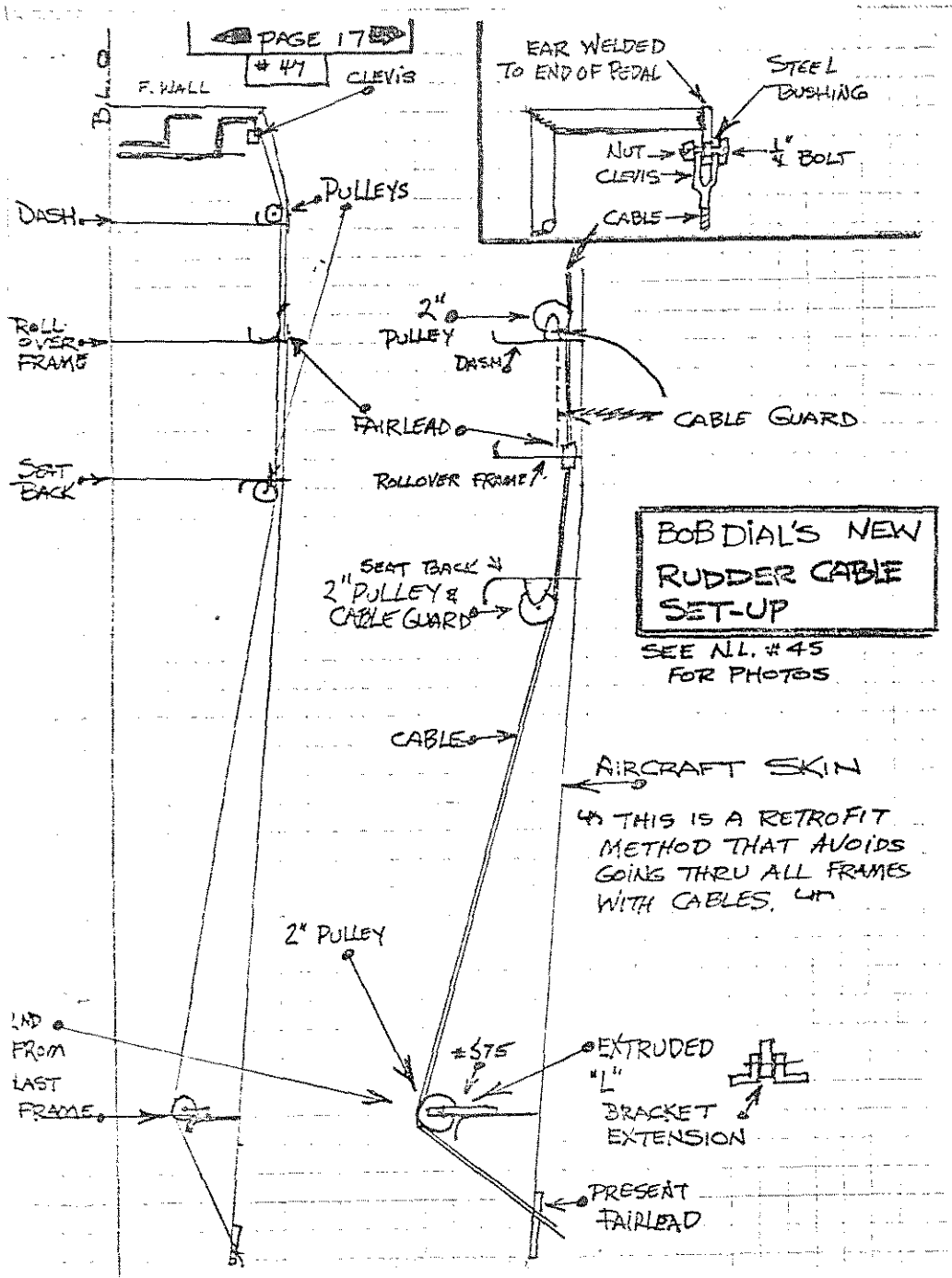
Computers as a shop tool: The hand held computer is as common now as pockets on a shirt and just as handy, too. For those of you doing your own layout work, it is an essential. I was helping someone lay out a part a while back and after subtracting one water line value from another on the computer, we left the answer in the computer, which was right in front of us, as we laid the part out. I had to think back to the "old days" when we'd do all of this computation right on the drawing on a vacant spot. Repeating the number to ourselves we'd start to layout the part. Somehow ever once in awhile we'd measure a wrong dimension and the waste basket would get a new part. To put the computer right in front of your scale and the work it'd be a lot harder to make a goof. Another thing that almost guaranteed that you'd make a mistake was to have a visitor talk to you as you worked. Anything that breaks your concentration causes mistakes. 95% of the ruined parts are caused by measuring something wrong.

Protecting alum: It's an almost foregone conclusion that you'll scratch alum in the process of building. Unless you are going to have an unpainted T-18 the scratches are no big deal if they aren't deep, as they can be polished or sanded out with Scotchbrite (a pot scrubber pad made of plastic and found at groceries and Hardware stores) or sandpaper or Sandscreen. There are strip-off plastic films available that are sprayed on and later peeled off as a sheet,that do a good job protecting against scratching. One is Fabrifilm (Turco products).Another is "Spraylatt", which is highly recommended to protect that brand new canopy from scratching. One of the places it can be bought is at a Sign Painter Supply house here. If you live in an area where such products are not available you might want to just go ahead and put a thin coat of primer on. Naturally,you'll want to Scotchbrite it and thoroughly degrease it before painting. There a several good 2 part primers on the market, that are much better than zinc chromate as a proper paint base. I'd get an etching primer. Sherwin-Williams and DuPont both have excellent ones. There are other good brands, too. Zinc chromate is very dangerous to inhale and as a result you can only buy spray cans of it at regular aircraft supply houses. Paint doesn't like to stick to alum, as the oil they use on the rollers at the mills gets into the pores of the metal. A simple test to see if you've properly degreased is to flood the part with water. If it beads up like your newly waxed car does you'd better repeat the process.

Never leave paper between stored sheets of alum. It absorbs moisture from the air and very soon you've got a crude galvanic battery going and soon you'll have corrosion on those new sheets. I've seen sheets ruined in one day's time. If alum is kept clean it doesn't hurt it to get wet. It's also a pretty good idea to keep alcohol around the shop to wipe off fingerprints each day. The acid in your perspiration will quickly etch your prints into the alum. No, I don't think bourbon would do, but it might be handy to have around if you need to console yourself after goofing up a part.

Routing Rudder Cables: Pg. 17 is Bob Dial's sketch of rudder cable re-routing. I now have a complete write-up on it for next N.L., plus drawings and write-ups on electric flaps, but we're out of space for this N.L. Also have 2 photo pages and write-ups on step-by-step spinner inst'n, 3 pages of specs on different T-18s now flying, an excellent method of laying out 2nd degree curves, plus a several other goodie subjects. I do need your tips, comments, experiences, your performance specs....anything. We'll keep MAS going as long as youse guys send in items.

I PLAN TO HAVE N.L. #48 IN THE MAIL ABOUT NOV 1-15
GOOD LUCK. DICK



JIGS ABLE TO ADD THESE TWO PIECES AFTER WEIGHING COPY, BUT BEFORE SKIN. AND OTHER ITEMS WILL HAVE TO WAIT UNTIL #48 COMES OUT.

CHANGING PROPS AND SPINNERS: Some of you will probably have this little problem to solve one of these days, so the following account might be of interest. There are other ways of doing this, but this method worked for me and it's simple to do. The pictures of it are sequenced in about the order of doing things.

"When I changed engines on my T-18 I also changed props. I went from a Sensenich metal prop to a Cassidy Pacesetter wood prop. The Cassidy prop was 4.47" thick at the hub, considerably thicker than the metal one. This meant that the front bulkhead of the spinner was now moved forward, so would now be too large to fit inside the spinner shell. The blade root profile was totally different, too.

Francis Richardson needed a prop and spinner for his new T-18 with the 125 hp O-290, so I sold these to him. I had a blank, undrilled spinner that I'd bought from John Tonzer back in '64, so I decided to go from scratch with it.

Scratch it was (head scratching, that is). I had to reduce the size of the front bulkhead , trimming the old flange off and adding tabs to be riveted to the shell and bulkhead. The problem was to determine the exact size of the forward bulkhead in its new position.

I dug out my Jan. '76 copy of Sport Aviation and re-read Tony Bingelis' explanation of installing spinners. It was excellent, but it didn't cover my problem. I also went back and re-read Bob Kaergaard's account in T-18 N.A.S. newsletter #16 (pg. 4). It, too, was an excellent guide to spinner assembly, but also was no help in re-sizing the front bulkhead.

I could add up the width of the rear bulkhead flange, the prop thickness, the hold down plate on the front of the prop, to get the new position of the F.B.H. bulkhead, but simply measuring that distance on the inside wall wasn't acceptable, due to the shell taper. This was the equivalent of measuring the hypotenuse of a triangle, instead of one of the legs. My calipers weren't that big, so I had to do something else.

I hit on the idea of the idea of an External Reference Frame. It consists of a flat plywood base with a couple of vertical risers spaced a little farther apart that the diameter of the shell. I added a cross piece at the top to stabilize the verticals and carefully squared it all up.

From the base of the ERF I measured the total thickness of all items and marked it on both legs of the verticals. With the shell centered between the verticals I measured horizontally to the shell from each vertical. Adding these two measurements together, plus the skin thickness of the shell on each side, and subtracting that total from the total distance between the verticals gave me an accurate diameter for the bulkhead's new position.

By clamping a piece of extrusion across the verticals and holding a pencil against it I could accurately locate this point on the outside of the shell by rotating the shell.

Spacing holes for spinner bolts : My only remaining problem was the precise spacing of holes to attach the shell to the bulkheads via nut plates on the front of the bulkheads. To get this proper spacing and provide exact 180° reference points for beginning the blade root cutouts I used a piece of scrap alum about 2" larger in diameter than the spinner shell base. Using dividers, I scribed a circle on it the exact dia. of the spinner. Then thru the center point I scribed lines thru and beyond this circle, laying out lines 45° apart (via protractor). I could then sit the shell down on this circle and transfer those points to the spinner shell easily.

To do the same thing for the front b'H'd I duplicated the above procedure except that I cut the circle out. This left a "collar" that would slip on over the shell and allow me to accurately space the attach bolts. I could index a point on the