EAA® Technical Counselor News

AUGUST/SEPTEMBER 1987

FIRST FLIGHTS

R. Dean Hollenbaugh and his nice Glasair. First flight May 5, 1987.

Technical Counselor Red Beitelshees of Boulder, Colorado says that Dean is EAA 161480 and is a member of Chapter 648. Red followed the construction of the plane and took the picture the day before. Red say that "Ten of us, mostly from Chapter 648 built a hangar 60' X 100', a metal building on the Longmont airport. He is one of the owners and keeps his plane there."

Jeff Fickling of Miami, Florida restored a Piper J-3 Cub.

The aircraft was purchased as a basket case in 1980. The first flight was May 23, 1987. Jeff also flew it to Lock Haven recently for the Piper 50th birthday anniversary there. Technical Counselor Dick Mozina reports: "She flys hands-off and is a really beautiful restoration. I have been looking in on his work along the way and also lending a hand now and then. This aircraft needs recognition and will get it anywhere it is flown!" Apparently he likes it.

TECHNICAL COUNSELOR NEWSLETTER STAFF:

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Editorial

THE EAA TECHNICAL COUNSELOR PROGRAM
A Policy Statement by Paul H. Poberezny
President and Founder, Experimental Aircraft Association
June 1987

GENERAL INFORMATION

Q. What is a Technical Counselor?

A. A volunteer aviation education counselor who, when asked to do so by an amateur aircraft builder, shares his knowledge, expertise and experience in order to assist the builder with the project.

Q. What are the qualifications for a Technical Counselor?

A. Tony Bingelis puts it well when he says: "Possibly one of the best qualifications for a Technical Counselor is his ability to listen." This is very true. We have other qualifications, and they are as follows:

a. Have built an amateur built aircraft or
b. Have restored an antique/classic aircraft or
c. Be an A&P, IA, DAR, DER or Aerospace Engineer (U.S. Ratings, other countries equivalents of these ratings are also acceptable) or
d. Have the qualifications for the above.

Q. How many Technical Counselors are A&P mechanics?

A. About 50% are A&P mechanics.

Q. My skill is in a special area, can I be a Technical Counselor?

A. The individual may have expertise in only one area such as woodworking or, welding or covering. Passing on these talents would be beneficial to builders working on that part of the aircraft.

Q. Why does EAA have a Technical Counselor program?

A. To ensure that an airworthy aircraft is presented to the FAA for final approval. To encourage the self-help nature of our organization, and to pass on aviation knowledge to promote aviation safety. We also are highly interested in maintaining the excellent image that the amateur built program has, and the Technical Counselor program has been a very effective way of doing this.

TECHNICAL COUNSELOR ACTIVITIES

Q. Who is the average Technical Counselor?

A. From a survey done, we know that the "average" Technical Counselor is 57 years old, the oldest being 80 and the youngest 27. On the average, a Technical Counselor visits aircraft some 12-13 times per year, puts on an occasional technical program in his local chapter, and on occasion, sends technical information on to EAA headquarters for consideration for publishing. 62% of the Technical Counselors are aircraft builders, having completed 1.9 aircraft each. 70% have completely restored an aircraft or hold A&P licenses.

Q. What activities must an EAA Technical Counselor perform to maintain his active Technical Counselor status?

A. Visit three aircraft per year, or provide three chapter programs per year, or send three articles to EAA for consideration for publication per year, or any combination of three of the above. He may also work as a volunteer at the Oshkosh EAA Convention in a Technical Counselor capacity or the Homebuilder's Corner, workshops, etc.

PERMISSIBLE FUNCTIONS

Q. Does the Technical Counselor sign log books?

A. The Technical Counselor **must not** sign off any log book or document indicating an official inspection or judgement of airworthiness. To do so may abridge the authority of the Federal Aviation Administration.

Q. My FAA office wants my Technical Counselor to sign my builder's log book.

A. A Technical Counselor **must not** sign log books. If he is an A&P, IA, DAR, etc., he may sign log books in that capacity, but not in his official capacity as an EAA Technical Counselor. Advisory Circulr 20-27C is explicit in that regard - the **builder** signs his own log.

Q. Can an EAA Technical Counselor approve design changes?

A. It is not the policy of the Experimental Aircraft Association and its Technical Counselors to design or redesign aircraft, components or parts thereof. Any design changes or changes from the original drawings of the designer are outside the parameter of the program, and would be between the builder and the designer. A Technical Counselor should recommend good aeronautical practices.

Q. I want to modify an aircraft. Can the Technical Counselor help?

A. No, his function is to ensure compliance with the plans. Any modifications to plans must be by agreement between builder and designer only.

Q. Can a Technical Counselor work on or test fly an airplane that he visits?

A. If a Technical Counselor works on an aircraft that he visits or test flies the aircraft, either for free or for a fee, he is acting on his own behalf, and not in his capacity as an EAA Technical Counselor.

Q. Does a Technical Counselor charge for his services?

A. There shall be no fees charged for an EAA Technical Counselor's educational help in assisting a builder by visiting his project. Any renumeration for travel or lodging between an EAA Technical Counselor and a builder desiring his recommendations is between the builder and the Technical Counselor.

Q. Can a Technical Counselor combine his volunteer work as a Technical Counselor and his work for pay as an A&P?

A. No. The Technical Counselor is a non-paid volunteer, as described.

BENEFITS OF BEING A TECHNICAL COUNSELOR

Q. Are there any benefits to being an EAA Technical Counselor?

A. One of the benefits is receiving the Technical Counselor Newsletter, filled with technical tips and information, issued six times per year. However, the main benefit is derived from passing on knowledge on aircraft building and safety practices so that others can complete an airworthy project.

Q. Is the EAA Technical Counselor protected by insurance?

A. The Technical Counselor is insured for any legal liability presented against him while operating only within the policies of EAA and its efforts to ensure safety in aviation.

AN INVITATION TO BECOME A TECHNICAL COUNSELOR

Q. I want to be a Technical Counselor. How do I become one?

A. Write to the EAA Headquarters Technical Counselor Administrator for an application form.

Oshkosh '87

EAA/AVCO LYCOMING TEXTRON OUTSTANDING SAFETY ACHIEVEMENT AWARD

For 1987, the winner was H. Paul Schuch of 14908 Sandy Lane, San Jose, California 95142, telephone (408) 377-6137. You will see a nice description of his equipment in the June 1987 SPORT AVIATION on page 26. The prize for this award is a brand new Lycoming O-235 engine. The award was presented to Paul by Tom Baier. Paul was selected over 16 finalists for his invention of the Binaural Doppler Collision Alert System (BiDCAS), a self-contained airborn Doppler radar system. This system functions independently of ground based systems or equipment installed in target aircraft and is designed as an inexpensive collision avoidance system. The radar transmitters in each wing tip of the aircraft pick up a directional signal, which is then transmitted to stereo head phones. Approaching aircraft can be heard as a rising tone while aircraft moving away can be heard as a decreasing tone. The intensity of the sound increases with proximity. This is a particularly timely introduction by the designer as a very deserving award.

Previous recipients of the award were: in 1986 Borris Popov of BRS Inc. for his ballistic parachute recovery system that had at the time saved over 20 aircraft, Fred Cailey in 1985 for over 11 years of technical articles in SPORT AEROBATICS magazine of a safety nature (a volunteer writer) and in 1984 Richard Brown won for his device to detect water in fuel.

Paul Schuch's equipment has been tested extensively in the area in which he lives which has very heavy traffic. He is working on getting the device patented and has several companies interested in its production. The design recently also won honorable mention in the Cardiff Publishing Co. 1987 RF Design award contest. In the twenty year period between 1957 and 1977, general aviation aircraft were involved in mid air collisions with air carriers 17 times, military aircraft 39 times, and other general aviation aircraft 465 times. According to these statistics, we are more than twice as likely to collide with a military aircraft as an airliner and more than 27 times as likely to be hit by another general aviation aircraft as an airliner. At this time, we are running about three mid air collisions per month in this country. Hopefully EAA and Avco Lycoming Textron's award of this outstanding safety contribution award to Paul Schuch will enable him to produce the device inexpensively for general aviation use.

OSHKOSH '87

Ted Slack was our number one volunteer at the Homebuilder's Corner building at the Technical Counselor area. At our wind down party, Ted passed a statement on to me that I would like to share with you. What he said was — "What many don't realize—it is a privilege to serve at Oshkosh — to help others realize their goals. It is too bad that more don't get involved or they would realize this is true." In spite of that, many Technical Counselors who do realize it is a privilege to serve are almost tripping over each other at the Technical Counselor area. Our thanks and deepest appreciation to John Grega, Willie Knebel, L.E. Boykin "Bo", Bill Twining, Ted Slack, Al Lurie, Ted Travis, Bob Herman, R.G. Beeler, George Cowan, Charles Schwartz, R. Kurzenberger, Gerald Redman, and Terry Algeo. It is sort of like serving your country in the military, it really is a privilege to serve. Our appreciative thanks to those who served us.

Our good volunteers went out and took a look at some of the airplanes and came to help the owners, discussing defects with them where they noticed them. We noted that most of these defects are of a maintenance nature. Of the airplanes that have been flown for a period of time, some of the following showed up:

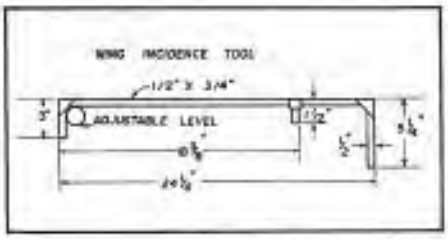
1. Fly Baby - elevator hinge is sloppy, left outboard side.
2. Original design - prop bolts not safetied properly, one wire six bolts. Left and right wing were developing some play at the rear attach points.
3. Pitts S2A lost motion at the elevator.
4. Mustang II - left elevator has movement "slop".
5. RV aileron control ball end - rusty and badly worn on the right side.
6. Sky Coupe - a loose exhaust system.
7. Taylorcraft - a loose exhaust system.
8. Hatz - right rear stabilizer working in up, in and out, and both stabilizers had damaged bushings at the elevator stop.
9. An ultralight rudder pivot had no bushings. The upper rudder hinge pin was loose.

Technical Tips

TOOL TIPS

WING INCIDENCE TOOL

With this tool, the incidence along the wing (or wash-in and wash-out along the wing) can be checked to eliminate any twist. The dimensions shown are for either Pitts or Acro Sport I. The tool is useful for any aircraft, but dimensions may need to be changed. The better the level used the more accurate the tool.



TECHNICAL TIPS

1. For prevention of battery terminal corrosion: QuickSilver Anti-Corrosion Lubricant manufactured by Mercury Outboard Marine of Fond du Lac, Wisconsin in a small tube obtainable at a Mercury Outboard dealer. A light film is all you need.

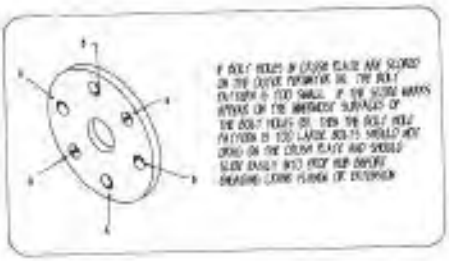
2. They recommend you use a chamois skin to filter water from autogas which it does, but one of our Technical Counselors found fine particles of chamois in the gascolator on his Turner. It floats and was on the screen in the filter. He is now using a mechanical filter from Aircraft Parts Supply House.

3. A lot of A&P's and IA's don't pull the drain on the Marvel Schebler carburetors to check dirt and water. It is a plug on the bowl lower than the bowl itself and is almost a must on annual inspection.

Tips 1 thru 3 are from Gene Darst of Beaumont, Texas.

4. If you are installing an automotive lap belt in an amateur built aircraft, it was found that the belt wouldn't release with pressure on it. A suggestion from Technical Counselor Neil Sidders is that we not use automotive belts or thoroughly check them before hand to see if they will release with pressure on them.

5. While tightening the prop bolts on a Long Ez project, a Technical Counselor encountered a suspiciously high torque reading even though the bolt heads had not yet bottomed. It seems the crush plate obtained from Great American Propeller Co. had a bolt pattern too small in diameter. He drilled out the holes with a .015 inch larger diameter bit and that cured the problem. The Great American Propeller Co.'s Fred Griffiths said that the plates had been supplied by Ken Brock and they thought they had caught all of them and was disturbed that a bad plate had been shipped. A Technical Counselor suggested that "loose prop bolts continue to be the single most frequent cause of non traumatic, mechanical failures in wood props I've examined to date. Torquing the bolts to the appropriate reading is vital to a safe installation. Periodic retorquing of the bolts is mandatory with a wood prop, even with one with the precision and strength of Great American's." Thanks to Art Bianconi.



6. In reading the February/March Technical Counselor News he came across Mr. Kurzenberger's excellent suggestion for an external charging attach point. I have been using a similar system on my Bonanza in the winters in Michigan and have a small change to offer that I feel is an improvement. Instead of using a screw attachment for the positive lead I installed a polarized mini phone jack in my plane with a compatible polarized phone plug attached to a one amp. trickle charger. This system has several advantages. It precludes inadvertent reverse hook-up and possible component damage. It eliminates the necessity of a ground clip elsewhere on the plane and the one amp. charger can be left on an aircraft battery all the time in the winter assuring a warm and fully charged battery without danger of damage or overcharging. In the sketch accompanying this article the master switch was shown connected to the grounding lead of the master solenoid. I personally consider this to be a bad practice and prefer to put the master switch in the hot lead side of the circuit. Cutting the ground side leaves the solenoid live at all times and subjects you to possible accidental grounding and activation of the starter by dropping a tool or a metal belt buckle, etc. This is from Joe Hillebrand, Technical Counselor.

7. You will see an article on aircraft temperatures etc., in an upcoming issue of the Craftsmans Corner. In addition, most epoxies lose 1/2 their strength at 150 degrees Fahrenheit. From Ben Owen, Technical Counselor.

8. I had a call from a builder with a Midget Mustang which was stalling around 85 MPH. I suggested a too sharp leading edge and the builders rebuilt the leading edge with micro balloons and epoxy reducing the stall speed to 59 MPH, substantially improving the aircraft. The root section on a Midget Mustang according to Bob Bushby is NACA651-212 and the tip is a NACA65-210. If in the process of manufacturing you make the leading edges sharper than was intended, the aircraft may have an excessively high stall. This is true of all metal aircraft.

9. From Bill Clause of Stolp Stardust, he did some tests on wood spar aircraft with metal fittings. The fittings are epoxy glued to the spar and according to the manufacturer they found that the unit will take 19 G's. If it is not glued to the spar, a spar and fitting will take a 9 G load. This was tested at Universal Studios in California and is a substantial reason for epoxy gluing fittings to the spar. Of course, the metal cannot be painted, nor the spar varnished in the area where the fittings are glued to the spar.

Engines

NOTICE FOR O-290-G OWNERS

Reed Johnson, Technical Counselor * 156 of Berkeley, California sent the following information to us, and this material should be brought to the attention of those people owning Lycoming Ground Power Units. Reed's letter is repeated verbatim:

We had an accident in Chapter 20 which highlights a situation that I believe should be given wide publicity. Ed Rudolph, who has recently finished a little cream puff of a Pitts rolled it into a ball Saturday. He had a forced landing. Fortunately he was not hurt at all and the condition of the aircraft after the accident is a great recommendation for the ruggedness of the Pitts design. The "G" meter was pegged in both directions but it didn't come apart.

"He had an engine failure. In fact, the engine froze solid. He managed to get it into a patch of oats between several housing developments. Of course as soon as the wheels hit the tall oats he was immediately on his back. He tore the gear loose, ruined the fin and rudder, caved in several capstrips on top of the top wing as well as bending up the cowling and other assorted damage including the cabane struts. A tight shoulder harness undoubtedly saved his life.

"The engine in the aircraft was a ground power unit and considering the number of these units that are being used, the situation that we found in the post-mortem of the engine should be publicized.

"In the engine manual for the O-290-D it gives a crankshaft and crankcase front end clearance of .009 to .016 with .026 maximum between the oil slinger ring and the front of the bearing boss; that is, nine to sixteen thousandths crankshaft end ply. This clearance was not present in this engine. The aircraft and engine had approximately 45 hours since he had completed it, all on fairly cool days. It is only in the last couple of weeks that the weather has warmed up to the point where you could call it hot. When the accident occurred it was the hottest day that this plane had been flown. It occurred just after a flight of about 45 minutes; time enough for the engine to get well heated up and for the case to expand. Aluminum expands more than steel.

"When we tore the engine down we found the back of the oil slinger and the front or thrust surface were galled with aluminum from the case, indicating that the aluminum of the case had expanded to the point where the dimension of the case became greater than the distance between the thrust surface and the oil slinger ring on the crank.

"Ed said that when the engine stopped it didn't make more than three revolutions before the engine froze solid and the prop stopped. After we reached the plane it had cooled off. The prop could be moved but it felt very rough. It was just tonight that we took the engine apart to look at it.

"So here is a point that should be made to all technical counselors and all people who are overhauling these engines who are not technical counselors, that the specified clearance *must* be present when the engine is put together. Ed was extremely fortunate that there was a field to get into and that he has a cool enough head to get into it, as the area where he was is fairly well populated.

I would like to emphasize to anyone working on these engines, in view of the number being used, that they be very sure that this clearance is present as well as **all** the other clearances specified in the overhaul manual. We looked at several other engines that have not yet been overhauled and found that in one this clearance was insufficient.

"The front main bearing became very hot due to the friction at this point; hot enough to melt out some of the bearing metal. Considering the number of the engines in this area that have been torn down to find the front bearing burned out, we wonder if this may not be a contributing cause. Nearly all with burned bearings had been overhauled and failed soon after. Can missing cranks and cases in an overhaul shop be one cause of this failure? In this case the engine didn't run long enough to completely burn up the bearing.

"There is one other point that I would like to comment on. In the dozen or so engines that I have torn down and looked at, including several that had just been overhauled, (one of which had thrown a rod and several that had the front bearing burned out) we have found the sludge tubes in the crankshaft had not been cleaned in any of them. In the engine that had thrown the rod, the sludge tubes were nearly full of muck. The sludge tubes should be positively cleaned or replaced any time that the engine is overhauled."

Editors Note: Thrust bearing clearance is very important in an assembly of an engine. It might be noted that you will frequently be advised to not move an engine by its propeller. This particularly applies to not putting flexing loads by pushing on the propeller near its tip. But you should know that when you are moving an engine by its propeller hub the load of the movement is being placed upon the thrust bearing when you push or pull on the hub. How to best move an airplane is a matter that each individual airplane owner has to decide.

VW ENGINE NOTICE

Next is from the Limbach Aircraft Corp. Newsletter, P.O. Box 1201, Tulsa, Oklahoma 74102, telephone (918) 832-9017.

First, there is ample and growing evidence that frequent changes of engine oil can be the least expensive way to achieving design service life. Most of us operating light/sport aircraft time-age our oil before we use-age our engine oil. An engine that is used infrequently does age; by most accounts, it ages faster than the engine that is run every day or at least frequently. Modern engine oils can give normal good service for the 50 hours we recommend between changes in the Limbach manuals. But, many of us operate in dusty and/or polluted air. In those cases, we recommend a shorter change interval. Many of us do not fly our planes for periods of one, two, three or more months. Here again, it is advisable to change oil sooner. Many of us operating air cooled engines use a 20 to 30 hour cycle for engine oil changes. As we stated above, there is growing evidence that frequent oil changes help extend

engine service life. In the long-term, it seems to be our least costly option. And for the Limbach engines, remember to use a high-grade automotive-type oil of a viscosity as given in your engine operating manual.

VW VALVES

Technical Counselor Neil Sidders found that a suitable substitute for his stock Volkswagon valves was the small block Chevrolet valves. They provide a little higher seat pressure which is good because the tighter the seat pressure, the better the heat transfer. Valves cool by heat transfer metal to metal as the air blasts particularly from the hot exhaust won't cool the valves. This change in valve springs has been adopted and is used by Rex Taylor of Hapi Engines and is a suggested modification to any older Volkswagon engine.

From the Goodyear Firebird Tale, Chapter 128

Al Ross gave a short dissertation on the problems with his KR-2 since it first flew about a year ago. The first of these was high cylinder head temperature (Revmaster 2100-D) which seemed to be the result of excessive leaning by the Posa carb due to attitude change during climb. The second was compression loss after running and slightly burned valves. It appears that the new camshaft required for the hydraulic lifters (not installed by Revmaster) was causing a small amount of valve float. This has apparently been alleviated by installation of new heavier valve springs of Chevrolet manufacture.

ENGINE CORROSION

A CONTINENTAL service bulletin issued several months ago deals with methods of preventing engine corrosion. Instances are cited where new cylinders began to rust only a few days after installation. But it turns out that after about 50 hours, varnish is deposited on the cylinder walls and protection against corrosion is gained.

New engines should be flown at least every 15 days, while older ones need a 30 day schedule. Pilots not able to meet this schedule are told to pull through new engines every 5 days (7 days for 50+ hour engines). The engine pull-throughs are to be done in addition to the 15-30 day flying schedule. However, IF THE FLYING SCHEDULES CAN'T BE MET, the pull-throughs should be done on a DAILY BASIS.

ELECTRONIC IGNITION FOR YOUR AIRCRAFT

By Robert (Bob) Yeakey, EAA Chapter 168, Dallas, Texas

Have you ever wondered why an aircraft engine uses 20 percent plus more fuel than a similar H.P. automobile engine? Have you also wondered what can be done to improve the situation?

Several years ago I was an engineer for Southwest Research Institute. A considerable part of my duties was associated with engine fuels and lubricants, including Octane Rating. I would like to share some of the things I learned with you.

There are actually two main causes of high fuel consumption: The first is the lower compression ratio required to compensate for the reduced cooling capacity of air; the second is the fixed timing associated with magneto ignition. It was said at the '82 EAA convention by the honorable Molt Taylor that the magneto powered ignition was a 50 year old design and that most of the cars out there in the parking lot had vastly superior systems.

Magnetos produce low voltage at cranking RPM. They make a spark at the same crank angle at all speeds. The impulse coupling helps bridge the starting problem. Even so, recommended spark gap settings for aircraft engines are very close (.017 to .019 inch) just so the low available voltage will fire the charge and get your engine started. Automobiles have been superior in this regard for many years. The spark in a gasoline engine should occur before top dead center at such a point that maximum cylinder head pressure takes place at top dead center. It is also desireable for the timing to retard at cranking and idle speed. 25 degrees btdc on the 160 hp Lycoming is the ideal timing under only one set of circumstances: The manifold pressure maximum, and the outside air temperature 60 degrees F. and dry air.

Fortunately, there is a rather handy modification that will take care of all these ignition shortcomings: This change is simply a good electronic system with timing controlled by the speed of the engine and the manifold pressure.

With this system properly designed and adapted to the O-320 on my T-18, a number of advantages would immediately be realized:

1. Spark plugs may be set to a wider gap, .035 to .040 inch, which will burn a leaner mixture, start better, and eliminate lead fouling when using 100ll av gas.

2. At part throttle, i.e. (60 percent power at cruise altitude) the timing will advance to give greatest power from the air-fuel charge. A greater percent of the heat energy in the fuel will go for power and the smaller percent of waste heat will result in a cooler, longer life exhaust system and a cooler running engine.

3. Automatically with the optimum timing thereby achieved, the fuel consumption will be lower. I predict a reduction of 10 to 15 percent based on stationary engine and automotive fleet experience.

To build this system and retrofit a Lycoming 160 hp engine will be done by first determining a spark advance curve. An approximate curve can be established by flying level with approximately 60 degrees F o.a.t. at various manifold pressures with timing varied by a cockpit operator at each pressure to yield maximum RPM. The resulting curve will not be 100 percent accurate but it will be a distinct improvement and adequate for the application.

One additional feature of the system will be a retarding circuit to retard the timing when and if any slight detonation is experienced. An amber light on the instrument panel will come on during the retard. This feature will permit the use of auto gas in A/C engines with 8.5:1 compression ratio like my 160 hp model. This is another cost reduction easily available with this retro fit system. This component will go on any aircraft engine that powers an experimental airplane.

The work involved to install this system isn't too great and a good part of the fuel savings realized by Dave Blanton in his 175 Cessna will be had. He, of course, used a liquid cooled Ford V-6 to achieve a far lower fuel consumption than air-cooled engines. He arrived at this system after years of testing all forms of ignition systems, including several magnetos. The installation should be relatively easy for the homebuilder since so much of the ground work has already been laid.

Fuel Systems

SERIES VS. PARALLEL
by

Frank L. Christensen
Director, Christen Industries, Inc.

Thank you for your letter of June 29 concerning Lyle Powell's article on fuel systems in SPORT AVIATION and my related article, Fuel Systems Re-examined, which appears in the IAC Technical Tips Manual.

I have reviewed Mr. Powell's article and his letter to you, as well as my earlier article. I find that Mr. Powell's comments about fuel system design are general in nature, whereas my comments are directed to a particular aircraft fuel system and event. Your request for my comments about these articles implies that they are in conflict and need to be resolved. I don' think this is necessarily the case.

Mr. Powell is obviously knowledgable, experienced, and responsible, and he has done considerable research on fuel system designs. His article presents sound general principles for fuel system design, and I certainly cannot disagree with any of his general recommendations; however, I question the broad statement in his letter which seems to say that there is absolutely no choice between the safety and reliability of a fuel system plumbed in parallel versus series, regardless of the type of fuel system components used or the type of aircraft. I would not suggest that series systems are better than parallel systems, but I do think there are cases where a series system is equally as safe and reliable as a parallel system, both in principle and practices.

Although the dual fuel paths which are theoretically inherent in a parallel system seem to offer greater reliability through redundancy, they are also more complex with more critical components to potentail fail such as flow check valves. In addition, the record does not seem to support Mr. Powell's view of the absolute need for parallel plumbing. All of the FAA certificated light aircraft which I am familiar have very simple series-type fuel systems, and the FAA certificated Pitts Special aerobatic aircraft has always had a series system. I know of no cases of fuel system problems or failures in any of these aircraft which can be attributed to series plumbing design.

My observations and experience suggest that in an aerobatic aircraft such as the Pitts Special a simple fuel system composed of a gravity-primed positive-displacement manual boost pump and AC brand engine-driven diaphragm pump, all plumbed in series, is equally or more reliable and safe, in principle and practice, as the same set of components plumbed in parallel with check valves. It would take more text and comparative plumbing diagrams than I am prepared to present here to illustrate why this is so, and even if it is so, this does not dispute the value of a parallel system.

A different type of aircraft with a system composed of an electric boost pump and another type of engine-driven fuel pump might be far less reliable if plumbed in series than in parallel.

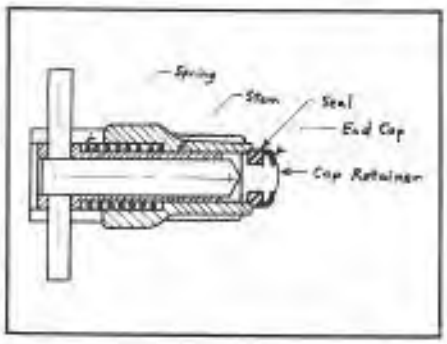
I certainly do not represent myself as an aircraft fuel system engineer, and as stated above, I do not disagree with any of the sound principles of fuel system design recommended by Mr. Powell, but I think that it is important not to overgeneralize in analyzing the design of any aircraft system. The best system design is often the optimum compromise between essential but conflicting design objectives. Aircraft should be very strong but very light, very sophisticated but very simple, and so on, and there are cases where a series fuel system composed of the right components is the more optimum compromise of conflicting reliability and safety design objectives that is a parallel system.

I hope the foregoing comments will be useful to you and that Mr. Powell will accept them in the constructive and non-critical spirit in which they are offered.

LOSS OF FUEL -
FUEL DRAIN VALVES

There have been a number of Malfunction or Defect Reports advising of the loss of the stem from Part Number CCA-1550 and CCA-1600 Curtis Dyna-Products fuel drain valves. Loss of the center shaft stem assembly usually results in draining the fuel tank. Examination of this valve design has revealed that the stem will be ejected from its valve body by spring tension if its seal deteriorates to a point where it no longer provides a cushion for the stem end cap. Loss of cushion caused the cap's deformation and/or the shearing of the end cap's rolled metal retainer. Once the end cap has departed the stem and the remaining seal seat material is sheared away, the spring will eject the stem from its valve body allowing fuel to drain freely.

The rate of seal deterioration, which normally occurs after hundreds of valve closings, has been greatly accelerated recently by seal exposure to low lead gasoline. The low lead gasoline softens the seal material thereby increasing its wear rate. The seal material, a nitrile compound, has been found to be the best of the presently available materials for this application. In most instances, a marginal seal can be detected by fuel leakage from around the valve stem, but not in all instances. Because of this inconsistency, the submitter recommends that after the valve has been closed, firmly grasp the stem handles and pull downward. If any downward movement of the stem is felt, remove and inspect the valve assembly prior to flight. CAUTION: When pulling downward on the valve stem, a marginal stem assembly may be pulled from its body and followed by a gush of fuel.



A mechanic advised he has found several leaking valves with **"O" rings installed instead of the proper seal.** The mechanic requested owners and pilots be advised that installing "O" rings is a no-no and requested the part number for the proper seals be published.

CCA-1550 - Seal Part Number **1269**

CCA-1600 - Seal Part Number **1319**

Safety and Notes

VIKING AIRCRAFT AIRWORTHINESS SAFETY BULLETIN

A Dragonfly Mark II aircraft has experienced a case of elevator flutter at approximately 140 MPH in turbulent air. The flutter ceased as the aircraft slowed down and the aircraft was landed safely.

Post-incident investigation disclosed movement present in several places in the control system where a tube is fitted within a tube and secured there with an AN-3 bolt.

We're certain the flutter incident was caused by one or more of these fittings becoming loose allowing the elevators to move independently of the control stick. We strongly advise all Dragonfly builder/pilots to ground their aircraft and check the complete elevator control system to assure that there is no slippage or movement present in any of these joints.

We further advise a Dragonfly pilot to check this section of the control system to determine if any excess movement is present before each flight.

A new control system is now being designed that will eliminate all of the tube within a tube joint to preclude the possibility of any further occurence of this flutter problem.

This from Viking Aircraft, RR 1, Box 1000V, Eloy, Arizona 85231

TECHNICAL COUNSELOR RETIRING

We would like to recognize W. A. "Al" Womack, Sr., Clark Street, Beaumont, Texas 77705. Al is retired from active life with airplanes and has been an effective and well-liked Technical Counselor for a long period of time. We all wish you happy retirement Al.

If you were at Oshkosh and served but weren't recognized, I would like to apologize but all Technical Counselors have to sign in on the sign-in sheet. If I forgot someone, I would like to apologize.

EAA® TECHNICAL COUNSELOR NEWS

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