October

Skywriter

2013

AMA SINCE 1936

SKYMASTERS RADIO CONTROL CLUB OF MICHIGAN

AMA Chartered Club #970

16 Year Gold Leader Club

www.skymasters.org

SKYMASTERS RC MICHIGAN

In this issue:

From the President...

We are approaching what most people would consider the end of the outdoor radio control flying season. But being the flying fanatics that we are, I know I will see many of you out there making tracks in the snow right through the winter. I'm making grand plans to put skis on my Sukhoi to expand my flying opportunities when the weather changes.

But we're not done with the season yet. We still have the fun fly, which probably will have happened by the time you read this. I will assume it was successful. (*editor's note... yes it was. See the story in the November issue*)

There are a bunch of regular club meetings and a Christmas party yet to come. And there are also rumors that we may enter a float (aka our trailer with a bunch of planes on top) in the Lake Orion Christmas parade. I'll be interested to see how that works out. With the enthusiastic participation we get from our members, I'm sure whatever we do will be a success. And of course we will have the Krazy Snow Fly. I can already smell the chili.

I hope everyone knows how much I appreciate their help but I do want to thank those that helped with our most recent events. The Dragon on the Lake and Cub Scout events both generated a lot of positive energy that I think is very good for our image. And although I wasn't able to attend personally, I've been told that the

(Continued on page 2)

(Continued from page 1)

Midwest Regional Float Fly was a great success as well.

Lastly, at the risk of sounding like a Nanny President, I'm going to make another one of my appeals for safety awareness. Recently, a throttle clevis on a glow engine broke as the plane was waiting to taxi out. Fortunately it was pointed cross-field as it should have been. Even though the engine went to full throttle there were no injuries or damage.

That was the good news. The bad news is that we are not always treating electric planes with the same respect. An electric plane that is plugged in has the same potential to wreak havoc as a running internal combustion engine; maybe more so as it will continually try to restart itself even if the prop is stopped by an obstacle. Even a park flyer has the potential to cause injury if it accidentally goes to full throttle and it is not restrained. Please make sure the prop is clear and the plane is restrained before you plug in. And keep it restrained until you take it past the flight line to taxi or hand launch. The best thing is to have it on a starting stand when you plug in, but if the wings are too small to fit, please hold it down some other way and make sure it's not pointed at anyone.

Happy (and safe) landings,

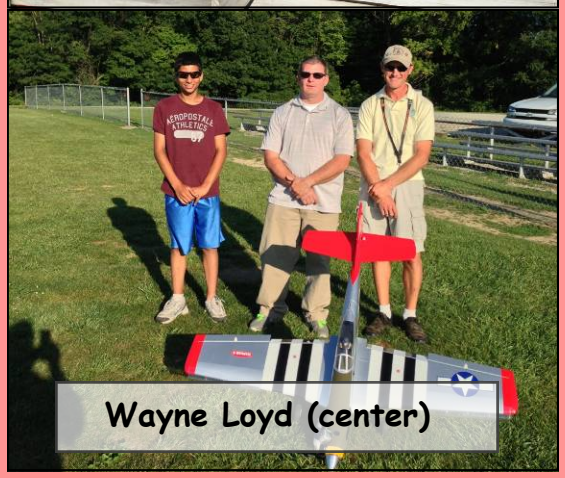
Ken

Ken Gutelius

President, Skymasters

kennanc@msn.com

Sheldon Kaye (center)



Wayne Loyd (center)

A great big welcome to ALL of our new pilots (so far) for 2013!!!!

1. Ibrahim Aref
2. Joey Baran
3. Brian Finney
4. Bill Gage
5. Faris Goryoka
6. Michael Johnson
7. Laithe Kalbuneh
8. Sheldon Kaye
9. Steve Kretschmer
10. Eric Lauton
11. Wayne Loyd
12. Joao Medeiros
13. Luke Milosch
14. Allen Nemeh
15. Jonathan Noocha
16. Max Nordlie
17. Russ Oliver* *is a Skymasters instructor*
18. Dan Rogers
19. Steve Schott
20. Charles Sherman
21. Ken Simpson
22. Marty Stefani
23. David Whittaker

Front Cover:

They just get more and more realistic each year! A beautiful and BIG L4 owned by Bob Komro from Durand, WI

Paul Goelz photo

Propwash

By

Joe Finkelstine

October, 2013

Hi All

After a summer of flying and flight instructing, I have a new list of topics I can now fill up the pages of this newsletter with for a while. One of the things I always get from a summer of flying and instructing at the field is a good list of topics to refill my idea list. Usually, I am out of ideas by Spring, which is the real reason I take the summer off from writing.

The first topic I thought I would write about this season is the airplane center of gravity (CG) and why it is so important for us. I think I wrote about this many years ago, but since I can't even remember when, perhaps it is a good time to discuss it again.

Before we get into specifics here, I think it best to first discuss two key concepts that play a vital role in describing why CG is so important and those concepts are called ***stability*** and ***torque***. Torque is often called ***moment*** and I will use both terms interchangeably, although they are not technically equivalent.

Once I explain these in terms of how they apply to CG, it will make much more sense. Let's start with stability.

For our purposes, I will narrowly define stability as the response of an airplane when disturbed from level flight. We have 3 independent axes on our planes and each axis (yaw, pitch, and roll) has a stability associated with it. I will argue a bit later that the most important axis for us stability wise is that of pitch.

So, what exactly is this stability thing? - Glad you asked. Imagine a RC plane flying straight and level at the field when suddenly, a gust of wind (or a wandering finger on the elevator stick) pushes the craft slightly nose down. How the plane responds to this disturbance is how we define the stability. If the plane seeks to return to its undisturbed straight and level, we would normally call that positive stability. If the plane instead was happy to stay in the new disturbed state, we call that neutral stability. Finally, if our ship actually increased the displacement from the starting disturbance, this is defined as negative stability.

Since I am somewhat of a visual thinker at times, I often think of the following analogy to help me remember these stability things.

For positive stability, imagine a marble sitting at the bottom of a bowl. If you push the marble, it will roll up the side, and then roll down and eventually settle back where it was. In this case gravity is providing a positive stability here.

Now imagine our marble on flat and frictionless table (good luck finding the frictionless table, I checked and Home Depot is permanently out of them). If I push the marble on this magic table, it continues on indefinitely, happy to stay in its new found speed we initially gave it. This is neutral stability.

Finally, imagine our marble and bowl again but this time flip the bowl over and put the marble right on the top of the inverted bowl. If we now push the marble it not only continues down the sides, but increases speed away from its original position and resting spot. This is negative stability.

For trainer planes (without the new self correcting autopilots available) we generally want significant positive stability - we want the plane to somewhat "right" itself as we hunt around the sky. For aerobatic planes we seek a more neutral stability - Agility is key for these ships, as we want the craft to go where and how we point it. In almost every case I can think of, we need to avoid negative stability as it will almost always lead to uncontrolled flight.

Our planes use the vertical stabilizer and the rudder for yaw axis stability. Wing Dihedral and shape are the primary factors in roll stability. They both are generally not as complex as pitch stability, but they do have importance, especially on planes that carry people – yaw stability (and dampening) is vital here, as you will wind up with a cabin full of people who will turn green and queasy if there is lots of wandering in yaw.

Pitch stability is controlled by the horizontal stab and elevator, wing placement, and aircraft CG, which is the whole point of this article. Pitch is the most important axis for us to consider, as an RC plane with negative stability in pitch will crash quickly. Negative stability in yaw will lead to funny looking flight, and roll instability can cause problems, they are not generally as significant as pitch instability.

Now that I have pontificated long about stability, we need to discuss the actual mechanism that delivers this stability and that comes from what is often called a "moment", but is in actuality a torque. In the most basic definition, torque is the application of a force (a push or a pull) at some distance from a rotation axis. It is a twisting force. Torque is the product of the force and how far away (radius) from the rotation axis this torque is applied.

Visualize a stubborn lug nut on a flat tire you are trying to

(Continued from page 3)

change on the side of a road. Most of us reading this have run into this situation and one solution is to get a long "breaker bar" – which increases the radius of the force we apply and the bigger radius creates more torque on that stubborn lug nut to twist it free. (Along with the addition of some colorful language, which is also required). We are generally limited in how much force we can apply with our hands, but by going to a longer radius (breaker bar) we increase the torque on the stubborn nut because of the longer radius.

In our aircraft's pitch axis, we have two primary forces that provide twisting moments (torque) and those would be wing and tail lift.

Now, what about that "axis" of rotation? – That would be the Center of Gravity (CG) of our craft. One property of the CG is that any moment applied would cause a rotation about the CG.

To complete the discussion a bit, the functional definition of an aircraft CG is the theoretical point on the aircraft that allows the plane to balance level when suspended, which is how we actually determine where it is. For this discussion though, the primary thing to remember about the airplane CG is that any rotation about yaw pitch, or roll acts through the CG.

Now, let's take a look at an image of a basic plane in flight and focus on the pitch axis and the competing torques involved:

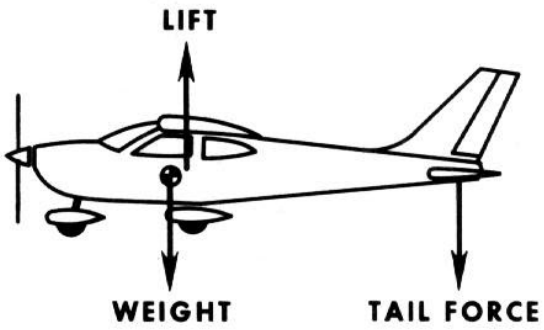


Figure - torques in the pitch axis - image from avstop.com

In the above figure (simplified here, as we are ignoring the thrust and drag), there are 3 forces that come into play for stability. The figure above shows 3 forces, two being "lift" and one being gravity (weight). The gravity force provides no twisting moment to the pitch axis because it has a zero radius – it acts directly through the GC, so it does not affect pitch stability directly. Gravity does supply a ***translation*** force however – it would like to have your plane meet the ground!

Look at the other two forces above. The wing provides lift and like the center of gravity, we can treat the wing lift as acting at one point called the center of lift. In a similar manner, the horizontal stab (and elevator) is also a wing and provides lift – Each of these lift forces are some distance from the CG, so they both create a twisting moment in the pitch axis.

The center of lift for the main wing is behind the CG, so this torque wants to rotate the plane nose down. The tail moment lifts the opposite direction and wants to twist the plane nose up. When these two moments are equal, the plane stays straight and level.

Now imagine that the plane in figure 1 above is disturbed by a gust of wind and points nose down. Well, looking at figure 1 above a slightly nose down attitude(without correcting with elevator) increases the angle of attack for the tail a small bit, generating a bit more lift which then rotates the plane back to level flight. Both of these lifting moments provide the restoring forces we are looking for. If our plane momentarily pitched nose up, the wing would have higher lift(from increased angle of attack), causing the plane to rotate back to level.

Notice a few more things here as well. The tail is generally much smaller area wise than the wing and produces less lift. However, the tail lift vector has a much larger radius (distance) from the CG so that the product of the larger radius and smaller lift vector still equals the larger lift and smaller radius of the main wing.

Additionally, when we move the elevator, we are changing the total lift of the tail which results in a net twist nose up, or nose down. This balance (or non balance) of opposing torques is what drives where the nose is pointed.

Now, let us take another view of the above figure 1, but now visualize a teeter totter – figure 2 below.

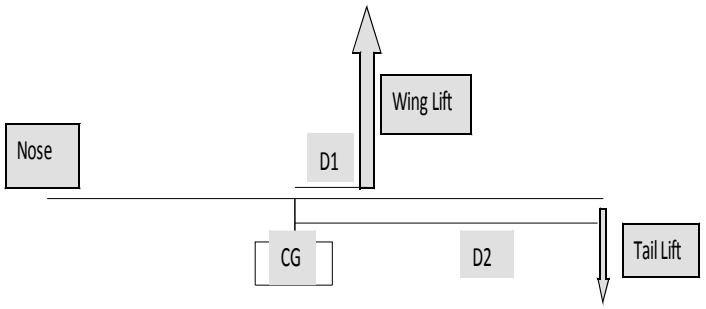


Figure 2 - A simplified view of the pitch axis

The pivot point of the teeter totter is the aircraft CG. It is a bit unusual from a normal teeter totter, as everything is on one side, but as you can see the wing lift wants to rotate counter clockwise (nose down) and the tail lift vector wants to rotate nose up. This is the same situation as

(Continued on page 5)

(Continued from page 4)

shown in figure 1 above. The two lift vectors, which oppose each other and give us stability act through the two distances D1, and D2 from the CG in the figure. Notice the small D1 distance between the main wing lift vector and the CG.

Now think about what happens as the CG is moved backwards (D1 is made smaller).

In the extreme case, where we move the CG back so far that is aligns with the Wing Lift vector, we completely cancel the torque available from the main wing, since its moment arm is zero at that point. Notice also as we move the CG back, the tail lift moment will begin to win the battle against the wing lift and point the nose up, which should be a familiar behavior if you have ever seen a tail heavy plane fly.

This situation of the CG in line with the center of lift would be an impossible to fly airplane as it would have large negative stability and crash shortly after takeoff. The plane would quickly stall, or would begin wildly pitching nose up and down as the pilot gets out of phase control wise with the plane.

So, as we move the CG rearwards, the restoring (stability) torques involved become weaker eventually to the point of not being able to correct a disturbance from neutral, or in extreme cases, even keep the nose level.

This is the primary reason we need to insure our CG is within the manufacturer's suggested range. Most manufacturer's will test the airplane and determine a range of distances (typically measured from the wing leading edge) that the two opposing torques can supply positive (or near neutral) stability.

I mention that most, not all manufacturers do this. Unfortunately, this last season I found several ARFs that were Chinese clones that no such effort was made to determine CG. I found one case where the apparently the manufacturer just copied the CG range text from some other manual as it was completely wrong.

Most reputable manufacturer's CG range listings are often conservative, so it is certainly possible that the GC you ultimately choose is actually not in the recommended range. Unless you have several references that state otherwise, it is best to start your initial flights with the GC well within the suggested manufacturer's range. As you become familiar with the plane, you can then experiment with the CG if you want to change some flight characteristics, or just leave it alone!

I think it also vital to point out that for the smaller RC planes, the size of the CG range also shrinks down along with the wingspan – For a small RC craft, the allowable range for the CG can be very small, so accurate measurements of the CG location are even more important for smaller ships.

I also saw a few false alarms on this during the year as a new plane was flown and flew a bit erratic in pitch, and or flew nose up for a while. Sometimes flying erratic in pitch has more to do with the pilot being a bit nervous on the elevator or the plane being out of trim.

Besides the customary balancing of the plane on a GC tester (or our fingers), I also test my CG in a fairly simple test. As part of my initial flights, I fly inverted and see how much up elevator stick I need to give it. I like my aerobatic planes to be very neutral, so I like my CG setup where the plane requires a very small amount of up stick (push) on the elevator to fly level inverted. There are many similar tests, but this I the one I usually begin with. For example, if I roll inverted and the plane climbs without moving elevator stick, I immediately suspect I have a rearward CG, although this is not always the case.

Remember we have control over where the CG is in several ways, from construction (If we build it), to where we place radio equipment.

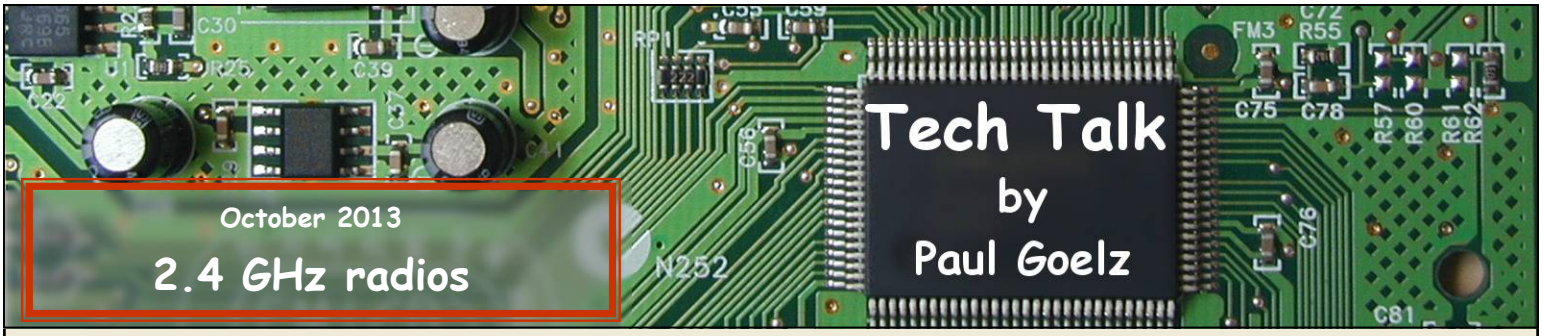
There also exists a condition where we move the CG too far forward and this is less catastrophic than rearward CG – The plane will require substantial up trim to fly level and will look funny in the air. The biggest danger of a forward CG is often that we run out of enough elevator travel, especially on landing flare.

There is an old saying many instructors who have been around long enough know and it goes something like this

"An airplane with a forward CG will fly poorly, but will only fly once with a rearward CG!"

See you at the meetings!

Joe



Hi there,

I thought I would devote this month's column to a general explanation of how our 2.4GHz radios work inside. This applies to Spektrum radios in particular, but in general terms applies to other brands as well.

Lets start with the transmitter.

Your 2.4GHz transmitter is constantly evaluating the position of the sticks, switches and knobs and converts those positions into numbers. Every time the transmitter scans the inputs it generates a new number for each stick axis, switch and knob. These numbers are then processed by the transmitter to add any functions like reversal, expo, dual rates, etc. At the end of that process, the number representing the final processed positions are combined with a unique transmitter identifier, assembled into a frame of data and sent to the RF deck.

The transmitter actually establishes a two way path between it and the receiver when the two are "bound" for the first time. After that process is complete, the receiver will not respond to ANY data that is not actually sent by the transmitter it is bound to. The worst that can happen if the receiver cannot hear the transmitter is it simply stops updating the servo positions. Interference can very briefly cause the receiver to miss an individual data frame, but since a Spektrum DSMx transmitter is constantly changing frequencies, it is almost impossible for interference from any single source to totally block the data for more than a few milliseconds.

Now for the receiver

A 2.4GHz receiver consists of the RF section that does the "receiving" and a microprocessor that process the received data. During the "bind" process, the receiver listens for a transmitter in "bind" mode and actually transmits back to it. After this two way process, the receiver reverts to purely receiving and passes the received data to its microprocessor. The processor evaluates each frame of data to ensure it is from the transmitter it is bound to. If the data passes that test, it is picked apart to extract the number cooresponding to the positions for each channel and these positions are routed to the servo connectors. Note that at this point, the servo position data is the same as it was in the 72MHz days, so any conventional servo will work.

2.4GHz vs. 72MHz

At 72MHz, the position of the receiver antenna vs. the transmitter antenna and/or nearby objects was relatively uncritical. However, at 2.4GHz, small changes in position can make a fairly large difference to the received signal. For this reason, many 2.4GHz receivers contain more than one RF section and/or more than one antenna. This is called "diversity reception". With diversity reception, the receiver is continuously evaluating the data from ***both*** receivers / antennas and selecting the stream that has the best signal. Typically, one receiver / antenna will be placed in one orientation and the other will be placed at 90 degrees to the first. With this setup, it is fairly unlikely that BOTH antennas will lose signal at the same time, so the receiver is almost guaranteed a contninuous data stream even if the signal fades out on one of the antennas.

Reboots and holds

If the receiver loses contact with the transmitter, it will typically hold the last valid servo positions. Most receivers will also lower the throttle to idle after a short delay. Sometimes this behavior is configurable. If the input voltage to the receiver falls below its minimum voltage spec, the receiver will shut down. It will then reboot once the voltage rises again. This can easily happen, for example, in a system where the receiver is being powered by a BEC that is not sized to handle the number of servos in your aircraft. Typical receiver behavior during a reboot is to move all servos to the position they were commanded to during the "bind" process. Typically, during reboot the throttle channel has no data on it to prevent the ESC from arming.

There are all sorts of additional fine details. If anyone has questions, let me know and I'll try to answer them!

Until next month…. Paul Goelz

Midwest Regional Float Fly

September 2013

The 23rd Annual Midwest Regional Float Fly was held on September 7th and 8th. Mother Nature had a slight curve ball – with some rain coming Saturday afternoon - but we still had 75 registered pilots and well over 100 planes taking to the water and skies over Island Lake Recreation Area over the weekend. The hard work of many people came together for another successful Float Fly!

Our full scale participation continued with a Maule Rocket flown in by Mike Weltyk from Oxford, MI. Mike's son and Steve Fredericks have worked on a model Maule Rocket in matching colors.

In addition to the flying, those that joined us for dinner Saturday night enjoyed a great meal. Bar None catered the dinner once again featuring both bbq and lemon pepper chicken, pasta, Greek salad and breadsticks. Bill Dezur made his famous Peach Cobbler for dessert.

After 2 days of flying, the pilots were rewarded with prizes from our generous sponsors! Everyone went home with something.. from a new tool, airplane, floats, electronics, to a Futaba 7C 2.4 radio system as the final prize! Our thanks to our sponsors, including **Hobbico, Castle Creations, Model Aero, Plane Fun Floats, Flightline Hobby, and Prop Shop Hobbies**.

For all those that won a prize – especially the larger ones – please take a minute to write to the sponsor to thank them for the donation! The challenge of obtaining prizes grows each year as requests to manufacturers and dealers continue to increase. The reputation of our event, and thank you's after the event all help in obtaining prizes for future years. (If you need to know who to write to – let me know…)

While the event remains mostly a 'Fly for fun' event - we again offered 2 competitive categories to entice those special and

(Continued from page 7)

unique models to come out. The winner in Sport category took home a Tactic 6 Channel radio system and the winner in Scale received a Futaba FASST 6 channel system! This year had some great looking models... Joe Rubenstein did the judging honors this year. And the winners were: In the Scale category, winning with his huge 60% L4 Cub was Bob Komro from Durand, WI. An impressive plane in flight – with many flights over the weekend. Skymaster Joe Hass from Rochester, Michigan won the Sport category with his Arrow – a design by frequent attendee Laddie Mikulasko.

This event can't happen without the help and efforts of our members (and some guests!) Thank you to EVERYONE that helped out - your efforts are greatly appreciated, by me and the rest of the club! I do want to thank some of the people that stepped up to coordinate different parts of the event. They recruited help, and ran their area.

Registration: Fred and Edith Engelman once again coordinated Registration.

Flight Control: Roger Schmelling ran the Flight Control tent - getting everyone that wanted to fly in the air as quickly as possible.

Kitchen: Bill Dezur ran "Billy D's Burger Shack" again this year. Bill and his team did a great job keeping the workers, participants, and spectators fed.

Retrieval Boats: Mark Smith provided the retrieval boat for those water retrievals.

Many other Skymasters and their families pitched in to help in these and other areas... **THANK YOU ALL!!!** Enjoy the pictures! and look for coverage early next year in an upcoming magazine article!

Greg Cardillo

"Cub Scouts at the field"

New field entry signs!

The New Club Signs Are Up And Look Great! What a difference they made!

On Saturday Sept. 28th, a work party was formed to finally install our new club signs. Without disappointment, an abundance of club members ounce again stepped up and contributed their personal time helping in this endeavor. This work was not for the faint of heart, it entailed man handling six by six by ten foot long wood posts and digging the holes for them with the Post Hole Digger from hell. The pictures will tell the story.

The day started with coffee and donuts about 9:00am, with lots of planning on the best height of the signs and the best location for the signs as to be seen by traffic on Scripps Rd. Then the digger was assembled and the fun began trying to dodge all the roots and rocks. In the mean time Ken Gutelius brought out his tractor with a back-blade and very diligently groomed the road entrance smoothing out all the humps and bumps.

After an hour and a half of man handling the digger, our holes were done and posts were installed. The signs went up easily and got secured. Everyone commented on how good they looked and what a great job Bill Dezur did making them. Thanks again Billy D. and all the volunteers for a job well done.

This project was just another phase in what the Skymasters BOD committee has proposed in an effort to beautify our flying site and make it more attractive to the surrounding community. Look for more improvements in the near future.

Thanks again to all that came out and unselfishly donated their time. Job Well Done!

Gary Wells

Radio Control Model Swap Meet

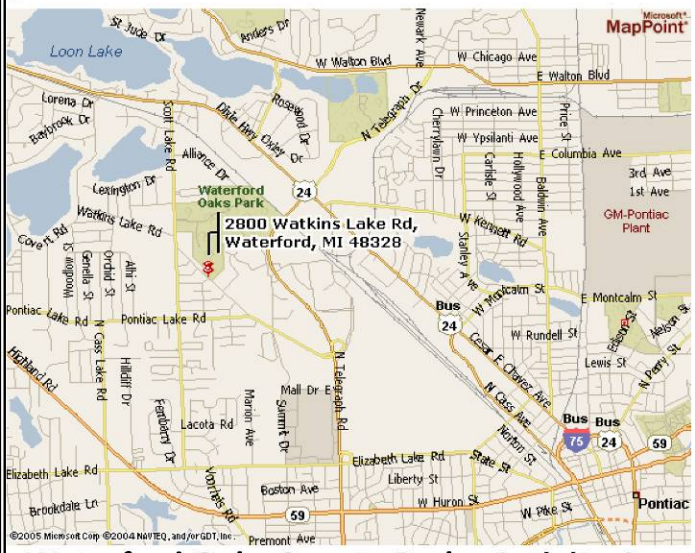
Sunday October 27, 2013 9 a.m. - 1:00 p.m.

Pontiac Miniature Aircraft Club

Buy-Sell-Trade, Radio Control: Cars, Planes, Boats, and Heli's 50/50 Raffle, 12 p.m. Auction

For Details Call or Email: Alvin, 586-404-0205, ajohns79@sbcglobal.net or Visit the club site at http://www.pmac.us

$5.00 admission, Vendor Setup 8:00 a.m. **Tables:** $15 advance $20 at the door



Waterford Oaks County Park - Activity Center, **2800 Watkins Lk. Rd., Waterford MI.48328**

¾ miles south of Dixie, ¼ mile east of Scott Lake Rd, Entrance on Watkins Lake Rd

ON THE WING

Skymasters Breakfast

(begins Oct. 7th!)

First and Third Monday of each month through May

9AM
Everyone welcome

Red Olive restaurant
In the strip mall on Walton
across from Crittenton Hospital

Indoor Flying

(begins Nov. 5th)

every Tuesday

11AM to 1PM

At Ultimate Soccer,
Opdyke and South Blvd
Pontiac, MI

Next Skymasters Meetings...

October 10th, 6:45PM (program by Ted Labbe)

October 24th, 6:45PM

at the Orion Center

1335 Joslyn Road

(on the east side of Joslyn, just south of Clarkston Road)

Support your local hobby shops!

The next time you shop at

Empire Hobbies

3278 Rochester Road, Troy

note that they are offering a 10% discount to any Skymasters member. Just show your membership card!

Other local area indoor flying sessions

(begins Thursday, Oct. 17th)

51379 Quadrate, Macomb MI

(north of 23 mile and east of Hayes)

Thursdays, 9AM to 3PM (6 hours)

Small electric planes and helis (separate heli space)

$10/session

Information: Steve Durecki 586-246-4203 (text or voice)

stevedurecki@comcast.net

October 2013

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2 Addison Oaks Float Fly 9AM	3	4	5
6	7 Skymasters Breakfast 9AM Red Olive Rochester Hills	8	9 Addison Oaks Float Fly 9AM	10 Skymasters Meeting 6:45PM Orion Center	11	12
13	14	15	16 Addison Oaks Float Fly 9AM	17	18	19
20	21 Skymasters Breakfast 9AM Red Olive Rochester Hills	22	23 Addison Oaks Float Fly 9AM	24 Skymasters Meeting 6:45PM Orion Center	25	26
27 PMAC Swap 9AM Waterford Oaks	28	29	30 Addison Oaks Float Fly 9AM	31		

Skymasters Information…

The Skymasters field is located in Lake Orion, within the Bald Mountain Recreational Area on Scripps Road (see map). A state park permit is required and can be obtained from the Park Headquarters located on Greenshield Road or at club events. Or, you can check the box on your tab renewal for a "Recreational Passport". Flying is permitted from 10 AM to 8 PM. The noise limit is 94 dBa at 10 feet. This noise rule is strictly enforced.

Wednesday evening (through August) is Family Night with flying and a pot luck buffet. Bring something for the grill & a dish to pass.

Wednesday 5PM to 8PM is also Student Night (through August) but there are usually instructors around all day. Meet the instructors and arrange for more instruction time together on other days. Our Chief Flight Instructor is Greg Brausa, 248-373-8949 cgbrausa@gmail.com

From June through August, **Club meetings** are held at the field, on the second and fourth Wednesday of the month at 8 PM . A great chance to fly and socialize. **Winter meetings** (September through May) are usually held at the Orion Center, 1335 Joslyn, in Lake Orion. Check the calendar here or on the web site for specifics. Bring a model for Show and Tell, enjoy coffee and donuts and listen to the speaker of the evening.

The Skywriter newsletter is available online at the Skymasters web site and is free to all. It may also be printed from the web site if desired. All contributions are welcome. Please send photos and articles to **newsletter@skymasters.org** If you know of anyone who may be interested in R/C Aviation, please give them a link to this newsletter or give them a copy of an AMA magazine. It may spark their interest!

2013 Club Officers & Appointees...

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Newsletter Submissions

Please send all articles, photos and announcements to the Skywriter editor at:
newsletter@skymasters.org
Deadline is the 20th of each month.
The Skywriter newsletter is published monthly by the Skymasters Radio Control Club of Michigan
www.skymasters.org