

Feb. 5, 1971

T-18 NEWSLETTER NO. 32

L.D. Sunderland, 5 Griffin Dr., Apalachin, N.Y., 13732

FLIGHT REPORT - Chris Fast, 507 Almar Ave., Pacific Palisades, Calif., 90272 - Reading T-18 Newsletter No. 31, I am reminded that I have thus far neglected to write to you regarding completion of my T-18. Sorry I missed you in July, would like to have shown it to you. Serial #262 was a five-year project and was test flown by Jack Parks on August 15, 1970. I now have fifty-nine hours on it with virtually no problems at all and the FAA lifted the restrictions on it last week. The O-290-G was built up by John Thorp and with 7:1 pistons turns a Mensenich 68/67 prop 3100 rpm. A 2500 rpm cruise produces a 150 miles per hour ground speed and the 3100 rpm gets a ground speed of approximately 176 miles per hour. It may do better after I install the gear fairings but I am happy with its performance. The big thrill to me is the way it climbs -- 1500 feet per minute at 100 miles per hour with two on board and 2000 feet per minute solo. It has Rudy Adler's wing root fairings so no tendency to "tuck under" with full 40° flaps. Stalls straight forward at 60 miles per hour and 55 miles per hour with flaps. I have John's drawings for the crankshaft flange reinforcement and hope to have it completed soon. Earl Ode tells me it does aerobatics very well but I will wait for the flange reinforcement before I take any lessons from him.

It has one of the first all-metal cowlings, developed by Jim Roberts from Thorp's drawings. It is a snug fit around the engine and I had problems getting exhaust clearances but it is "clean" aerodynamically. I developed the banjo type air filter from John's plans -- it is a "free breather" and works well.

As for the seats -- I bought a pair of seats and tracks out of a wrecked Cessna 150, cut them down and re-upholstered them. They may be a little heavy but they are comfortable, and my wife and kids enjoy the seat track adjustments. Haven't seen any that I would trade for them. And speaking of "belts and suspenders", I used .032 side skins on the fuselage and I'd do it again. One test pilot recently told me that my bird is the only T-18 he has flown that didn't make a "canning" noise when taxied. Sure it cost me seven pounds, but then my total weight empty came out at 862 pounds, so I'm happy.

I would advise anyone building the T-18 to use reverse riveting (we call it the "bell bar" method at McDonnell Douglas) on the fuselage or smooth contour. This method employs use of a broad surfaced backing bar on the outside surface while the rivet is upset with the standard riveting gun and tee-shaped set from inside. It is impossible to leave rivet depression marks on the outside surface with this procedure.

Another point I might mention concerns the paint job. For good bonding be sure to treat all surfaces to be painted with an aluminum con. Follow this with zinc chromate primer (or FR primer if you can get it, it's catalyst mixed). Do not allow the primer to age before applying the finish coat. One to two hours is maximum. For best adhesion the finish coat should be a catalyst mixed paint, preferably polyurethane. Synthetic enamel or lacquer will not bond sufficiently to stand a tape test.

In closing, let me say how much I have appreciated the Newsletters; you have done an excellent job and it has helped us all. And speaking of help - who could build one of these little birds without it. These T-18's are a grand group and it's been a rich experience working with them.

T-18 to 747 - L.D. Sunderland, 5 Griffin Dr., Apalachin, N.Y., 13732 - If you were to ask the average T-18 pilot what his wildest dream would be regarding his flying accomplishments, he might have to admit that he would like to see what it feels like to fly one of the really big ones like a 747. Once a person has flown a T-18, he has some idea of how a nice hot fighter like the P-51 feels, but a 747, that's just beyond comprehension.

Well, this T-18 pilot had his wildest dream come true last week when he slid into the left seat of a Pan Am 747 and the instructor said, "It's all yours, do anything you like". This fantastic opportunity came when I put a new type of rate gyro, which is solid state (no rotating parts), into the autopilot of the 747 and we took it up on a combination crew training and test flight.

After the two trainee captains were put through various exercises like emergency descents after de-pressurization, stall recoveries and various types of landings - manual, automatic, and with flight director, the instructor put me in the left seat so I could check out autopilot operation with our new gyro installed. Much to my relief, everything went fine with the test. During this time, I flew around in the vicinity of Atlantic City where Pan Am usually goes to practice landings. Much to my surprise, the 747 has ideal handling characteristics even with the gear down and 10 degrees of flaps. I was most surprised at the roll response. There was no big lag like you might expect, but the wing seemed to move just as fast as you turned the wheel. It was much better than many light airplanes I've flown. Of course, with the hydraulically boosted controls, the feel forces were ideal. The only unusual feature is the rather high detent force on the rudder pedals. Automatic turn coordination is supposed to keep the ball centered when you fly it manually, but it doesn't do too good a job and the ball hangs off slightly. When I tried centering it with rudder pressure, nothing happened. Then I finally discovered that it was necessary to really push the pedal to get it out of detent. But I soon decided there was really no need for rudder and just enjoyed myself doing steep turns and trying to get used to a strange panel.

My overall impression was that while in the pilot's seat, you didn't get the feeling you were flying a large airplane. It was just as easy to fly as a light twin. The wings and engines are swept back completely out of view and you can't even hear the engine noise. You don't really appreciate the size of the monster until you climb out of the seat, descend the spiral stairs and go for a stroll to the tail. All I could think of was, "Wow! What a miracle!"

The view from the cockpit, near or on the ground, was something else. While sitting on the huge concrete apron with nothing around as a reference, it didn't seem too unusual until I spotted the tiny speck of a ground crewman three stories below. On takeoff you go charging down the runway during a very rapid acceleration and then instead of gradually taking off, you rise straight up in the air very rapidly and finally the wheels come off. With an empty load, she really climbs. We held over 3,000 fpm. Landings were also a thrill for besides being sure you could never get that much airplane on a tiny runway, the cockpit seems like it is 200 feet in the air during flare. It is a real relief when the wheels grease on much more smoothly than most big jets.

When we pulled up to the passenger terminal at JFK, it seemed that we were parking a tall building, but the airplane was only half as tall as I felt when I walked away from the 747, looked back and asked

myself, "Did I really fly that thing?"

AIR PROGRESS ARTICLE - Editor - Just received a letter from the editors of AIR PROGRESS Magazine saying that they will be publishing an article I wrote on the T-18. It will probably be several months before it appears.

LAW SUIT - As you read in SPORT AVIATION, John Thorp is being sued as the result of a T-18 accident. Many of you had gotten wind of this already and generously offered financial support. But it hadn't been publicized through the Newsletter yet because there is a chance it will never come to trial and John didn't want to get everyone stirred up prematurely. However, now that the "cat is out of the bag", here is the story.

As was reported in the Newsletter, Bill Hutchison was killed when his T-18 was observed by a witness to spiral down striking a power line and crashing. Investigation showed no structural or mechanical failure. Other pilots who had flown the airplane said it had a bad wing drop-off in a stall, apparently due to a bad twist in the wing. Bill talked to John about this but said he wasn't going to re-skin his wing because he didn't plan to stall his airplane anyway. Someone who knew Bill well said there was evidence that he had never stalled it. Bill was a WW II P-51 pilot with no recent flight experience. He had had another pilot make the test flight and at the time of the accident, the airplane had 16 hours on it.

The FAA report (I didn't read it) found nothing wrong with the airplane and concluded it was a stall-spin accident. John Thorp made an off-the-record comment to the investigator that the T-18 doesn't give a lot of warning before a stall and the guy included this statement in the report. (I think John was completely wrong in this statement because it does give a lot of warning -- at least the many which I've flown, and I think I've flown more than John has.) Anyway, there are certain lawyers who make a living following up accident cases. Some people call them "ambulance chasers". This is the kind of thing they look for.

Also killed in the crash was Jerry Finney who had his T-18 about 90% completed. (It was later bought by Ford Hendricks in Seattle and I got a letter yesterday saying he just made the first flight.) Mrs. Mary Finney moved to Florida after the accident. Two different lawyers approached her about suing John for the accident but she declined. Finally, a third one flew his personal Lear Jet to Florida from California and talked her into suing for \$750,000. Last fall, John was served papers listing charges such as defective design and negligence.

As ridiculous as these charges are, John still has to defend himself. Lawyers won't guarantee any maximum but one estimated \$20,000 and another \$12,000 to fight the case. In all probability he could win the case since it is so absurd, but even so, it would wipe him out since he has no insurance for this sort of thing and only owns a small house and shop. Since Mrs. Finney has no money, she couldn't pay for his attorney if her case failed. So it is impossible for John to win if it goes to trial. He hopes that it will not get that far. Since Mrs. Finney's attorney found out John had no insurance he hasn't been heard from. So, John has his fingers crossed that the case will be dropped. In the meantime, he hasn't got much sleep. If the case goes through, I may be asking for some help from all EAAers.

CENTER CONSOLE - Just had a visit from #353, Casper Tootgoshin, 1011 Langs Ave., West Bristol, Pa., 19007. He is trying to get his T-18 into the air and wanted to see how I had solved some of his problems. He has been within "about a month" of flying for nearly a year.

When he climbed into my cockpit, he commented on the amount of room it had. He said he had put in a center console below the instrument panel but was sorry now for he doesn't have room to adequately move the stick for roll control. I asked him why he disregarded all my strong advice against this and he said he had seen some pictures of center consoles in SPORT AVIATION and thought they looked good. Also, he didn't set the panel back like I recommend so didn't have enough depth for his radio.

Because of the console, he didn't think he could reach a gas shut-off valve so didn't install one. Use of a console, of course, does not prevent use of a shut-off valve with a rod connecting it with a handle on the console. A shut-off valve is an absolute necessity for a gravity feed system for you don't want to have to drain the tank everytime you work on the carburetor. It is also necessary for safety reasons. So now he has to do it over and put one in.

He obtained a Tri-Facer muffler and had it all fitted in behind the engine mount. But he ended up with only 1/8" sway space which is far too little. I finally talked him into doing it the easy way, like the plans. He said this held him up for months. Anyway, after he had a ride with Don Carter, he went home all "hot to trot" to get into the air. His advice is, "Don't deviate much or you'll be sorry."

ENGINE BALANCING - When I replaced my crankshaft in my engine due to the flange failure, I had the main moving parts balanced at a local shop that specializes in balancing hot rod engines. This included ~~shaft~~ shaft, pistons and rods. To my amazement, the rods were really out of balance. The reason appeared to be that the rods were made from forgings with two different numbers. This could have been the source of the engine vibration that caused the flange failure. So, be certain to have the O-290-G engine parts balanced. When I told John about this, he was not surprised. He said before he balances rods he matches up a set with all the same forging numbers. Of course, if you have only one engine, you can't do that. He said rods in the G engines can differ in weight by as much as 7 to 16 grams. Continental balances their engine parts to 1/2 gram. The hot rod shops usually balance parts to 1/4 gram.

Rods are balanced by supporting the small end and weighing the large end on an accurate scales. The bearing caps of three rods are ground off to match their respective rod weights with the lightest one. Then material is ground off the small end until all rods weight within 1/4 gram of the same weight.

ROD BOLT TORQUING - The first connecting rod bolt which I tried torquing to 40 ft-lbs never made it. The highest torque reached was about 38 ft-lbs and then the bolt just kept on stretching and necked down under the head. I sent it to John who split it to inspect for flaws but found none. But again, I didn't find out anything new. He said he ran into bad bolts before, one in an engine that had thrown a rod. He thinks they must have gotten a bad batch of bolts which weren't heat treated properly. This is why he always torqued

his bolts to 40 to 50 even before Lycoming raised the recommended value from 30 to 40 ft-lbs.

THE FOUR-PLACE SKY-SCOOTER - Most of us have heard some mention about John Thorp's connection with the design of the Piper Cherokee, but few know the details.

It all started in 1942 when John designed the two-place Sky-Scooter. This fine little airplane seemed to be at the wrong place at the wrong time, and although several attempts were made to get it into quantity production, it never made the grade. Only eight were built. Although none of the big boys would buy the design, Bill Piper came to John and asked him to make a four place version of it. So, John did the basic design of the airplane that was to be the original Cherokee. He took the plans to Fred Weik, who was still a professor at Oklahoma A & M, and he approved them before John took them to Piper. Later several changes to the design were made and John disclaims any connection with them but the Cherokee 135 was basically John's design. He also built landing gear parts for the first five airplanes in California.

LANDING GEAR - As I pointed out previously, if you have a suitable lathe available you should turn down at least the outer 1.5" landing gear tubes to reduce weight and make the gear softer. This, of course, is not necessary for the gear is fine when made from straight tubes, especially if you add 2.5" to the center 1.25" tube at the lower end. Most people have trouble finding a suitable lathe. Ted Williams, 3254 Park Ave., Mansfield, Ohio, 44906, (446) sent in a picture of his lathe set-up which looks like a real fine idea. To extend his lathe bed, he built up from wooden blocks a support for the tail stock and bolted it to his sturdy work bench at a point which would allow the gear leg to be mounted between centers. He didn't have a steady rest, so he made one by notching a 2 X 4 which was attached to the work bench at the end of the lathe bed. It certainly looks simple and permits even the long inner legs to be tapered on the smallest lathe.

While on this subject, you might like to hear a report on Don Carter's gear. He heard reports that the standard gear was a bit stiff for taxiing on rough ground so decided to soften it. After some rather exhaustive stress calculations, he convinced himself that he could eliminate the outer 1.5" leg taper (both up and down) the inner 1.25" leg, lengthen it by 4 inches and completely mount each leg independently in rubber. It should still meet the FAA drop test requirements for landing gear. At the top, the two legs are separated and rubber washers are used between the leg and the 517 fuselage member. At the lower attach points it uses the standard rubber spacers but the cross member is only pinned at each end so it does not restrain the legs in bending or twisting.

After over 300 hours of service, how has it worked out? It is the softest T-18 gear I've seen and ground handling is excellent. Due to the extra length and flexibility, during a full power run-up with only one person aboard, he tipped up and ricked his prop. Due to the twisting moment on the legs and the soft rubber suspension, the wheels toed out so that they aimed nearly at the tail wheel. This gave unusually fast deceleration so he never needed brakes but it was mighty hard on tires. He operated mainly out on paved fields, but did use some grass strips. The legs have never failed but did gradually bend out and back taking a permanent set. While taxiing,

they have a pronounced quiver about like on a Tailwind. Don recently bent the legs forward and gave them a lot of toe-in and camber so they would be in about the right position in the loaded position. This has significantly reduced his tire wear, but now he says he has to use brakes to get stopped.

Don's experiment with the gear is interesting because it has demonstrated how far you can go in softening and lengthening it. Since the legs take a permanent set in normal use, it is evident that the outer tube is needed for strength. Torsional stiffness is also needed. If the legs are lengthened more than 2.5 to 3 inches, it moves the wheels back too far and you might nose over.

My recommendation is to build the gear as shown in Newsletter 28. If you plan to operate out of really rough fields, you might shorten the lower end of the outer 1.5" tube by an inch or two. If Don's single tube leg hasn't broken off, it seems safe to at least shorten the outer tube slightly without serious consequences. So far, John has only approved of tapering, lengthening the inner tube and cutting down the size of the cross tube to gain softness.

As far as retractable or tri-cycle modifications is concerned, I haven't seen any yet that I would recommend. Bill Johnson's tail dragger retractable hasn't been tested yet and it looks the simplest to build. It should be as stiff or stiffer than the standard gear so I wouldn't think it would be good for rough fields. He should be flying sometime in early '71 so we'll know how it works before long. Russ Basye didn't recommend his due to weight, complexity, and performance and I don't know of any others tested. I can only say that with performance like I get with standard gear, why would anyone want to go to the trouble of converting to retractable gear? If you simply want the benefit of tricycle gear without sacrificing performance, you could just retract the nose wheel -- that is, if you want to land on your nose sometime. Paul Poberezny says there are only two types of retractable pilots -- those who have and those who haven't -- yet.

TROUBLE SIGNS -- My wife, Marilyn, thinks that anyone who can't fill out a questionnaire will probably crash the first time he takes off. For instance, some people put the date in the space for plans number and others put down only the street address where it said Complete Address, even when they had a change of address, and some tore off the half with the label on it. Most gave no tips or progress report. She thinks some of you are in real trouble.

SHAFT EXTENSIONS - By John Thorp - I suspect that if bearing on the spud is adequate, there would be no flange failures. A loose extension on the "D" shaft could break the flange as on the 0-320's in the twin Commanche. (The prop extension should be made so it fits tight on the spud end of the crankshaft.)

N-299 - (Dr. Cottingham's) just flew in from McCook, Nebraska. Vaughn and I are going to put the new cowl, exhaust and carb air box on it. It now has 800 hours on it. Much of it at night.

PLANS PRICE INCREASE - John Thorp - Here are the rest of the seat installation drawings and a revised copy of the battery box installation drawing. You should now have 12 additional drawings counting those that I gave you when you were out here. I am selling the 12 for \$18. -- to those now holding drawings.

I have asked Paul to increase the price in my ad to \$150. for the present package of 195 drawings (almost 700 ft<sup>2</sup> now). I plan to

include the dynafocal mount drawings and wheel and gear fairing dwgs later on in the \$150 price. At that time, \$25 will bring all the new prints to bring the old set up to date.

TRIM SYSTEM - R.L. Moore, 3327 Fennimore, Corvina, Calif., 91722 - While installing the Elevator Trim Jack Assy. (T-18) A-701, I became aware of what I consider a potentially dangerous condition. I noticed a sloppy condition. That is, when alternating force applied to 703 Torque arm a movement of approx. 1/4" was noted. After further investigation the cause was located in the Fafnir K56A bearing. The bore race of the bearing moves 1/16" end-play. After checking new bearing supplies am convinced this is normal to this bearing. What concerns me is as the ships get more time on them the bearing blocks loosen up and the K56A loosens even more, the tabs become free to move from external excitement. From my experience with "closed loop systems" this is a prime cause for system oscillation. In this application, "flutter". I'm currently planning on rising a "unibal" type bearing. Editor's Note: I think we all had problems with end play in the trim jack screw. I remedied it by simply rounding off the end of the screw and putting in a shim to take out all the play. It has very little wear so should last a long time.

HORIZONTAL TAIL - John P. Foy, 299 Edith Dr., West St. Paul, Minn., 55118 - Last November the breather tube froze up on my bird and pushed out the front seal, which is no problem, except for the time spent taking apart and putting back together again. However, the worst winter in 88 years hit this state and I decided to put the tail mods in plus more engine baffling, straighten vertical tail, close down cheek openings, mount radio, etc. I'm still at it and have no idea when I'll get it finished. (Note: This article was written March 17, 1969.)

By the way, I read your article in the latest SPORT AVIATION and appreciate it very much. You have done a fine job!

While working on the horizontal tail mods, I worked up a method for alignment and assembly that should work on the wings just as well. I'm assuming that the skins are bent and drilled and punched for rib rivet holes, and rear spar.

Cleco skin to all ribs and rear spar. Slip entire assembly over main spar. Block rear spar to level with main spar. Clamp a piece of angle, long enough to reach the entire length of the assembly, at the leading edge and trailing edge. Eyeball from rear spar and all around assembly. Mark centerline of main spar on the skins and clamp main spar to skins. Now drill rivet holes through skin into main spar and cleco as you go. This should give perfectly straight wing and tail components. The two outer wing panels can be done in exactly the same manner by placing them together side by side. After both sides of the main spars are done, the top skin can be unclipped and opened up and the rib end rivet holes marked on the main spar. Then remove the skin assy. and drill the marked hole locations. The rib end holes must have been punched before the skin assy. has been placed on the main spar.

To align the horizontal tail assy, slip mast and pivot fittings on tube spar, at premarked distances. Mount pivot fittings on fuselage. Wings must be mounted on fuselage for this method to work but it will insure that horizontal tail will be perfectly aligned with wings. Now use bubble level to block wheels to make sure that main wing is perfectly level. Set bubble level on main wing spar to check.

Now use level of block horizontal tail tube level. Mark fittings and tube with locator line, using pencil. Check movement of horizontal tail tube by mounting mast (center) fitting to elevator tube. Make sure that tube clears fuselage longerons and has enough travel to give the full up and down range. The skin assy could be clamped to the tube at this time to check the degrees of travel approximately. Drill one rivet hole in each fitting as a pilot hole while tube is blocked rigidly in place. Remove tube assy from fuselage brackets. With fittings in place and clecoed, drill the rest of the rivet holes in the brackets on the drill press. Cleco brackets to tube. Mount tube on fuselage and slip horizontal skin assys onto tube. Block tube in zero degrees, check skin assy's in zero degrees, tap end caps into place on tube. Now, unblock tube and hook up elevator push pull tube to center mast. Check skin travel against 0, 5 up, and 15 down marks on side of fuselage. This is the last chance to rectify any horizontal tail movement errors! Remember -- 5 up is actually nose down control movement at the control stick. Do not get confused! Clamp skin in place and make locator marks at the edge of the skin where it meets the tube at the inboard edge. Remove the tube and clamp skin with angles, same as wings and drill skins and tube, clecoing as you go. Open top skin and mark, and drill rib rivet holes, after removing skin assy. Clean up assy's, and rivet.

RECORD OF FIRST FLIGHTS (Cont'd. From Newsletter No. 22) - Here is the latest list from John's files. If you know of any errors in this list, please notify both John and me. Also, if you have flown and haven't had an article about it, shame on you! Send me a letter.

	First Flight
15. Ron Zimmerman, 1917 McKinley St., NE, Minne. Minn. 55418	7/10/67
16. Clif Hagy, San Antonio, Texas	7/11/67
17. Bill Martens, Ft. Worth, Texas	7/20/67
18. Floyd Maples, 69 BelAir Bl., Clarksville, Tenn. 37040	9/6/67
19. Harold Beckett, Washington, DC	9/8/67
20. Merlin Miller, Rt. 2, Tirrell Rd., Charlotte, Mich 48813	10/26/67
21. Lyle Fleming, 46035 N 20th St., Lancaster, Calif., 93534	1/30/68
22. Lu Sunderland, 5 Griffin Dr., Apalachin, N.Y. 13732	4/1/68
23. Jack Brightwell, 19 Philip Ave., Cabramatta, Australia	4/5/68
24. Rudy Adler, 13503 Cheltenham, Sherman Oaks, Calif. 91403	4/18/68
25. Bernard Thalman, 2912 Glenview Rd., Wilmette, Ill. 60091	6/3/68
26. John Foy, 299 Edith Dr, West St Paul, Minn, 55118	6/17/68
27. Peter Hodgens, 136 Curlenis St., Bondi Beach, Australia	9/29/68
28. Don Carter, 2316 Donna Dr., Vestal, N.Y., 13805	10/12/68
29. George Burton, 472 W Oad St, El Dorado, Ark, 71730	12/68
30. Hugh Grammer, Texas	2/22/69
31. Bill Hutchinson, 14852 Mansa Dr., Lamarada, Calif. 90638	No Date
32. Lawrence Larcom, 173 N. Union St., Delaware, Ohio 43015	3/21/69
33. Rus Basye, 4957 E. Nevada, Fresno, Calif., 93700	5/18/69
34. Bob Hammer, 15935 SE 41st Pl., Bellevue, Wash., 98004	6/30/69
35. Ron Baker, 988 Margaret Dr., Alcoa, Tenn., 30701	8/24/69
36. Lionel Robiodoux, 195 Crestview, Ottawa 8 Ontario Canada	9/6/69
37. Al Neunteufel, Chicago, Ill	7/69
38. Springer Jones, Rt. #1, Mitchell, Neb., 69357	10/7/69
39. Tom Miller, 4625 Harvey Dr., Mesquite, Texas, 75149	11/15/69
40. Bob Godwin, 1209 W. Evans St., Florence S.C., 28501	11/18/69
41. Dick Lagatore, 4715 Freedom Dr., Charlotte, N.C. 28200	4/20/70



right next to us at Chino and just had the time signed off. Kenny  
 holes just brought his out. They both have John Thorp's rebuilt  
 engines. They seem to run real good.

Today we took off with our two T-18's and flew to Havasupai and had  
 lunch and flew back. About 450 miles round trip. We flew up and  
 down the Colorado River with visibility about 60 miles. When we got  
 back to Chino, Chino reported visibility 1 mile but we made it in ok.

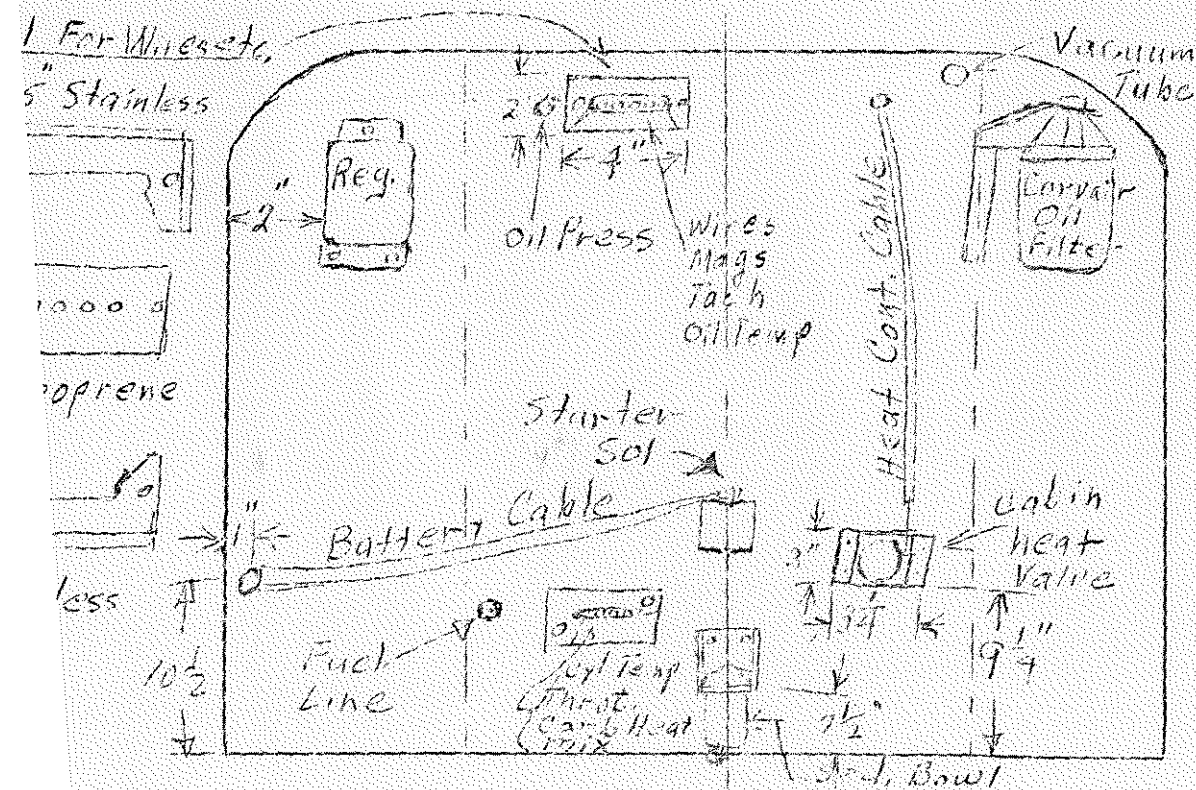
GPU ON CRANKSHAFTS - John Thorp - I still might use a new GPU shaft  
 that I have and use the new "D" shaft for a biplane racer engine.  
 At its weakest point other than the flange, the GPU (0-235) shaft is  
 88% as strong as the 0-290, 0-320 and 0-340 shafts. If the 0-340  
 shaft is strong enough as compared to the 0-290, then the 0-235 shaft  
 is more than strong enough in the 0-290.

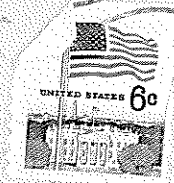
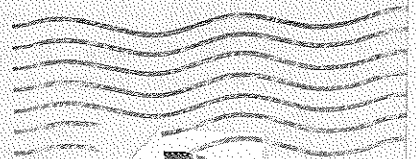
The spuds on the 0-235 and 0-290 shafts are 1/2" longer than on  
 the 0-320, 0-340 and 0-360. I feel that if the #1070 extensions were  
 redesigned to bear the full length of the exposed part of the spud  
 and fitted closely on the spud so as to minimize motion, there would  
 be no way for bending to get into the GPU flange and our various beef-  
 ups for the flange would be "belts and suspenders". However, I think  
 that knowing you can get home even with a broken flange is worth a  
 bet. You might want to close up the bore in the extension a thou.

2.251  
 2.250 dia. The spud call out is 2.251 dia.

We have N-299V back in my shop at 818 hours. Doc Cottingham flew  
 600 hours in 18 months. Vaughn and I are rebuilding it for another  
 600 hours of sod field use. For such use the tail gear is too stiff  
 and I should re-design it. I probably won't have time now.

FIREWALL LAYOUT - Ed. - Here is a sketch of my firewall layout which so many have  
 questions about. Hope you can figure it out. The homemade bulkhead seal for  
 hoses and cables seems to work ok and the FAA didn't object. Sure saves on holes.





407 J.R. Wood Jr.  
705 N Cross  
Robinson, Ill.  
62454