T-18 NEWSLETTER

ISSUE NUMBER 83

This special issue of the T-18 Newsletter is dedicated to the memory of John Thorp, who passed away April 18, 1992.

A stillness, a silence, a time to pause and think of the man that designed our T-18s and started us toward the goal of building and flying our own airplanes. The news of John Thorp's passing came Saturday, April 18, as I worked, surrounded by the many pieces of a nearly completed T-18. The news brought the silence and a feeling that something was missing in my shop. A part was not there or had just disappeared? As I paused and remembered that much of John went into the design and years of helping and supporting his builders. Many can tell of using his tools and workshop for their projects as John built his own T-18 and also took time to help them. More can tell of his patience and willingness to explain again and again those questions that came to him by phone. John Thorp always gave his very best. It was then that I realized nothing was missing, John's spirit and desire to do an excellent job will always be there, each time we read one of his blueprints or push the throttle to the wall, John will be there.

Thank you John.

The T-18 Mutual Aid Society

JOIN IN THE MEMORIAL CELEBRATION

THE 80 th ANNIVERSARY OF THE BIRTH

of

John Willard Thorp

JUNE 20, 1992

TO BE HELD AT THE OLD LOCKE HOME

19960 ELLIOT ROAD

LOCKEFORD, CALIFORNIA

Bring your memories in word or pictures.

A commemorative brochure will be assembled for purchase by all who wish.

Or if unable to attend, be with us in spirit and send your memories to :

Thorp Commemorative Trust
P.O. Box 805
Lockeford, CA 95237

Transportation will be provided from Lodi airport as in past celebrations.

Thorp Commemorative Trust
P.O. Box 805
Lockeford, CA 95237

PAUL H. CROZIER
8016 OAKWOOD FOREST DR.
HOUSTON TX
77040

JOHN THORP 1912-1992

The aviation world has lost one if its truly great men. John Thorp was an intellectual giant, a veritable walking encyclopedia of gilt edged facts of airplane design factors and engine performance knowledge.

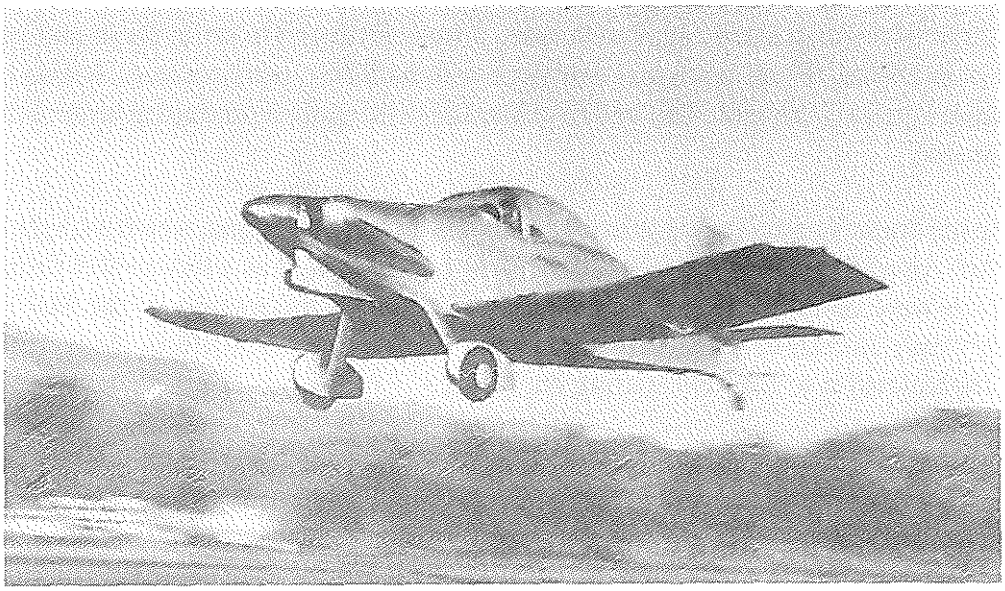
But John Thorp was much, much more than a man bordering on genius in his chosen craft. In every way, he was a gentleman in every sense of the word, a kind and caring person, courteous to all. He was totally honest with everyone, as well as with himself. His very demeanor was always low key, almost to the point of being self-effacing.

He never trumpeted the immense aviation knowledge he was in possession of, but one of his greatest joys was passing on bits of that knowledge to any sincerely interested ones. He had an almost religious zeal in educating his followers in pure unvarnished facts.

When he bestowed one of these gems of knowledge on a person, you could make book on it that it was an absolute fact, based on experience, and was totally reliable, totally devoid of fiction, rumor, or hearsay. He always offered answers to questions in his quiet, unassuming way, but he never tried to force his observations on anyone.

John joined EAA in the very beginning and always exemplified the true EAA spirit, ever pushing the frontiers of knowledge outward, and the generous giving of himself. That quality alone made him a great man in the eyes of those who knew him.

The EAA knew well of his accomplishments as an aircraft designer. In WWII days as a Lockheed design engineer, he was commissioned by Hall Hibbard (the president) to do the complete preliminary design of the famed P2-V naval patrol bomber all by himself, with later production drawings showing



John Thorp's T-18

the world's unrefueled non-stop distance record for many years until the Voyager came along.

Some also knew that John Thorp was the world's #1 expert on engine performance and cooling with such companies as Hughes and Lycoming calling on him for his experience.

His knowledge of engines wasn't just theoretical, either. He dearly loved re-manufacturing the 0-290D (personally), which became a legend on its own for its outstanding quality.

Not many in EAA knew John was a sheet metal craftsman without peer, also. He introduced EAAers to Matched Hole Tooling, a super accurate method of building an airplane without jigs. The T-18 was and is the outstanding example of this system, that he also previously introduced to industry.

He also introduced EAAers to the ABC system of measurements and the decimal system in the T-18's 222 drawings, which were of professional production quality and a prized classic possession of today.

John's shop, in an older section of Burbank, was a Mecca for the ''clan.'' These were privileged to spend their weekends with him, absorbing a sheet metal education from him as they built their T-18's on his hard tooling. There were the days when John was the happiest, freely giving of his time and expertise, which reflected his basic goodness and generosity, much like a highly respected college professor surrounded by enthralled students.

The Saturday ritual always included the entire gang recessing for lunch at nearby Sir Cedric's, where the atmosphere was heavy with serious airplane talk. John's blackboard there was the ever present paper napkin.

Besides the P2-V design at Lockheed, he designed the tiny Little Dipper and the 2 place Big Dipper. The Little Dipper was a single place low wing on a tricycle gear, powered by a 2 cylinder engine John had ''put together'' (of about 50 hp). Not only was it so simple and easy to fly but it would also fly in and out of football sized fields with ease. I was privileged to see it fly in and out of Lockheeds parking lot in Dallas, where it amazed everyone with its STOL performance. It also once flew inside the pentagon ''patio'' I'm told. Too bad Lockheed decided against producing both of these designs (for many reasons).

Space doesn't permit going into great detail on his other designs, which included several models for Fletcher Aircraft destined for New Zealand Ag work, as well as a tiny rocket firing COIN fighter, all of which were certificated. He also type certificated several models of the Sky Skooter, another remarkably easy aircraft to fly. I flew one several hours a day at Rockford, along with Bill Warwick, as we demonstrated it to EAAers starting on T-18s.

Another of his triumphs that I was privileged to fly at another ''Rockford'' was the tiny twin two place Derringer and it was the very best twin I ever flew, bar none. It was powered by two cont. 100hp 0-200s (''beaned'' up to 115hp by John). Its minimum one engine control speed was actually less than its stall speed! Not only would it climb very well on 1 engine, the pilot could keep both feet on the floor. Fantastic!

When he sold the design, the new owners heaved it up and put 0-320s in it, which ruined it commercially and aerodynamically. Too bad. The same was true with John's preliminary design of the Piper Cherokee. John said their changes in the fuselage shape cost it 25 mph, with a touch of bitterness in his voice.

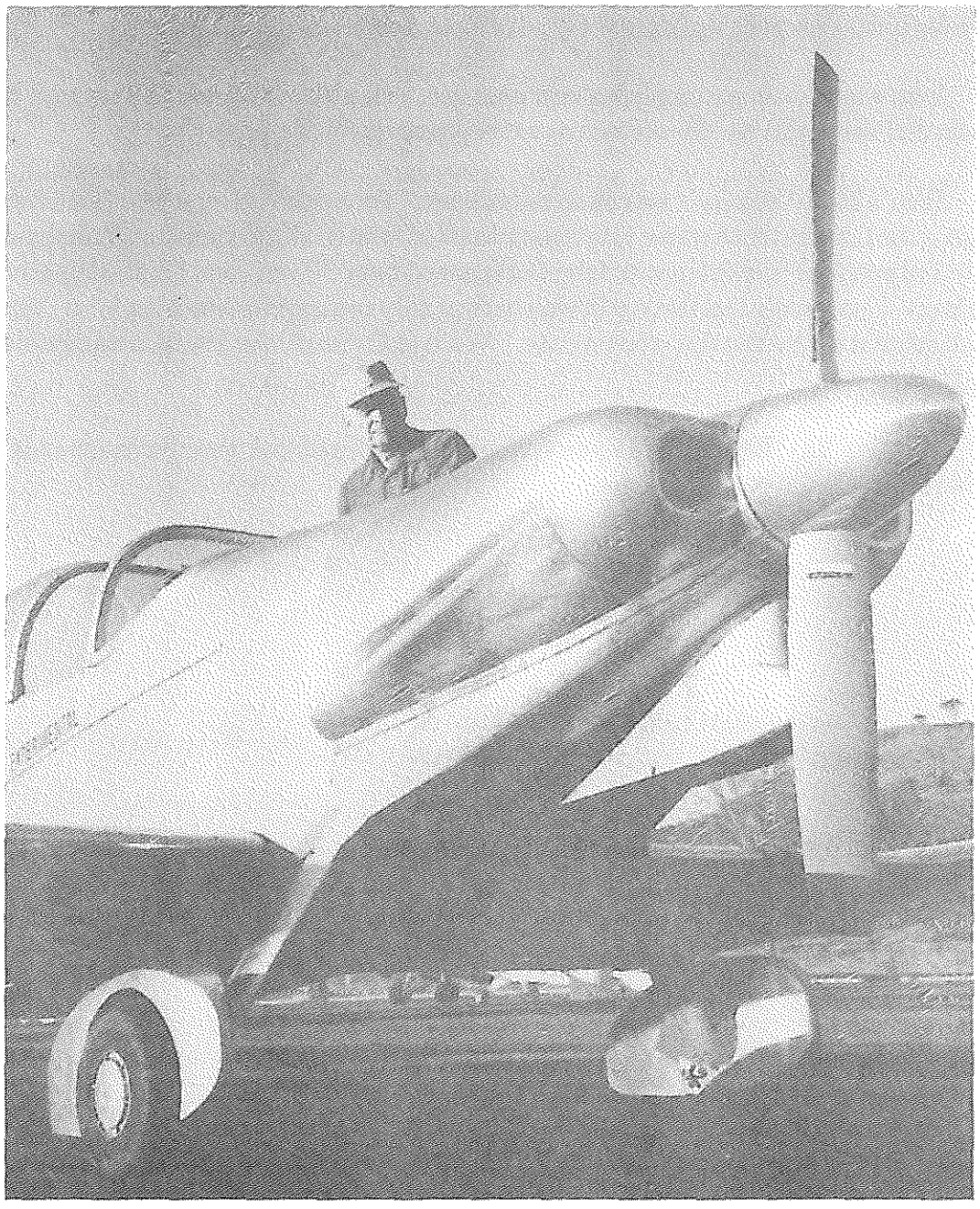
John freely admitted his #1 weakness was in business dealings, nearly all of which turned out poorly for him, with poor timing and circumstances also a factor.

John was also an accomplished test pilot and, yes, a gutsy one too. I flew with him in his own T-18 several times and would rate him as a competent, precision pilot.

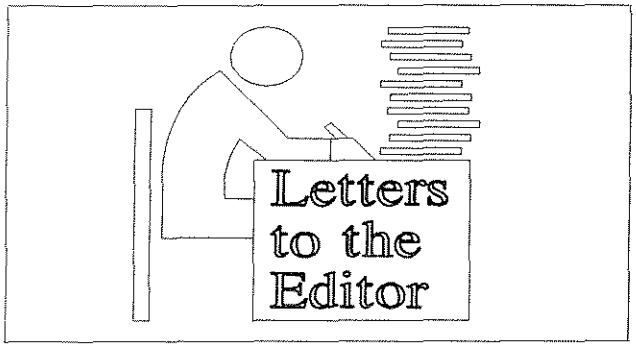
John's T-18 ''family'' was close to his heart. There were several like Bill Warwick and Dan Dudash in the LA area that became very close friends of John and Kay. Both Lu Sunderland and I enjoyed a warm and personal friendship with John that spanned some 30 years and his passing leaves a deep void in our lives. I personally feel that my life has been greatly enriched for knowing John. Mere words seem so inadequate at a time like this when we say, ''We'll really miss John Thorp, a true gentleman, scholar, and a giant of man.''

John and Kay, his wife of 45 years, eloped in 1947, and took their honeymoon in one of John's Sky Skooters.

Dick Cavin



JOHN



Dear Rich

Work on my plane is nearly completed. I have a few items to complete before the FAA inspection. Winter and a new home have delayed my building.

I was successful in changing the builders name on the registration. IT took affidavits from the prior owners and 2 1\2 months.

Now concerning the new home. It is located on Chehalem Airpark, a 2,300 ft. grass strip. I have two hangars (space for rent), a pilot's dream come true. (Elevation 190')

I would like to plan an informal fly-in in July or August if anyone out there is interested. If ''you'' are interested, contact me and I will make the plans.

Chehalem Airpark (175) is located 3 1\2 miles from the Newberg VOR on the 231 degree radial. Camping is available on the field and motels are 5 miles away in Newberg or 15 in Hillsboro.

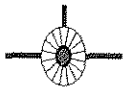
Electronics International Inc. has a ''free'' booklet available: Pilots Manual for Diagnosing Engine Problems. I highly recommend it if you have a digital CHT\EGT gauge. It and my Smart Scanner would have prevented a major ''Engine Out'' situation in my old Cessna 150!

Electonics Int.
5289 NE Elam Young Pkwy, #G200
Hillsboro OR 97124
(503)640-9797

If anyone is passing through Oregon, stop by anytime. I enjoy talking about or flying T-18s.

Del Zander and I will be flying this spring. Along with Greg Halverson's T-18 and a few more around the state, we might make a serious challenge to the ''other'' local homebuilts. (That RV group)
Sincerely, Brad Chapman, 17505 NE Terrys Lane, Newberg, OR 97132

H 503-538-7316
W 503-635-4016



Dear Richard

In 1968 I was number 20 to fly a T-18 and have given hundreds of rides during the 1100 hours that I flew it using a 76 EM 68"x81" Sensenich prop vibration tested by Sandy Friezen which is what a certified airplane would have to do. Be sure to have your metal prop vibration tested and use a calibrated torque. Particularly on high compression 4 cylinder engines.

Lyle Trusty is cruising at 200 to 200 mph plus at 75% power using his 76EM 68"x 87" Sensenich fixed pitch metal prop. He has a different cowl and wing plus faring the flaps, ailerons, and tail wheel. He has flown this type of fixed pitch metal prop over 1000 hours which I also did. This says something for metal props.

I know of wood props that have disintegrated on high compression 4 cylinder engines. Maybe on wooden props using a 1\4" thick plate on the front securing the bolt heads and putting elastic stop nuts on the back so you can retorque them frequently would be the way to go.

At 80 years of age I sold my T-18, so drop me off the mailing list.

Sincerely
Lyle Fleming

Dear Dick

Thank you again for your efforts on the Newsletter and all that it involves.

I have not had any problems with my T-18 since the new elevator. It was definitely induced by excessive control forces on the elevator. The airspeed has been calibrated and is accurate and the airplane will do 200 mps straight and level at 2700 rpm on a Lyc 0360 engine with a fixed pitch aluminum prop., that is at 1000 feet over a fixed course .

I have flown the A\C about 150 hours since I bought it and I am still impressed.

Good Luck and Thanks Again.

Tom Waage
Phone# 508-945-9010

Hi Richard

I'm adjusting to full retirement like a duck to water, but I'll be back in Nebraska working on the plane--the last of April-May until OSHKOSH.

Best Regards and I really appreciate your effort.

Harlo McKinty

Hi Richard

Here's my dues for the T-18 Newsletter. I just got back from spending the winter in Albuq. New Mexico, great to get away from it all but too long without the bird.

Sure glad to get the newsletter, I hope to attend the May get-together. Keep up the great work--I really enjoy the newsletter.

Bob Olds
2207 Wilkes Ave.
Davenport, IA 52804
319-326-2430

Dear Rich

Well I put off long enough writing to you.

Flew N1943K on Dec. 8. Everything went fine . Flew great, having little problem with lights, radios, and things like that. Have 11 hours on it now. Empty out is 943. Have a 150 hp Lyc., speeds and climbs ECTs are very close to most of the others.

I did have a problem with the airspeed using the piper blade type on the wing seams the straightest side pressurized also giving me a 15 mph slower reading until I disconnected it now using cabin stater.

The float on the fuel sender decided to sink one day, so out came the instrument panel and tank to get at it. 3 cracks in the brass float. Soldered them, now it floats again. Checked it in hot water to see if it bubbled when heated. We'll come to see you when 40 hours are flown off. Kenny Ranta, Omaha NE

Editors Note: Looking forward to seeing you. See Kennys pictures later in this letter.

Working on T-18 #2 wide body, new L.E. wing nonfolding type, basic fuse metal work done, main spar done, outer panels done. No engine choice yet--have 600 hours on T-18. No one 36 EH modified 0-290 Cassidy wood prop-160 mph. 1900 ft main climb one person. Have flown to Oshkosh 3 times with 36 EH. Elmer Hymen, 36 Center St, Midland Park, NJ 07432

Dear Richard,

I would like to share some information with other T-18 owners which may be of interest. I understand that it has been written about before but here it is anyway.

I originally completed my T-18 in June 1970 (633 PM). It had 160 h.p. engine with a fixed pitch metal prop. With full flaps I never experienced any pitch

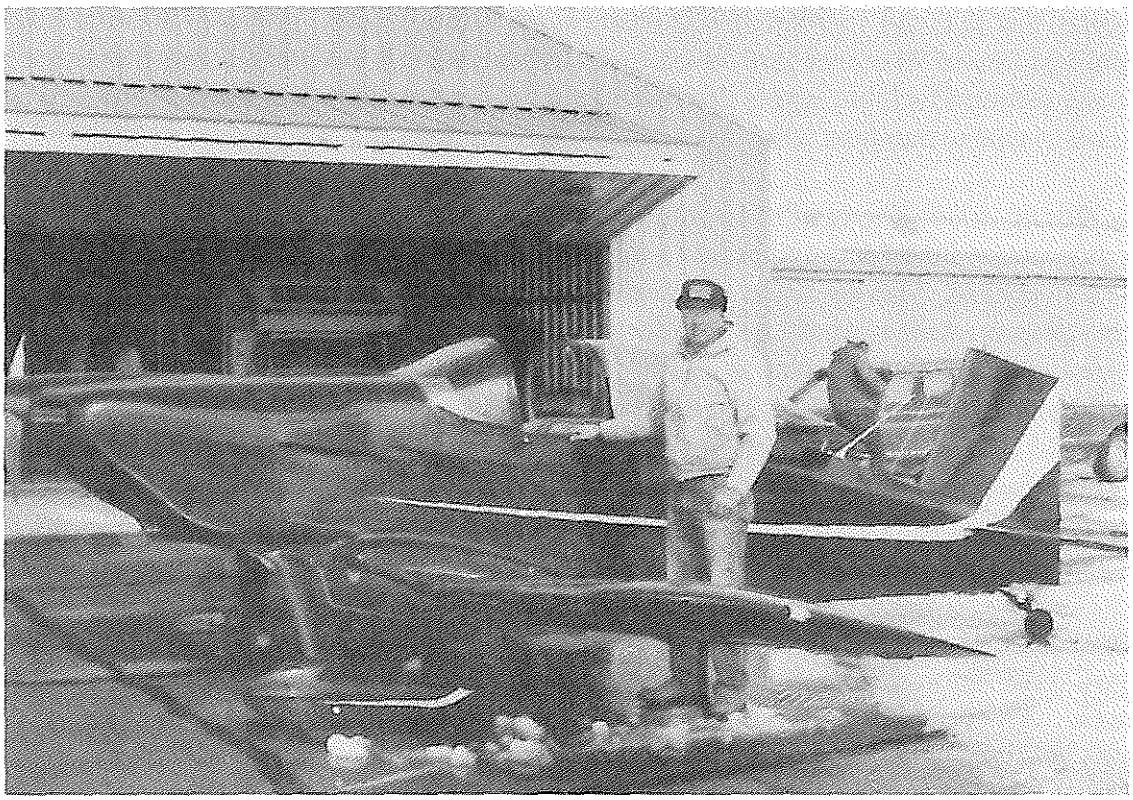
over tendency (bunt maneuver). Eight years later I totally reworked the plane and installed a new Hartzel constant speed prop. This time the plane had a tendency to pitch over with full flaps. It appears that the weight of the CS prop made the difference. I sold 633PM after 16 years of flying.

A couple of years ago I purchased John Hardy's T-18 (57JH) and I have been sharing it with Capt. Pat Stanley who instructs in T-38's at Enid, OK. Together we have gone over the airplane and upgraded everything. This plane has a hartzel cs prop also and it has a tendency to pitch over with full flaps. I have electric flaps and we became very concerned that we may sometines encounter the problem with not enough time to retract. I know a lot of folks don't like electric flaps bit it sure cleans up the cockpit.

After talking with Barret Kemp, he sent me a copy of NL #71 which explains J.S. Thompsons apparent fix for the bunt maneuver.

I am enclosing a sketch of the strips which Pat and I installed. I have flown the plane several hours and it seems to have fixed the problem. With a most forward CG and using various approach speeds, there is no tendency at all to pitch over.

Thanks,
Parker Miller
N57JH

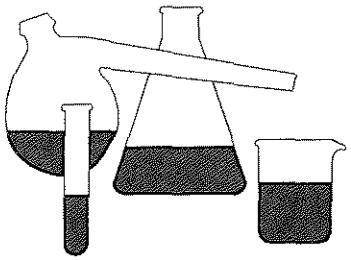


Kenneth Ranta with his new "flashy red" T-18, N 1943K

OCTANE RATINGS

by Craig Marshal

with reprints from EAAC by
W.J. Keough



Dear Richard,
Further to our telephone conversation of Feb. 2, 1992-Please find enclosed my check for the T-18 Mutual Aid Society membership as well as the fuel information and personal letter I received from the author of same, with permission to reprint in the T-18 Newsletter. OK'd by phone. I hope you will print this information in a SPECIAL SAFETY NEWSLETTER (a.s.a.p.) as I was shocked to read someone using Mogas in a Lycoming engine that requires a minimum 91-96 avgas. A study of this is information will reveal that a mogas with a 92 A.K.I. or (antiknock index), as advertised on the gas pump, when tested by the motor method will result in a reading of 86 octane which is well below the requirement of the 91-96 engine. I was also told (off the record) that a well blended mixture of 1\3 100LL + 2\3 mogas with an A.K.I. of 92, or M.O.N. of 86 should yield a fuel with octane numbers high enough to satisfy the requirements of the engines certified to run on 91-96 min. octane avgas, as far as destination is concerned only. One should be careful when mixing mogas and avgas as the octane reading does not move in a linear fashion, that is to say 1 gallon of 100 octane avgas blended with 1 gallon of 80 octane mogas will not yield 2 gallons of 90 octane fuel. At this point I am saying that I am not recommending the use of mogas for any aviation fuel, but supply this information so your readers can make an informed decision with regard to octane numbers when considering alternate fuels.

My request to Bill Keough for this information was because of the Lycoming 0-320-E2G 150 h.p. 7 to 1 compression 80-87 fuel engine had a camshaft that went to war with the lifters and made me and my T-18's very sad. This condition was caused by a reconditioned camshaft being installed, while the old cam followers were retained, because they "looked good" at last overhaul. Lycoming says anytime a new or reconditioned camshaft is installed, new cam followers must also be installed (believe it). This engine started making metal at 100 hours since O\H. Since my T-18 engine was over propped anyway, "Warnke almost constant speed 67x77 prop!" I decided to modify to 0-320 "D" series 160 h.p. By the installation of 8.5 to 1 high compression pistons. This engine is equipped with nitrided cy. barrels, as premature wear will take place with plain steel barrels. Consult Lycoming's "Cylinder, Piston, Piston ring, application list #SFN 880-1".

Now for the good news. If you check newsletter no. 78 you will find performance figures for my T-18 C-GCWAS before mods. Since then I have done a 2 way average ground speed check over a 5 mile course. Air speed error not more than 1 1\2 kts.

Mod #1 installation of brake caliper fairings. This mod blew my mind. 7 kts increase at 75% power 2000 ft. 5 kts increase at full power and top speed at 2000 ft. No brake overheat problems. So put them on boys and girls. Cheap speed! Mod #2 engine power from 150 h.p. to 160 h.p. Same prop, "Warnke

67x77.''
Top speed 170 kts. tas. at 2000 ft and 2550 rpm cruise 157 kts. tas. at 2000 ft. and 75% power O.A.T. 40 degrees F. Have not yet checked rate of climbs, but I expect 1600-1700 fpm at 1500 lbs. gross.

I have two questions I would like answered if any of your readers have the info. I could not find answers in any of the newsletters.
1) Can the T-18-CW be flown safely with the canopy locked in a full open position, or removed completely. I suspect there might be air flow problems over the tail feathers. I have not tried to do this to date, but wish to do so.

2) Is there any change in the forward or aft. C of G limits, since the Lu Sunderland mods, (wide body, 5" longer airframe) and (convertible wing with new airfoil). If anyone has the answers for these two questions, please contact me ASAP--call collect or write to the above address.

Richard please keep up the Newsletter, you are doing a fantastic job for your fellow flyers, and I am sure they love you for it.

As always, please excuse this poor penmanship--I'm not very clever at this sort of thing.

Happy landings,

Craig Marshall

144 Strathallan Blvd.
Toronto,Ont. M5N IS7
Oct.21,1991

Dear Craig

Enclosed you will find a copy of the article on Moaas vs. Avgas and this will supply the missing words for your copy. You will note that the text says that motor octane (MON) for mogas octane correlates very closely with the first number of the avgas test. This is an important consideration when you consider changing the compression ratio of an engine.

I called Bob Falkiner at Imperial Oil this morning to get his opinion of the suitability of using premium auto gas on a Lycoming that requires 91/96 avgas. Bobby by the way is a member of EAAC and has just completed a Quickie. He is a research chemical engineer with Imperial and is the expert on aviation and motor gasoline quality.

Bob confirmed that the current motor octane of premium mogas is in the range of 85 to 87 and this is well below the required avgas octane of 91 as specified by Lycoming for the high compression modification. This substantial difference of 4 or 6

octane numbers between the motor octane and the avgas requirement would indicate that you could be running the risk of severe detonation during takeoff and climb power settings. Bob pointed out that it is probable that the Lycoming test conditions for establishing the octane requirements were undoubtedly much more severe than the conditions that you will encounter. However, the trouble is that you would not know if you are gettinq detonation at takeoff power until you had done serious damage to the engine.

In the case of using regular mogas as a substitute for 80/87, you are using a mogas with 83 M.O.N to replace an avgas of 80 octane. In your modified engine you would be using a premium mogas of 86 M.O.N. to replace an avgas requirement of 91 octane. So you are certainly stretching the factor of safety in the octane ratings and it would appear from this that it would be prudent for you to operate on 100/130 avgas on the modified engine.

We hope this helps you in your decision.

Sincerely, W. J. Keough

MOGAS CHALLENGES AVGAS reprint from EAAC with Bill Keoughs permission.

The EAAC is pleased and extremely fortunate to have Bill Keough on board as a fuel expert. His presence with us in Ottawa at our recent Mogas deliberations, was greatly appreciated. He has spent most of his working life in petroleum related pursuits and is well qualified to discuss this matter. He has served on one Royal Commission enquiring into environmental concerns related to lead pollution and is presently serving on another which is enquiring into problems related to nuclear energy. Bill is newly retired from his last position as Vice President, ESSO Petroleum. He also flies a Cessna 172. Ed.

For more than five decades, pilots under-stood and believed that aviation fuel (avgas) was inherently of better quality than automobile gasoline (mogas) and the use of mogas in an airplane engine could do serious damage to both the engine and probably the pilot. For most of that time that understanding was right. So why is it that in the 1980's there is a serious movement to use mogas in aircraft engines? Is it the sizeable price differential between mogas and avgas or are there more fundamental reasons?

Like most things of this kind, the trend to the use of mogas in aircraft is an evolutionary development and not some sudden change in basic truth and principles. Back in the late 30's and through the war years of the 40's mogas was a low octane rather

unstable mixture of hydrocarbons with wide variations in distillation and volatility. Avgas, by contrast, was a product much the same as today's. In 1938 the United States Army Air Corps developed a specification for a grade of avgas that was to have an octane rating of 100 and this became the fuel for the high performance aircraft developed during the war. To use the mogas of that era in such an aircraft engine would have been disastrous.

After the war, the technology used to produce military avgas was applied to the manufacture of mogas. Fluid catalytic cracking and Alkylation were the key process developments. Auto engine designers were quick to utilize the new qualities of mogas. Engine compression ratios and horsepower increased dramatically throughout the 50's and 60's. By 1965 the Research octane of mogas was approaching 100 and mogas was looking more like avgas.

About 1972 a further development improved the quality of mogas, when petroleum companies began to market a grade of ''unleaded'' mogas. To meet the octane requirements without the use of tetraethyl lead, the refiners developed the naphtha reforming process that produces a very stable high octane hydrocarbon. Unleaded mogas became a premium quality product with stability and octane much the same as 80/87 avgas.

The evolution of the quality of mogas is the main reason that we now hear of this fuel being used in some aircraft engines. Qualities of various mogas samples are compare to 80/87 avgas in Table I and we will discuss some of these differences.

Octane is the quality that prevents premature explosion of the fuel, on the compression stroke of a gasoline powered engine. It is an essential value in the engine's fuel, if the engine is to be able to produce its design power. In Table I the 80/87 avgas was tested as though it were a mogas so that we could compare its octane value with the mogas samples. As you can see, the octanes are all very similar and it is reasonable to conclude that engine knock or power loss from this source should not be a problem when using mogas in an 80/87 engine.

While discussing octane, perhaps we should divert for a moment to clarify how octanes are measured and reported. Motor gasolines are tested for two octanes using different conditions of fuel air ratios and compression ratios. One test gives a Research Octane Number (R.O.N.) and the second produces the Motor Octane (M.O.N.). Then to further complicate the situation the two octanes are combined to give an ''Octane Index'' which is the arithmetic average of the two test results or R+M/2 octane posted on the gas pump.

Aviation gasoline octane is measured under different operating conditions than motor gasoline. The first test simulates cruise conditions and is referred to as the ''Lean'' octane. Both octanes are used to identify the grade of fuel so we have 80/87 or 100/130 grades.

If we compare results of mogas and avgas octane tests we usually find the M.O.N. of mogas is very close to the ''Lean'' octane of avgas but R.O.N. does not correlate with ''Rich'' octane.

VOLATILITY

Volatility is a term used to describe

the propensity of a fuel to vaporize at normal operating temperatures. Motor gasoline must vaporize so that it can mix with combustion air and be distributed evenly to the engine cylinders but at the same time not vaporize so much as to produce excess vapor in the fuel line or carburetor bowl where it can cause the fuel starvation phenomenon known as vapor lock. Vapor lock occurs in a fuel system when gasoline is heated to a temperature that causes excessive evolution of vapor which can interrupt the flow of gasoline to the carburetor or cause foaming in the carburetor bowl. The net result of this excessive conversion from liquid to vapor in the fuel system is a reduction in the amount of fuel reaching the cylinders and a loss of power much like leaning the mixture in an aircraft engine.

Mogas has a much greater variation in volatility than does avgas. In the winter the volatility of mogas is increased so that cars will start more easily on a cold morning. However, if you get one of those crazy chinooks in Alberta when the winter temperature jumps to summer like conditions your winter mogas is a prime candidate to give vapor lock problems. And likewise, if you are using a supply of winter mogas in an aircraft on a hot spring day you may find your mixture running lean when you least expect it. If you are going to use mogas in an aircraft then it is absolutely essential that you take the time to understand something about volatility. Let's see if we can help.

To estimate the volatility of a gasoline we should, ideally, like to know the distillation curve of the fuel and the Reid Vapor Pressure (RVP)- The RVP is a relatively simple test which tells the pressure exerted by a fixed volume of fuel and air at 100 degrees F. It is a measure of how much light hydrocarbon such as butane or pentane is in a gasoline. The RVP of mogas will be considerably higher in the winter than in the summer, ranging from 15.5 PSI in January to less than 11.5 in July. By contrast, avgas never exceeds 7 PSI at any time of the year and it is common to find avgas in the range of 6 PSI or lower. So mogas is, by design, a more volatile fuel than avgas and we should therefore expect more problems on high temperature days with mogas.

Knowing the RVP of a fuel will give you a hint about the volatility but it does not tell the full story. To get the rest of the story you need to know the distillation characteristics of the fuel, especially the temperatures at which 10% and 50% of the fuel volume is vapourized. Looking at Table I you will see a substantial difference in the distillation temperatures for the Alberta unleaded mogas and the Southem Ontario mogas. In Alberta, 10% of the fuel will be vapour at 31 degrees celsius while in Ontario the temperature would have to be 39.5 degrees. Then look at the 80/87 avgas which would have to reach 67.2 degrees to produce the same ratio of vapour. So the distillation temperatures give another piece of information that is vital to understanding volatility.

Now we have to put the two pieces of information together. RVP and distillation temperature can be combined to produce an indicator called T(V/L)20 which is calculated and used by fuels researchers to set specifications on mogas blends to avoid vapour lock problems. The term

T(V/L)20 means the temperature at which you will have a 20.1 vapour/ liquid mix. In Table 1 this temperature is calculated from the RVP and the 10% and 50% distillation temperatures using a formula specified by ASTM Spec. D-439 for mogas. The lower the (V/L)20 temperature the more chance you will have of running into vapour lock. As expected, the Alberta gasoline has a much lower critical temperature than the other listed products.

At this point you are probably saying this is all very interesting but not of much practical value. That's true but there is something you can do if you are the type who likes to fiddle with gadgets and read specifications. First, the gadget. There is a relatively inexpensive (about $205 Can.) test kit called Gas-Chek that is reported to do a good job of measuring RVP and as an extra it also includes a test for alcohol content of the fuel. It is very portable and is used by pilots and race car operators in the U.S.

Then if you want to know something about the distillation of the fuel you can get a copy of the new specification that the Canadian General Standards Board (CAN/ CGSB B-3,5-M79) has produced which sets out the maximum volatilities (RVP and distillation temps.) for unleaded mogas in various geographic areas of Canada for each month of the year. This will give you some guidance to the type of fuel you are buying from reputable sources.

There are still other things you can do to minimize the risks of using mogas. Don't fly on a really hot day if you think you have some leftover winter gas in the tank. Aviation Safety magazine reported a rule of thumb formula attributed to Mr. Al Hundere of Alcor, for calculating the safe outside air temperature when operating with mogas of a known RVP. The formula is:

Safe OAT degrees F = 120 - 6x(RVP-7) This is based on a safe temperature of 120 degrees with regular avgas of 7RVP. So you subtract 7 from the RVP of your fuel, multiply this by 6 and subtract the total from 120. If you have a mogas of 15 PSI RVP this formula says don't fly when the temperature is over 72 degrees F, It's interesting but I can't say how valid it is.

There are also some good operating practices if you operate on mogas, such as - advance the throttle slowly from idle; don't sit for long periods at idle before takeoff; do a full power run up; and when you get in the air stay below 5000 feet because altitude also vapourizes gasoline. And last but very important, use only unleaded fuel. Don't use leaded regular.

Now if you haven't given up on the thought of mogas as an aviation fuel there are some other things to worry about like alcohols and aromatics but that's a story for another day. Fly safely.

References:

Harry Zeisloft ''Autogas flight test in a Cessna 150 airplane'' SAE paper 830706.

Alexander R. Ogston ''A short history of aviation gasoline development, 19003-1980" SAE paper8lO848.

B.C. Caddock, P.T. Davies, AW Evans and R.F. Barker ''The hot fuel handling performance of European and Japanese cars'' SAE paper 780653. WJ.Keough 144 Strathalla Blvd., Toronto, Ontario. M5N 1S7

TABLE I
FUEL COMPARISON
UNLEADED REGULAR MOGAS 80/87
ONTARIO ALBERTA WISCONSIN AVGAS

Distillation	DEGREES			
10%	39.5	31.0	40.6	67.2
30%	62.1	58.5	65.6	81.7
50%	94.0	102.5	97.8	93.9
RVP kPa	90.8	105.5	90.3	35.6
PSI	13.2	15.3	13.1	5.2
T(V/L) 20 Deg. C	46.4	41.3	47.4	70.1
R+M/2 OCTANE	88.6	87.7	87.2	88.0

Editor's Note: My thanks to Craig Marshal and to W. J. Keough for the above material. I will publish Part 2 of Mr Keough's article in the next newsletter. I would like the membership to send their comments for the "Letters to the Editor" section of Newsletter 84.

FOR SALE

GPU PARTS
12 volt direct drive starter (Delco Remy) and starting ring, bendix mag parts, 1 Slick 4016 VW mag, Marvel Schebler carb. parts, new exhaust valves, new std. main bearings, 3 crankcases, regrindable cams and one crankshaft, connecting rods.

T-18 PARTS
Flat back engine mount and the alum. plate (completely machined) folding wing main spar and the steel fittings, ailerons and counter weights, plans, and many misc. parts, axles and brake cylinders.

Eddie Eiland
1350 Thunderbrook
De Soto TX 75115
H (214) 230-8266
W (214) 330-2370

For Sale:
Ratray T-18 Cowling-used, but certainly usable--$150.00
Scott Tailwheel assembly-6 inch solid tire-used - $100.00

Jeff Ackland, 6812 Cottonwood, Shawnee, Kansas

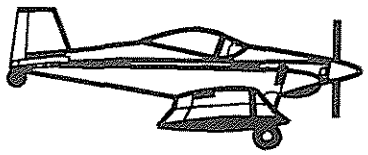
For Sale:
66"x76" sensenich prop--$350.00 (never used) suitable for 150-160 hp lycoming power in T-18

5x5 Goodyear wheels and brakes--Best offer

Bob Yeakey
9729 Bellewood
Dallas TX 75238
H (214) 398-2947
W (214) 750-7438

FIRST FLIGHT

by Ken Morgan



THE FIRST FLIGHT (The Second Time Around) N 46806 By Ken Morgan I have been working on a T-18 project all my life; well, not quite, but it seems that long. During the building process, I always got involved with other airplane projects and let the important one go (T-18). I had completed most of the T-18 basic structure (bought a wing from Lyle Fleming in CA.) and was ready to start on the other 50% when I heard about a T-18 in Florida that had been stripped of engine and instrument panel. This aircraft had been built in Kansas and first flown in 1977. Since that time it had gone through several owners, including the present one who had taken it in trade on a Cessna 210. Does the pedigree sound interesting? The new 210 owner wanted all the T-18 radios and instruments (full IFR panel with autopilot) for installation in the 210. The new owner of the T-18 was a dedicated RV builder and wanted the T-18 engine (fuel injected IO 320) and constant speed prop for an RV-6 he was building. I purchased N 46806 sans panel, electrical, radios, or engine. However, I did get a current airworthiness certificate with the aircraft. This brings up a point, for those of you buying completed projects, the only legal way to obtain registration is to get the airworthiness certificate with the aircraft. If not, you are in a catch 22 situation and must either be the builder, or it must be a kit with you completing the other 51%. On June 1, 1990 my new T-18 project was trailered from western Florida back to Texas. J'nene and I created quite a scene touring the Vicksburg Civil War Battlefield/ Cemetery with the T-18 trailering close behind. I was enthused about the aircraft as I could see flying it in about 3 months. After installing the engine/panel from my original project and adding electric trim and a general weigh reduction effort; Yep, you guessed it, 13 months and 27 days later, July 27, 1991, N 46806 saw daylight under her wheels, _The First Flight, The Second Time Around. Even though I cheated a bit (purchasing another project), the thrill of the first flight was just as intense and joyful as I had imagined. For those of you working long hours to complete your project, believe me it is worth all the effort. I have had experience in tail draggers, restoring and test flying an early SA-100 Starduster Biplane, in addition to a few hours in a Luscomb 8E, and T-18 time from a few years back (I had flown and soloed Bob Millers T-18). I felt qualified to handle the first flight, particularly after getting several hours of dual with Gary Green. However, I decided to let experience prevail and ask Gary to do the honors. Magneto problems on Gary's plane just before OSH prevented him from making the flight. I'm grateful to Gary for his help and encouragement; however, I'm awfully glad I was able to make that first flight myself. Test flight day was blue sky, temperature about 77 degrees, and wind south at about 10mph. I had completed all aircraft work and made several taxi runs earlier in the week. She handled great on the ground with no tendencies to head for the boonies. The aircraft had weighed in at 871 lbs. with an empty CG at station 62.47 (7.47 aft of the leading edge of wing datum, 14.9% MAC). This empty weight was a real accomplishment as the aircraft had previously had an empty weight of almost 1100 lbs. This was with an IO 320 injected engine, constant speed prop, full panel, including auto pilot, and an apparent complete lack of weight consciousness by prior owners. From the above configuration I had gone to a highly modified 0290G, Pacesetter 68 X 66 wood prop, full panel less vacuum/gyros but with all other goodies including Terra Nav/Com, Transponder/Encoder, ECDI, and Foster 500

Loran. After a thorough pre-flight there was nothing else to do but go. I was fortunate to have good friend and T-18 renovator (N 56VB) Evan Roberts to do chase in his A36 Bonanza. Also flying chase was my RV buddy and good friend Tom Keim in his RV-3. Engine start-up was accomplished in 2 blades with the 0290 idling smoothly, ready to go. Taxi to active, check radios, and coordinate with my chase pilots. Mag check was good with about 60 rpm drop. Pulled a notch of flaps, no pattern traffic, rolled to center line and slowly applied full power. She responded immediately with the tail up in about 400 ft. and airborne in about 800 ft. Climb out at 120 mph indicated, 1000 fpm on VSI. What a wonderful feeling, and then you get the answer to that proverbial question: Was it worth all the time and effort? And, you already know the answer to that one. Except for making several circuits above the airport with one notch of flaps hanging out the flight could not have been more successful. Minor problems were roll trim (heavy left wing), and higher than normal oil temperature. Takeoff rpm was about 2200, with full throttle rpm of 2600 at 3000 ft., Indicating just under 190 mph. I couldn't be happier with the overall performance as there was some concern regarding the ability of the 0290 to pull a Pacesetter 66" pitch prop. I believe the standard 0290 would have a problem: however, my modified 0290, with higher compression (7.5:1) D2 pistons, 0320 intake valves, and MA4SPA carb. does an outstanding job. I am still working on the heavy left wing. The oil temp problem was caused by restriction in the partial flow oil filter connected in series with the cooler. I now have about 50 hours on N 46806 and enjoy it more each time I fly. Performance at cruise is spectacular; however, I could use a few more revs on take off. The Pacesetter folks can reprofile the outer prop tips to give me 150 more revs on take off. This may be the optimum solution for compromise take off/cruise performance. A recent trip from D/FW to St. Louis 3:15 going and 3:30 on return. Round trip of 1100 miles, producing average ground speed of 163 mph, @ 2500 rpm, 8.6 gph fuel burn. Not bad for an 0290 GPU. I am more than happy with these numbers. etterm an individual cyl. 4 stack exhaust Prop: Pacesetter 68" X 66", Thorp spinner. Airframe: Imron paint, longer gear, all wheel/brake and gear leg fairings. Rattray cowl with adjustable cowl flaps Performance: 2600 rpm @ 2500 ft. 188 mph indicated 2450 rpm @ 3000 ft.(75%) 160 mph indicated Stall Clean: 63 mph ind. Stall Flaps: 60 mph ind. Good stall characteristics, no bunting tendencies. SEE YOU AT THE FLY INS! Ken C. Morgan T-18 N46806 S/N 1064, Vital Statistics: Empty Wt. 871 lbs. Empty CG 62.47in Gross Wt. 1500 lbs. Fuel (main 29, aux rear deck 10) 39 gal Full panel less vacuum/gyros, Terra nav/com, ECDI, xpnder/encoder, with Foster 500 Loran (updated NOCUS/SOCUS midcontinent chain) Engine: 0290G modified to produce 140 hp.

Ken Morgan, 1612 Northridge Dr. Arlington, Texas 76012 817/265-6838
N46806

January 16,1992

T-18 Mutual Aid Society
Route 3, Box 295
Clinton, Il. 61727

Rich

Enclosed is a check for the 1992 News Letter keep up the good work.

My T-18 N8AL turned nine years old in December. I gave it a birthday gift of a NAV-AID Auto-Pilot. I was able to locate the servo in the spar box under the pilot seat. This allows me to hook the control linkage directly to the walking beam. With the auto-pilot engaged I can always override it with the control stick, this is a built in safety feature. The NAV-AID has a track mode and I have coupled it to my II MORROW FLY-BUDDY + loran. Talk about neat, this thing is better than sliced bread.

I regularly fly with a buddy who has a RV-4. His aircraft has a Lycoming 0-320 160 HP. My T-18 has a Lycoming 0-320 150 HP. We both are flying behind Sensenich 66-74 wood props. We have both checked our tachs. At any given RPM the T-18 is faster. Turning 2500 RPM I have about a 5 MPH speed advantage. We fly together about once a week and my T-18 is always faster. He thinks it is because I have less frontal area but we all know that the T-18 is just a better airplane.

Again keep up the good work.

Al Bosonetto N8AL
32625 Benson Dr.
Westland, Mi. 48185

Day (313) 651-1333
Nt. (313) 261-6852

Editors Note: Good letter Al. Could you send a sketch of how the servo is connected. Thanks.

T-18 NEWSLETTER
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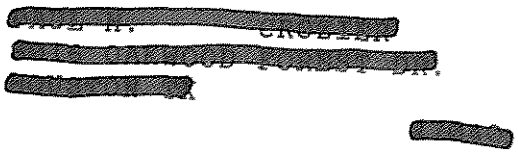
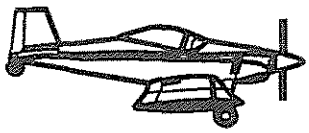


Newsletter #84 is being prepared and will be sent to all of you that have renewed for 92 Check the label for a red zero for not paid. Let me know if I have a bookkeeping error. Thanks.

T-18 MUTUAL AID SOCIETY 1992 RENEWAL

Please include a check or money order for $25 and send to:

Rich Snelson, Route 3, Box 295, Clinton, IL 61727



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