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May 26, 1971

T-18 NEWSLETTER NO. 33

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

OSHKOSH 1971- Headquarters would like to put more emphasis on education at this year's EAA Fly-In. Since the T-18 we've been building needs only the finishing touches, it doesn't make a very good subject for demonstrating the various fabrication operations. They would like for us T-18ers to put on a continuous demonstration of some of the basic operations like forming ribs, cutting sheet metal, punching rivet holes and riveting. Joe Poklesny, President of the Oshkosh chapter, is building a T-18 and he will set up a tent with tools and materials. What we need is manpower. So everyone who expects to be at Oshkosh and is willing to donate some time, please write and tell me. State which days you expect to be there and how much time you would donate. Hopefully no one will need to be tied up for any long period of time. Does anyone have good hard rib form blocks which could be used without fear of wearing them out?

TO RIGHT A WRONG - As you know, John Thorp is being sued for $750,000 as a result of the Bill Hutcheson accident. What you probably didn't know is that the power company is also sueing him for the damage which Hutchison's plane inflicted to the power line. To the rest of the aviation world, this seems too ridiculous to believe, but to John it is one nightmare after another for he has to spend hundreds of dollars to defend himself. Many T-18'ers have contacted me about starting a fund to help pay legal expenses. At John's request, I had held off on this, but it now seems appropriate to do something. The Finney case has been pretty quiet lately, but John just had to appear in court on the power company case. On top of all this, I hear that the earthquake inflicted some serious structural damage to John's shop where the West Coast builders go to copy templates and make parts. So, if you would like to make a contribution to a worthy cause, I'll collect the money and turn it over to John. You might want to spread the word among other EAAers for this case is mighty important to the future of the homebuilt movement. If someone could win a suit on such a flimsy charge as this, even designees wouldn't dare give people advice for fear of liability. Make your check out to T-18 Mutual Aid Society and be sure to note at the bottom that it is for the legal fund so it won't get mixed up with T-18 Newsletter funds. I'll make a report on the outcome. Thanks.

DICK WALEN - No. 336 - Toledo, Ohio - Just a short line to pass along a few tips. 1. Located inspection hole in floor between tunnel to inspect rudder pedal cables and connections. Saves pulling tunnel to inspect. Also made hinged pieces on fuselage by aft vertical fin so that the rudder and fin don't have to be removed to inspect the horizontal tail fittings and trim linkage. The main tip is building the new horizontal. How do I salvage all parts except old tube and transfer holes in skin to new tube so that everything lines up perfectly? First, drill rivets out of bottom of skins on airplane. Next with skin hanging down use 90° drill adapter and drill front rib rivets off tube. Then drill the top row of rivets holding skin to tube and slide skins off tube. Remove tube from airplane and drill out rivets to remove three fittings. Take any thin white paper, preferably tracing paper, and wrap tightly around full length of old tube and tape so the paper tube can't rotate around the metal tube. Transfer on each end with pencil the centerline of the tube for the top row of rivets on the paper. You can see the countersinks on the old tube

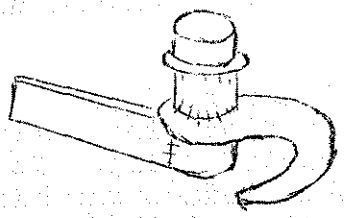
through the tracing paper. Take a straight pin and prick punch the center of the countersinks. When finished remove securing tape and slide paper tube off and install on new tube. Align the centerlines and secure with tape. Center punch through the pin holes, remove paper and drill. When I installed my skins and ribs everything came out exact. It sounds like a lot of work but the whole operation from start to finish took one week. The first tail I built took me six weeks. Will give full report on new cowl at Oshkosh. George Rattray has really bent over backwards for us T-18ers. He has now the most beautiful T-18 cowl on the market. Wing tips and tail tips with no waviness. He is tooling up to make Canopies for the T-18. The new cowl with fiberglass fillets and all weighs 20 lbs. complete. Just wait until you see my bird. (Cowl $145.00, tail group $25.00, Fillets $35.00, Wing tips $50.00)

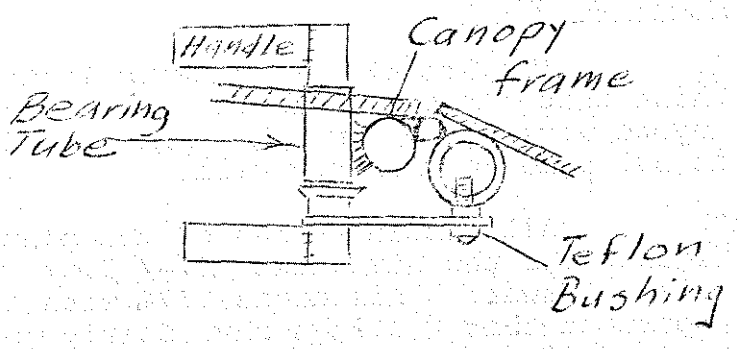
K & A AIRFAB CLOSES - W. Kistler of 70 Sherrin ST., Norwell, Victoria, Australia writes that Keith Shepard has moved to Denver without completing his order. Can anyone help?

FRED KRACHT FLIES ($559), 31 Caron port Crescent, Don Mills, Ontario, Canada - The first flight was made on August 23, 1970 and I can only say that there really are no words to describe the first flight of something that has taken two and a half years in the basement and garage to build. The only problem I had was a major one. The crankcase was vented in two places - at the front of the 290D2 engine I had installed, and on the rear case of the engine. Unfortunately enough, I got positive pressure on one vent and negative pressure on the other which in turn sucked out all the oil mist in short order causing the oil to empty corpletely and scoring two bearings, but everything is together again and well. (Note: He now has only one breather.

CANOPY LATCH - L.D. Sunderland - Several builders have written to me on the subject of canopy latches. In particular they are concerned about being able to unlatch the canopy from the outside in case of an accident. My feeling is that the relatively large plexiglass canopy could quite easily be broken with your foot or an implement like a rock or stick. It seems quite likely that the canopy would not remain intact if an accident were serious enough to render the occupants unconcious. Regardless, it would be desirable to be able to unlatch the canopy from outside. Ron Chernich of Brisbane Australia sent a sketch of the canopy latch on the Victa Airtourer. This latch fastens but does not apply a clamping pressure. Since the only reason for a latch on the T-18 canopy is to apply pressure to the rubber seal to cut down on air leakage noise, I've taken the liberty to modify the sketch slightly to provide for a clamping action. See Figure C1. Don Carter uses two of these hook type clamps on the two forward lower corners of his canopy and they really work fine. His can be opened only from the inside, however. Don also installed a key type lock flush with the skin just aft of the seat back. A plunger engages a hole in the canopy frame. If I had installed a lock, I wouldn't have lost a set of earphones from my T-hangar.

Canopy Latch





JACK HAGLE FLIES - 461 Melrose Lane, Crystal Lake, Ill., 60014 - After some four years and nine months of intermittent toil I can announce that T-18 #347 flew successfully on April 30. I am fully satisfied with everything about it. I'd sure hate to spend all that time and end up with a "dog". Performance is startling even compared to the jets I fly regularly. It seems to take off short on less than full power. I have been very gentle with the power the first couple hours since it's a majored engine. Promise to send in the performance sheet as soon as I get some good data. First flight was uneventful except for some crumby landings. I have an 0320 with constant speed prop and extension, standard gear from Jenkins, modified tail, cut down deck, etc. It's more or less standard Thorp. Tips: 1. For maintenance reasons, I put bolt and nut through sticks and socket so it is removable. 2. Also, I have a Harrison oil cooler that came with the engine. I mounted it vertically in front of the #2 cylinder. Oil temps have never exceeded 170°. I think I will change it to a horizontal position in the same location so that the ends are not blocking any part of the cylinder head. It would then be in the front baffle for that cylinder. 3. I put an access plate underneath the right elevator to make it easier to install the nut and bolt on the elevator torque tube. 4. Someone probably has an ex-Apache engine and prop like I do. If the prop is bent and smashed it's a lot better to find a Cessna 180 or 182 or Mooney or Comanche prop and put money into it. The Apache hub is a lot heavier with the feathering spring etc. than is needed. Sounds elementary but I just realized it a short while ago. I really like the performance with the constant speed prop. Last, I have an EGT guage and I think the fuel savings will pay for it in just a short time. Really takes the guess out of leaning the engine. Newsletters have been invaluable.

POP RIVET SOURCE - Hensley Sales, 921 Western Ave., Angleton, Texas, 77515, Phone 713-849-5278 - At last we have a source for all lengths of 1/8" monel pop rivets. Dick Hensley has from #19 BS to 440 BS in both MD and MK. He says he will ship same day as order is received. If you estimate postage, he will refund overpayment. Prices per hundred and grip lengths are shown below. 10% discount for over 500, 20% for over 1000 rivets.

		GRIP RANGE	
Rivet No.	MD (Dome Head)	MK (Countersink Head)	Price/100
419	.020-.070	.030-.100	$2.50
424	.071-.120	.101-.150	2.75
429	.121-.170	.151-.200	3.80
435	.171-.230	.201-.260	3.20
440	.231-.280	.261-.310	3.40

QUESTION BOX -

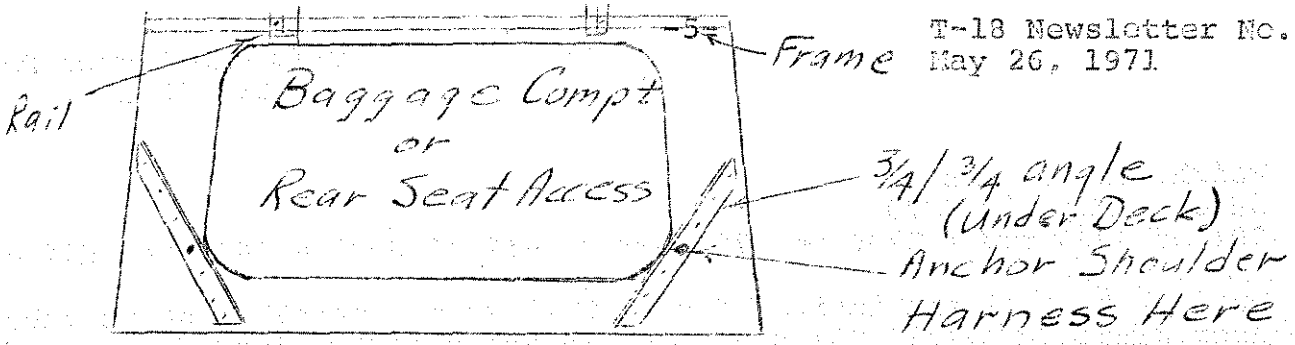
1. The Franklin Sport Four looks like a very good buy, do you think that a mount could be adapted to use it, and have you heard of anyone working on a mount? Answer: Haven't heard of anyone using it but someone probably will.

2. All fitting holes on the plans have the words "ream" and two figures for the size like .374/.376. Do I need a special tool for this? Answer: This means .375 with a tolerance of .001". It is important that fittings have fairly good fits to reduce chucking and it is difficult to maintain this sort of tolerance with a drill. It is preferable to drill undersize and then finish to final dimension with a reamer. AN bolts are slightly undersize so don't aggravate the situation with oversize holes. Finish reaming can be done with a drill if the final cut is very light and the drill is sharpened precisely.

3. What about using pop rivets on the 509 and A510-1 fittings? Answer: 5/32" cadmium plated steel rivets are available for this purpose. If your pop rivet tool won't accept the 5/32" rivet stems, just drill out the hole. John said they found loose 1/8" pop rivets in one tail being disassembled for modification, but this isn't necessarily significant since it isn't possible to buy 1/8" pop rivets which are long enough for this application.

4. What is the best all-around prop for the T-18 with GPU? I've seen all kinds in old Newsletters. Answer: It is a bit like asking what is the prettiest kind of girl. Personally, I like brunettes. Also, the measurements alone don't tell how much power can be delivered. Two props with the same length and pitch can have quite different characteristics. John says he has seen two Sensenich 74DM series props with identical length and pitch give much different rpm. I have two DM props which are 1/2" different in width. As to the "best" prop, it depends somewhat on your personal preference. The amount of horsepower you get out of your engine is almost directly a function of rpm - the faster, the more horsepower, according to John. But there are those who don't like high rpm because it doesn't "sound right". However, my personal opinion is that my present prop is very nearly ideal. It is a 68" (long) x 70" (pitch). I've also tried this 68" prop with a 66" pitch and a different prop which was 67 x 68. Max. rpm for each was 2700, 2900 and 2750 respectively. I haven't taken good data on the 70" pitch yet, but it will give 178 IAS max. while the 66" pitch would give 180 and the 67 x 68 gave 174 IAS max. Rate of climb is more than adequate for all three - over 1200 fpm. The 66" pitch naturally gave the highest rate. The nice part about the 70" pitch is that I can indicate 160 at 2500 rpm which happens to be the rpm I like to cruise at. It is significant that no one has had any problems with longer props. Especially, with the longer gear legs, you can use a 70" long prop with no trouble.

5. Explain your seat belt and shoulder harness arrangement. Answer: As you know, I have a big hole cut out of my rear deck for the rear seat. I like this arrangement even when a jump seat isn't used for it simplifies front seat construction since it doesn't need to be folded down to get access to the baggage compartment. To anchor the shoulder harness, I riveted a piece of 3/4" angle diagonally underneath each forward corner of the aft deck and secured the harness with a 3/16" bolt through this.



6. How do you buck rivets in the tail of the fuselage?
Answer: Find a small boy, otherwise plan ahead.

PARTS LIST - Monroe R. Maxhimer, 1010 Erie St. S., Massillon, Ohio, 44646 - I have made a parts list by listing first by drawing number and then by part number and material type. I find this listing almost priceless in ordering parts and materials. If anyone wants a copy, I'll send them one for $3.00.

NEWS FROM MERRILL JENKINS - KEN KNOWLES FLIES - 27902 Alvarez Drive, Palos Verdes Peninsula, California, 90274 - It's been a lot of fun building our T-18, "N77KK". It took almost 3 years, with lots of help from my wife Jerry and our friends. Jack Middleton, our neighbor, was always there when he was needed which was most every weekday night. Others who helped very much were Merrill Jenkins, Mel Nagles, Bill Warwick, Vaughn Parker, John Thorp, Chris Fast, Oliver Smith, George Leader, Cleon Burden, Chuck Borden, Micky at Nagles' Aircraft, Noel Hayward, and many others.

After the plane was finished we towed it tail first down the hill from our home in Palos Verdes to Torrance Airport -- less wing of course. After putting the wing on, Bill Warwick made a couple of taxi tests and everything checked out ok, but he said we should install a cylinder head temperature gage. This we did. Then it was off with the wing again, and onto a trailer to Chino, the place where most home builts in this area fly off their 50 or 75 hours.

We had it ready to fly on Saturday, 10/17/70. But, by the time the fog cleared at Torrance Airport and we flew out to Chino in Bill Warwicks "182", the smog was not so good at Chino, but Bill Warwick said he would taxi "N77KK" a little. Well, his taxiing took him out to the runway, and down it just far enough to have it jump off the ground and fly off in the smog! He flew fast and slow, did stalls, etc. After two or three landings and take-offs he brought the plane back to the hangar and reported that it would fly hands off. What a happy time that was for us, and am I ever glad to have someone of Bill Warwick's T-18 experience to check out "N77KK". The following weekend he checked me out in it. Man, what a nice airplane to fly! John Thorp said after he had a ride in it that he will be happy if his flies as well. Thank you John.

This T-18 has one of John's engines in it. A 67/68 prop. The induction box is per John's drawings. At first it wasn't, but I had to change it. Man, what a difference it makes. My first under the cowl intake did not work out, but this new intake box of John's really makes this plane go. 1:35 from Las Vegas to Torrance with a little head wind. We were turning 2600 rpm at 8500 feet.

The following are some performance figures (no static used)
At 500 ft. top indicated speed is 200. (175/180) is my guess as to what it should be.
At 500 ft. & 2500 rpm it indicates 165. (145) is my guess as to what it should be.
At 500 ft. top RPM is 3000.
Rate of climb at 110 mph, two people, 1400' min. Turns 2500 rpm.

Weight is 859 lbs.
Date of mfg. 10/7/70.
90% of 3000 rpm = 2700 rpm 75% power, 81% of 3000 = 2430 rpm 60% power.

One way to cool the inside of your T-18 is to install a short tube approximately 1-1/2" dia x 6" long in the fuselage just forward of the wing main beam. Cessna type. Use a 064 2024-T3 doubler and approximately 3/8" thick micarta block as a socket. Weld a cover on one end of the tube, then cut a hole in the side of tube approximately equal to diameter of tube. Hole should be oblong and about 1.0" from caped end of tube. Now slide tube open end into socket which should have a slip fit hole in it. Cut a hole in leading edge of wing like Cessna does. This must be in first bay unless you have lightening holes in nose ribs. Put one on both sides of fuselage. If this is not enough cooling, Bill Warwick says make a small door with control to open and close at back of canopy near canopy frame and center line. The air pressure here will make the air flow up and around your shoulders.

I work for Merrill W. Jenkins Co. so I get the T-18 Newsletter through Merrill Jenkins. It has been very helpful. Thank you.

We now have four T-18's flying out of Torrance Airport. Oliver Smith, George Leader, Chris Fast and Ken Knowles. By July we should see Sandy Crists' T-18 finished and Bill Warwick should soon have his back with all the drawing changes added. I think Bill has over 800 hours on his T-18.

I think there will be 4 or 5 T-18's at Oshkosh this year from Torrance, Cal.

Lu, we met one time at John's shop when you were out here on vacation, and I look forward to seeing you again this summer at Oshkosh.

Starting soon we are going to sell material marked per John Thorp's templates. Each rivet hole will be center punched. The trim scribed, bend lines marked all ready for the T-18 builder to trim, drill, deburr and bend up flanges as required.

Won't this make it a lot easier to build a T-18? We are going to start with the fuselage and from there on to other T-18 parts.

POWERPLANT TIPS - L.D. Sunderland - In my last article, "More on the O-290-G" (February, 1971 Sport Aviation) I briefly pointed out some ways to extend the life of an engine by properly installing and maintaining it. This article is intended to elaborate on these points as well as provide some additional information.

Virtually every time I have discovered a powerplant related problem since beginning publication of the T-18 Newsletter in 1964, I have subsequently found that John Thorp already knew about it and had long ago found a solution. Unfortunately there doesn't seem to be any practical way to instantly extract all the information someone has learned through 40 years of formal training and practical experienc but here are some of the things about engines which I've learned largely through my association with John.

A major reason the O-290-G engine has gotten some bad publicity is that it has been abused perhaps more than any other aircraft engine through improper overhaul, maintenance and installation. Of prime importance for good reliability and long life is the design of the cooling system. There is more to it than just hanging an engine out in the breeze or, on the other hand, wrapping a nice tight cowling around it with two big holes in front and one or

more in back. Even if your guage says the oil temperature is within the green range as stated in the engine manual, there can be hot spots which can ruin rings and valves. And, from the efficiency standpoint, on a clean airplane the cooling system losses can represent a high percentage of total drag, so just enough air should be permitted to flow through the cowling to adequately cool the engine.

There is a rule of thumb for determining the size of cooling system air inlets and outlets. For an airplane in the climb speed range of a T-18, about 100 mph, the opening should have an area equal to .35 times the horsepower of the engine. For an O-290-G turning up to deliver 140 horsepower, the cooling air inlets should have a total area of 49 square inches. Anything extra just means loss of performance.

Location and size of the cooling air outlet is just as important as the inlet. The size needs to be only slightly larger than the inlet, say 10%, to allow for expansion of the heated air. Location and shape can greatly affect drag. One of the worst is the stalled flap type on the bottom cowl near the firewall. Hot air doesn't like to go down, especially into the high pressure field below the wing of a low wing airplane. The use of side outlets permits a more natural flow with no high-drag projections into the low pressure region over the wing. The very best are adjustable cowl flaps like Ron Zimmerman has on his T-18.

Now that we have the right amount of air flowing through the engine compartment, what do we do with it? One thing you don't do is try to cut corners and use the intercylinder baffles from an O-290-G. Not only do they provide inadequate direction to the air flow around the cylinders, but the little steel clips used to support the baffles are forced down between the jugs causing them to distort. Sometimes you can see uneven wear on the inside of the cylinders where those clips had pressed. The surest procedure is to precisely copy the baffle system of a proven commercial design like on a Bonanza. Be particularly careful to keep it tight so no air can get through except where it is supposed to go. John even seals up all cracks with GE silicone (bathtub seal, etc.) except where the baffle touches cooling fins.

For long life of any engine, it is important to keep the oil clean. The best way to keep contamination low is to first not let it into the engine. The automotive paper type filters can be adapted for aircraft use and they do a good job, but the old folded screen type used on many light planes is virtually useless except for keeping out birds. John has recently found a source for the porous foam material (filtron) used in lawn mower air filters. It is made right in VanNuys, near his home. Why don't you parts suppliers stock this material so everyone can have a first class filter?

Once the dirt gets inside the engine, then you must filter it out of the oil. If your engine isn't equipped for a filter, it is quite simple to instal one. Just remove one of the allen head pipe plugs from the oil journal at the upper right front of the crankcase or on the accessory housing and insert a brass fitting which has been brazed shut and then drilled out making a .070" to .100" orifice. (It can be changed later to get right oil pressure and cooling.) Connect high pressure hose from this fitting to the oil filter. If you don't have an aircraft type filter just buy the aluminum casting from a Corvair which holds the filter and cut off the portion not needed. From the filter connect to the oil cooler. Some people have objected to this series connection of cooler and filter for when the filter clogs up the cooling is degraded. However, it seems to me like

a good way to indicate when the filter is getting dirty. I haven't found it to be a problem anyway.

There are three sizes of Corvair coolers. The smallest will provide adequate cooling for a 125 hp engine if it is mounted in the nose cowling so it receives unheated air. When I moved mine from the rear cylinder baffle to the nose cowling just under the left main air inlet, it lowered the oil temperature from about 215 to 205°F. The next size Corvair cooler has the same external dimensions but gives 25% more cooling. The largest cooler gives another 50% more cooling. This largest one, used on the Spyder engine, is the best if you can obtain one. The dune buggy boys keep them gathered up in the Southwest A new model VW is coming out with a cooler the size of the Spyder but with more efficient fins. When I changed from the smallest to the largest cooler it lowered oil temperature about 15°F. High oil temperature is bad news for the oil. Although Lycoming lists the red line temperature at 240°F, John likes to keep his oil temperature at around 200 so moisture is driven off.

How could changing plugs cause a valve to stick? When plugs are removed, carbon gets broken loose. If an exhaust valve is partly open, carbon from the top plug may collect around the valve seat. Then when the engine is turned over, the valve will smash the carbon and cause it to stick to the valve. One of two things will then occur. If the valve is held up so it cannot touch the seat to be cooled, it will become overheated, the stem will swell and the valve will stick open. Then when a fresh charge of fuel-air mixture is brought in it will be ignited with the intake valve open and a backfire will occur in the entire intake manifold causing almost total loss of power. This is no pipe dream for it is precisely what happened to my engine.

If the valve doesn't stick, the carbon will cause a hot spot and burn a hole in the valve or seat. John had this happen on three different Lycoming and Continental engines a short time after overhaul. He and an engine manufacturer's representative doped out what was happening. He changed the procedure for removing plugs to always remove the bottom plug first and bring the piston up on compression stroke before removing the top plug. In the many years since he adopted this practice he has never had a burnt or pitted valve. His attempts to get the engine manufacturers to redesign their engines so this could not happen have been unsuccessful because of the expense involved.

High oil consumption is a frequent problem with engines installed in homebuilts. This is caused by either poor ring seating or valve guide to stem clearance. Several sentences were inadvertently left out of my last article and the result could be the very opposite impression to the point I was trying to make about valve stem clearance. Following the sentence, "The -G manual allows .008 in clearance." should have appeared, "Don't believe it. Replace the guides if there is more than .004 in clearance."

When overhauling an O-290-G engine, it is best to use the chrome rings recommended in the Lycoming parts book. If the cylinders have been chrome plated, plain cast iron rings must be used. In order to get rings to seat, several things must be done. First, it is necessary to break the glaze in the cylinders. If you do not have access to a special tool used for this purpose, take a piece of #220 wet-or-dry paper and, without making any vertical scratches really rough up the wall. It is a common practice to coat moving parts in an engine with STP when assembling them. Do not put STP on rings or cylinder walls because it will prevent ring seating. For the first

25 hours, or until oil consumption drops, don't use STP or detergent oil. When an engine is first started, it is not good to operate it at low power settings. It should be run on the ground only long enough to ascertain proper operation. John feels the best way to break in an engine is to fly it at normal cruise power. This puts high pressure on the rings and seats them quickly before glaze can form.

Rings have special features which help them seat. The back side of the two top rings has a bevel on one corner. This unsymmetrical cross section causes the ring to twist and thus put higher pressure on the cylinder wall. Also, the front face of the ring is cut at an angle so it initially touches the cylinder along a very narrow band to speed up ring seating.

One subject regarding converting the O-290-G previously given very little publicity is the balancing of all moving parts. This is very important because although the G parts were originally balanced during overhaul they might have gotten mixed up. Some rods have been found to differ by as much as seven grams while Lycoming balances aircraft engine parts to within one half gram. You can balance rods and pistons yourself if you have an accurate scales which will measure to a fraction of a gram. First find the lightest piston, then machine off the skirt of other pistons to match it to within 1/2 gram. Thensupport the large end of a connecting rod and balance the small end by weighing on scale and matching three to the lightest. Then weigh total rod and remove material from large end until all rods weigh within 1/2 gram of the lightest rod.

NO NO'S - Now we have two more items to add to the list of things NOT to do with your airplane. One is, don't do a slow roll on take-off even over a beach. Second, don't buzz a lake for there might be power lines stretched across it. Two T-18's just ended up "in the drink" because of the above. Fortunately, all four occupants got out.

MATERIAL SOURCES - If everyone who is offering T-18 materials for sale on a continuing basis will write to me, I'll include a list of current suppliers in the next Newsletter. Also, if you know of good sources for tools or materials let me know so I can include them. Since I'm not building now, I get out of touch with sources. In the meantime, Merrill Jenkins and Sport Aero are the two main sources for aluminum kits including extrusions.

OSHKOSH - There should be a good crop of T-18's at the Fly-In this year. John tells me that four will be there from California so come get inspired and maybe you'll get yours finished soon. John can't figure out why there hasn't been any mention in the magazines about Ron Zimmerman winning the Pasmany efficiency contest last year in his T-18. Ron, why don't you write an article for the T-18 Newsletter telling all about it. See you all at Oshkosh.

The T-18 Forum is now scheduled for 2:30 on Wed Aug 4 in Tent No. 2. See you all there. A continuous T-18 demonstration will be held all week with several types of metalworking activities like riveting and forming sheet metal. We T-18'ers are asked to man the display so if you plan to be there, let me know ahead of time so I can make up a schedule which won't require the same persons to be there all the time.

Attention: If you haven't returned your questionnaire, please do so.

T-18 NEWSLETTER
Luther D. Sunderland
5 Griffin Drive
Apalachin, N. Y. 13732

APALACHIN, N.Y.
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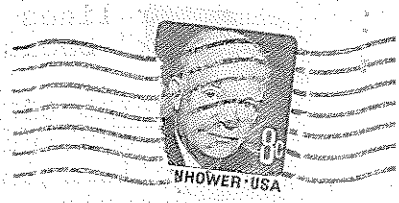

(407) J.R. Wood Jr.
705 N Cross
Robinson, Ill.
62454