



# DESIGNEE NEWSLETTER

## THE PUBLICATION OF THE EAA DESIGNEE PROGRAM



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The **DESIGNEE NEWSLETTER** is a forum for the exchange of information and ideas of interest to aircraft and ultralight builders, restorers, and flyers. The sources of the materials published are EAA Designees, readers, Chapter newsletters, and other publications. Readers are encouraged to submit manuscripts, drawings, and black/white photos for consideration. Every effort is made to select accurate materials of interest to a majority of readers. Opinions expressed and responsibility for accuracy rests entirely with the contributor. All materials submitted become the property of EAA - no remuneration will be made. Materials should be sent to Chuck Larsen, EAA Designee Director.

### MARVEL SCHEBLER/FACET CARBURETOR

Dear Chuck:

Keep up the good work with the **DESIGNEE NEWSLETTER**. I read in your November **NEWSLETTER** J. Mark Smokovitz comments about Marvel Schebler (Facet now) Carb floats. Marvel wants everyone to convert his carb from the plastic (foam) floats to the new brass floats.

Leaking carburetors have been the result after conversion.

If any of your readers are doing the conversion, or are having leak problems after conversion, read "ADDENDUM TO INSTALLATION INSTRUCTION E-938 FOR CARBURETOR FLOAT KIT 666-915 MODELS MA3 & MA4 CARBURETORS" E-938A.

You can call **FACET** at (901) 423-2500 or write for E-938A to:

**FACET AEROSPACE**  
1410 Highway 70 Bypass  
Jackson, TN 38301

If one follows those instructions he shouldn't have any further leaks.

Auto fuel has cut the wear metals in the oil as my oil analysis proves. I have one C-150 with over 2200 since top nearing 3600 T.T.!

Use of bracket air filters has reduced the wear metals in my oil by 3/4!! I also change oil at 33 hour intervals, **always** preheat below 32° F, and use oil analysis. If you get valve sticking troubles, use a synthetic — AMS oil is what we sell.

Thanks for the "sounding board".

Leon E. Rediske  
Rainbow Airport, Inc.  
10010 South 76th St.  
Franklin, WI 53132

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### DESIGNEES AND SUBSCRIBERS:

March is the month in which we living in northern latitudes can see spring on the horizon. It is traditionally the month of "In like a lion — out like a lamb", melting snows, running water and warming winds carrying colorful kites to dance in the sky. By month's end a warm breeze will signal the coming of spring and nature's annual renewal of life.

Plans for **OSHKOSH** are rapidly moving toward reality as communications between your Headquarters Staff and the army of Volunteer Chairman who form the leadership nucleus that organizes each years gathering. Your help is needed by these Chairman during the convention. Vern Lichtenberg, Convention Site Supervisor, also needs help for building projects and other preparations for **OSHKOSH '85**. Make plans now to be a volunteer at the convention and if you are able to help in the preparations, contact Vern to schedule your pre-convention efforts.

The EAA action for 1985 is in high gear here at the EAA Aviation Center. Your comments and suggestions about EAA and its activities are always welcome and your input for this and other publications is essential. I ask you to submit materials to me that may be appropriate for publication in the **DESIGNEE NEWSLETTER** or the "Craftsman's Corner" in **SPORT AVIATION**. The text should be as complete as possible, drawings "camera ready" if at all possible and good quality black and white photos provided when appropriate. I look forward to considering your ideas for publication.

Chuck Larsen, Designee Director

### EAA AIR ACADEMY '85

**EAA AIR ACADEMY '85** needs your help to provide young people the opportunity to live and learn the arts, science and lore of aviation in both classroom and workshop settings. You can help in developing a new generation of "airport kids" to carry aviation into the next century. We ask that you consider each of the following and take steps to support this new, innovative EAA program.

1. Tell young people, who are 15-17 years of age and interested in aviation, about the **EAA AIR ACADEMY**. Pages 19 through 22 of the December, 1984 issue of **SPORT AVIATION** tell the complete story. A reprint, brochure and complete registration materials will be provided by request.
2. The Academy needs volunteers to provide "hands-on" instruction in all aspects of aircraft construction, restoration and

maintenance. These workshop instructors will work hand-in-hand with participants in the Restoration Shop of the Aviation Center from mid-July through **OSHKOSH '85**.

3. There is also a need for experienced volunteer aircraft builders and restorers from early July through mid-August. Those with the necessary aircraft experience and the desire to work with young people are urged to apply.
4. Financial support for operating expenses and scholarships are also needed. Such donations, of any amount, are tax deductible and will help bring youth to enjoy the benefits of this new and innovative EAA program.

All communications regarding the above or any other aspect of the **EAA AIR ACADEMY** should be addressed to:

Chuck Larsen, Education Director  
EAA Aviation Foundation  
Wittman Airfield  
Oshkosh, WI 54903-3065  
Phone: (414) 426-4800

# LETTERS 'N SHOP TALK



## AIRCRAFT POST-WINNER INSPECTION

From the EAA Chapter 200 Newsletter. Edited by W. O. Poston, EAA 70880.

The program presented at a meeting of Chapter 200 by Dick Shane, EAA 140702 was of great interest to all in attendance. Dick's program was about preparing your airplane for spring flying.

Often in the winter months airplanes get flown very little to not at all. This year we had several long spells of real bad weather which even kept some of the bravest aeronauts inside. It also caused hangar doors to be extremely difficult to open. This sitting time for your aircraft is not always good for it and it needs to be checked over extra carefully before taking it out for that first flight. (This is true of any long periods of sitting — winter or summer).

Dick pointed out some FAA and commercial publications that could be purchased by the aircraft owner that would help in the inspecting of his airplane. Included is one FAA publication that describes what maintenance the aircraft owner can accomplish himself.

Members were asked by Dick to join in with ideas, helpful hints, and questions pertaining to the topic, and many did. Dick did an excellent job of controlling the discussion and keeping it on related subjects.

Some of the problems and solutions discussed were as follows and we hope you will use them in your spring inspection.

### 1. Mice

- They make nests in airplanes. They like close tight areas such as headliners and trailing edges of wings.
- Their urine is extremely corrosive. Be sure to make a good inspection of cables and metal around nests.
- They like to chew on rib stitching. Remove all inspection covers and look very close.
- Ideas for keeping mice out of airplanes and hangars were to put mothballs in a cloth bag and hang in tail of aircraft and to put mouse/rat bait in hangar as far away from airplane as possible. (You don't want them to get back into the airplane before kicking the bucket!)
- Set the wheels in oilpans. Varmint won't cross to get into airplane.

### 2. Wasps

- Always check for wasps nests. This is a year round problem.
- Check wings, fuselage, and engine compartment. Don't forget under panel and other tight hidden areas.

### 3. Snakes

Not much of a problem but it has happened to several people in our Chapter as well as to many others. At least several stories to this effect were told.

### 4. Birds

- Build nests in wings, fuselage, and engine compartment. They seem to have the ability to get into holes you wouldn't believe they could.
- Their droppings are also very corrosive and affect both fabric and metal.
- Can cause engine overheats and fires.
- Plug all holes, vents and don't forget around exhausts and landing gear. (WARNING: DON'T FORGET TO TAKE OUT ALL PLUGS BEFORE FLYING).
- Try keeping them out of your hangar. There are several ways suggested but none known to be 100%. They include putting stuffed owls in hangar, rotating (flashing) lights, but all include sealing your hangar as best as possible.

### 5. Water

- Gets into alot of places and settles in low spots like in trim tabs, trailing edges, bottom of fuselage and other places mentioned later.
- Water can affect your CG whether it is frozen or liquid.
- Can cause corrosion on cables, fuselage, etc.
- Can freeze and cause damage to structure and fittings.

### 6. Landing Gear

- You should lift all three wheels and check brakes for drag

and wheel bearings. Check for rusty brakes.

- Check all struts for proper inflation.
- Check all tires for proper inflation and wear. A low tire can slip on the wheel during landing or hard braking causing damage to the valve stem.
- Make sure shock struts are clean and don't leak. It is a good idea to wipe off struts before each flight. (The prop throws grit and dirt up on struts).
- Check all steering provisions and make sure they are working properly with full movement.

### 7. Instruments

- Ice/water from rain and wind, snow, etc., can get into pitot systems. Some aircraft have a provision for draining these. (WARNING: DO NOT BLOW INTO PITOT TUBE).
- Check static aperture to be sure it is open. (WARNING: DO NOT BLOW INTO STATIC APERTURE).

### 8. Propeller

- Check for nicks and damage of metal prop.
- Check wood props for nicks and separation of wood.
- Check tips of wood props to see if metal or fabric is loose because of moisture getting under it.
- Wood props should always be put in horizontal position when not flying airplane.

### 9. Battery

- You should take the battery out during the winter and store inside a warm place (if possible).
- Be extremely careful when recharging battery.

### 10. Fuel and Fuel System

- Check for water in fuel tanks and gasolator. Fuel tanks in some aircraft won't drain out all of water when sumped.
- Check all screens in fuel system, carburetor, gasolator and fuel tank.
- It was recommended that the fuel selector be left on while aircraft is not being used. The carburetor's fuel evaporates and the seals dry up. By leaving the fuel on it allows carburetor to keep full.
- Keep tanks full of fuel. This can help keep down water caused by condensation due to temp changes.

### 11. Oil

- Because of condensation water can form in the oil as well. This water will collect in the crankcase.
- Retire aircraft with fresh oil and change before first flight.
- Take out plugs and pull prop thru. This is because some cast iron valve guides can seize up after sitting a long time. This could prevent that or would detect it before flight.
- When first starting airplane watch oil pressure closely. The oil pump may have lost its prime.

### 12. Engine

- Check magnetos while pulling prop thru for oil check. Listen for mag impulses.
- Make sure engine is clear of bird and wasp (mud dobber) nests.
- Check all connections to engine and accessories.
- Check wiring harnesses for wear and tear.

### 13. First Flight

- Make a very thorough and extensive preflight and engine run up.
- Make several high speed taxi runs before flying. Check controls, brakes, instruments.
- Stay around airport on first flight. While airborne check for flutter which can be caused by water inside control surfaces. Check C/G, stall it and land it.
- After landing check for leaks.

These procedures will help make your aircraft last longer not to mention keeping you around to attend EAA meetings.

These ideas and suggestions were pointed out by various Chapter members and Dick Shane. Everyone learned and this was one of the best programs we've had. Thanks to Dick for his time and effort.

# TECHNICAL TOPICS

## MAGNETO CHECKS

From *TURN & BANK*, the Newsletter of EAA Chapter 85, Vancouver, British Columbia, Canada

### QUESTION

"What are we looking for during the magneto check of a normally aspirated engine?"

### TRUE OR FALSE

Magneto timing is only checked annually or as required by the maintenance schedule.

### ANSWER — False

Whether you know it or not, you check mag timing every time you do your pre-take-off mag check.

### TRUE OR FALSE

Mag drop as specified in the flight manual is a maximum acceptable, little or no drop is ideal.

### ANSWER — False

Little or no drop spells TROUBLE.

In fact, more potential trouble than a drop in excess of that specified in the flight manual.

To understand that statement, it is necessary first of all to understand why an RPM drop occurs during the mag check.

Let's have a look at the combustion process as it occurs in the combustion chamber of the cylinder.

The fuel/air charge (1 to 15 approximately) does not explode in the cylinder, but burns at a measurable rate. With two spark plugs in each cylinder, the burning occurs across the cylinder along two flame fronts, so that with the corresponding rise in pressure and temperature during the power stroke complete combustion should occur a few degrees of crank shaft rotation before the piston reaches B.D.C. This measurable rate of burning, which is dependent on a number of factors, is the clue to mag timing. If the magnetos were timed to create the spark at piston travel T.D.C., (which would seem logical) the time interval required for complete combustion would result in incomplete combustion when the pistons reach approximate B.D.C. and the exhaust valve opens. Result — poor efficiency for the fuel consumed.

To compensate for this relatively slow burn (that is, relative to crank shaft rotation) the magnetos are timed to fire B.D.C. of piston travel, roughly 25° of crankshaft rotation. At 2000 rpm this represents only one five hundredths (1/500ths) of a second. This spark advance is established initially by calculation, then fine tuned in an engine test cell.

Now let's go back to the magneto check before take-off. First, let us assume that all other engine parameters are perfect.

Warm up has been completed and we are at mag check on the checklist. The book says, 1800 rpm check left and right mags. Not good enough. Installation of mag switches vary, but for a two switch installation if you turn the left switch to "OFF" you're in fact checking the right mag and vice versa. Make sure which mag you are checking, you may have to clue your AME later. The book says maximum drop 75 rpm either mag. You observe a smooth drop on either magneto of 50 to 60 rpm after waiting 5 to 10 seconds on each mag to allow rpm to stabilize. Good or bad? (Remember 75 rpm was max.) So something less by 10 to 15% is probably ideal.

In subsequent days, you note that mag. drop gets progressively less until eventually little if any mag. drop is discernable. Good or bad? To the surprise of many, this situation is extremely bad, here is why.

In reality mag. timing does drift, for a variety of reasons, in either direction.

On a new magneto or old magneto with newly installed set of breaker points rapid cam follower wear or seating usually results in a net timing drift towards the late direction in the first 50 hours and then stabilizes. Point arcing or erosion, resulting in timing drift in the early direction occurs at a faster rate depending on the magneto, operating voltage, spark plug condition, cylinder mean effective pressure, rpm etc. Drift in the late direction (i.e. from normal 25° BTC to say 15 to 10° BTC) will manifest itself with an excessive mag. drop because burning of the fuel air charge in the cylinder is late in initiation, is slower to propagate

because only one instead of two flame fronts are present. Conversely drift in the early direction from nominal 25° BTC to 30 to 35° BTC will result in lesser than normal mag. drop, since even though only one flame front exists it is initiated earlier than normal, and sufficient time allows for complete combustion.

To this point we have talked about what is happening during a pre-take-off runup or power checks — but what comes next?

Let's assume all checks were according to the book, except a very small mag. drop was present. Remember, this signals early spark ignition. As we accelerate down the runway, ram air effect will increase volumetric efficiency, and cylinder mean effective pressures will rise. If it happens to be a hot day, aircraft at gross weight which will prolong full throttle time, trouble is brewing. Engine cylinder head temperature rises rapidly. We are just nicely airborne when all these conditions interact, the engine loses power and rough running is very evident. What's happening? Detonation in one or more or all cylinders is what's happening. The fuel/air charge in the cylinder will tolerate a maximum pressure and temperature (depending on fuel octane rating primarily) and still burn at a uniform rate. To alter either or both of these conditions dramatically, detonation is likely to occur.

In our case early mag. timing is responsible. Ignition occurs well before top dead center of piston travel, with a rapid rise in combustion chamber pressures and temperature. This rise, coupled with initial charge temperature plus high cylinder head temperature will result in detonation or explosion before the piston reaches top dead center and starts down on the power stroke. This extreme rapid rise in pressure and temperature is power robbing, and dangerously destructive. Burnt or collapsed pistons, burnt valves, broken or bent conrods or crank failure may result.

I suspect that many of the cases of cylinder head failure are the direct result of this condition.

Whatever the end result, detonation is almost surely the harbinger of an immediate forced landing. Unfortunately, with the high noise level present during take off, the clattering sound of detonation may not be heard and to retard the throttle, (the only possible cure for detonation) goes contrary to normal reaction with an engine which is already losing power.

I mentioned a moment ago that detonation may occur in one or more cylinders. Why, you may ask, if timing is the culprit? The answer is uneven cooling. An individual cylinder or cylinders may reach temperatures sufficiently hotter to achieve the critical temperature of the fuel/air charge to cause detonation. And don't confuse detonation with pre-ignition. Detonation may affect all or several cylinders when the cause is early mag. timing. Pre-ignition is normally the result of high engine temperatures and individual cylinder hotspots. Glowing carbon deposits is usually the bad guy. They act like a glow plug to cause very early ignition and explosion or detonation, not caused by early ignition timing.

One last point to touch on concerning timing drift. Before installation, the mag. is timed internally to insure that the points open at the precise instant that peak voltage is being generated in the primary coil by the rotating magnetos. Any drift of timing by cam follower wear or breaker point erosion will also affect this internal timing resulting in a weaker spark.

## MAGNETO CHECK

SYMPTOM	PROBABLE CAUSE
Excessive, smooth rpm drop	Timing drifted late
Very small, smooth rpm drop	Timing drifted early
Engine cuts out	Faulty magneto or switch
Substantial difference	Drift of either or both mags
Steady "miss"	One or more faulty plugs or leads
"Scattering miss"	Faulty magneto

The above is the text of a very interesting and informative talk given by Harold Townsend of the Regional Safety Office (RASO).



# DESIGNEE VISITS

One of the important services provided by our DESIGNEEs is visiting aircraft building/restoration projects to discuss and offer suggestions about them. The DESIGNEEs in the following listing are to be commended for their efforts in helping to make sport aviation a safer activity by providing this service. Comments for publication are selected for the purpose of providing guidance or assistance to builders and the DESIGNEEs visiting them. DESIGNEEs are requested to note problems or procedures observed in their project visits in the comment's section of the Designee Visit Report.

Chris Falconer #266  
Edmonton, Alberta, Canada  
(403) 479-3515  
\*KR-2

Jack Hickey #478  
Carrabelle, FL  
(904) 697-2499  
\*Flybaby  
\*Sparrow Sport  
\*Emeraude

Jorgen A. Rjosstad #483  
Grand Rapids, MN  
(218) 326-2606  
\*Long EZ

Bud Roller #977  
Grand Forks, ND  
(701) 772-0610  
\*Glasair

Ralph H. Prince #1072  
Penn Valley, CA  
(916) 432-2406  
\*Falcon F51.

Don Pellegrino #1230  
Story City, IA  
(615) 733-2589  
\*Sonera III.

Fred N. Wimberly #1237  
Arlington, VA  
(703) 979-2483  
\*Avid Flyer

Roy Jensen #1398  
Las Vegas, NV  
(702) 645-9085  
\*KR-2

C. B. Ericson #1636  
Barrington, IL  
(312) 392-6675  
\*Sky Hopper II  
\*QZ

Donovan Gregory #1520  
Cranada Hills, CA  
(213) 891-2621  
\*BD5

Doug Drees #1599  
Tumwater, WA  
(206) 943-9109  
\*KR-2

David Richter #1643  
Linden, NJ  
(201) 486-3656  
\*Hurricane Replica.

Sid S. Champion, Jr. #1671  
Jackson, MS  
(601) 956-2467  
\*Steen Skybolt

Bob Hendricks #1631  
Puet St. Lucia, FL  
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\*Glasair

Robert L. Olson #1641  
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\*Moni

D. Neil Rettinger #1646  
Oswego, IN  
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\*Corby Starlet  
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\*Falcon

William Besarick #1654  
Boca Raton, FL  
(305) 994-2483  
\*Pitts Special

Duward Peck #1663  
Traverse City, MI  
(616) 947-6390  
\*Sonera II  
\*Beds BD4

Douglas Harris #1666  
Harlingen, TX  
(512) 423-2163  
\*Turner T40 A  
\*KR  
\*Zippy Sport

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