INTERFERENCE

The Newsletter of the San Gabriel Valley Radio Control League

Volume 49 - Issue 4 **Celebrating 49 Years of RC Aircraft Modeling** **April 2011**

News and Notes

President's Message

Poker Fly and T28 Races

It was a cloudy and overcast morning. Our day started out with people arriving, canopy's going up and planes coming out. It was the start of a great day of flying. The Poker Fly and T- 28 Pylon Race have now begun.

Registration started at 8:00 am Saturday April 2nd. We have 16 entries in the Poker Fly and 9 registered pilots for the T-28 Pylon Race. We had 2 raffles. One was for the pilots only and upon registration you received a ticket to be drawn at the end of the day for a variety of prizes. The other raffle was a club raffle. Our pilots raffle had lots of goodies; including one electric motor, a speed controller and an assortment of props just to name a few of the items. A really nice battery charger was donated by Banana Hobbies for the pilot's raffle. The club raffle tickets were 6 for $5.00 and it gave you the chance to win one of 2 nice planes. One donated by Banana Hobbie and the other donated by our very own Paul #3.

The Pilots meeting started around 8:30am opening with Instructions on Safety and the contest Rules. Now let the fun begin. Some of the events of the day included an early morning crash by Larry Chapman. Believe it or not we also had a mid air crash in the T-28 Pylon Race.

The object of the Poker fly was to be able to make a poker hand with 5 out of the 6 cards given for all completed flights. You would use these cards to win the trophies for high and low hands. Part of the rules to get a Poker card was to taxi back to the start line, finishing the flight. It was funny to watch some of the pilots having a heck of a time doing just that. I found it funny too how the pilots were being very secretive with their hands. As seen on the Poker Channel, they were putting on their poker faces. Felling bad when they had the opportunity to trade in one card to get a better hand and only to discover they got another bad card and should have went for the low hand rather than the high hand. Fun to watch the games they played. We found the T-28 Race was very competitive as pilots were all flying around the same speed. Slow motion. ☺ The heats consisted of 3 pilots racing a total of 10 laps. They had a total of 4 rounds throughout the day. I think next year this will be a race I would like to try.

We had a guest join us for the day, taking pictures and video. His name is Tony Ayala. He is trying to start up his own business making movies and video for scale airplanes. What do you think? We could be stars and not even know it. He will be our guest speaker next week at our club meeting. He has put together a short video and he

Continued at **President's** *on page 2*

Contents and Contributors

President's *continued from page 1*
will be bringing it to the meeting. Showing some of the winners and events of the day. Hope you can be there.

The skillful winner of the T-28 Pylon Race and a $25.00 cash price and the low hand trophy of the Poker Fly was Frank Alcaraz. The winner for the best high hand and a trophy was Larry Chapman. Low hand winner won with a low score of 25 and the high hand was won with a pair of Aces. The raffle had many winners, however if you were not there I am sure you would like to know who won the planes. Well Jim Patton got first pick and he choose the FA-18 and Lou Renteria won the 60 size sport plane. A big congratulation to all the winners. And a special thank you to those who tried but did not win. I would like to thank Cermark, Covina Hobby, Pegasus Hobbies and Banana Hobbies for their generous donation of prizes for the pilots and club raffle. A special thanks to Raydeen Timpano and Dee Hines for serving a good lunch.

Our annual club auction was at our March meeting. Once again, Skip and Zac did a great job of auctioning off all the items that were brought. There were so many airplanes, engines and radios up for auction and so much more. Myself I won an auction for a Q500 kit at an unbelievable price of $20.00. What a deal. Can't wait till next year.

See you at the next meeting.

PaulTimpano

Ken's Pen

The Information Wall

Or something like that! But it's actually true with our models too. The amount of information you should know to be able to be informed about the new generation RC stuff is really awesome. We have Electronic Engineers (EE) flying RC at our field, who when asked a question about today's 2.4 stuff, just shrug their shoulders! At one time each one of them could sit down and design their own R/C system, build it and make it work. You would like to think that an EE could still do it today given enough current information and a fully stocked fancy lab - but the task would be huge to say the least. Because today he would have to be a Programmer too. Ugh!

My Brother Bob is an EE. In 1958 or so at my request, he designed and built my first R/C Transmitter. No problem. It worked great! Thanks Bob! It was mostly junk box or salvaged WW2 parts and took several months. Cost? 4 years of tough learning in an expensive College. Today I could buy a 2.4 cheapie for $25 and they throw in a receiver. Just $25. That's not enough to pay a Gardner for mowing one lawn today.

Now I'm far from being an EE and much closer to being an idiot - who prides himself in knowing a little about something I try to teach. So when the opportunity arises I will stop and show a student some small portion of electronics or aircraft theory that I profess to understand. But as you know, I'm beating my head against a huge wall. The information wall. It's so dense even an idiot can recognize the pathetic efforts a guy like me makes is surely futile. All you need to teach today is how to open the big cardboard box the stuff comes in, all ready to go! What ever is in the box is a mystery and a extremely awesome amount of technology. What's inside looks just like the picture on the box and it really fly's with remote control! The cost? No college at all and about the amount it would cost to have the lawn mowed for a month!

But even faced with teaching something you don't know crap about, basics are still basic! And I try real hard to
Continued at **Ken's Pen** *on page 3*

Ken's Pen *continued from page 2*
slip in some here and there. A little on Voltage and Current, some on lift and stalls and more on safety. Everybody in models should know a little about how to measure a voltage. After all, at a well know imported tool freight company, a basic electronic meter ready to test "stuff", is $3 or $4. For that price there's no excuse for not having one in the flight box and one on the bench at home. A lot of people do already. But when faced with a choice of which switch position is which – they close it up and put it away!

So what I'm suggesting is how about a little one on one using a few meters? Behind closed doors of course. If you are one of those guys that has moved the electronic test meter way to back of the tool drawer, fess up! In a few minutes you can be as professed as me! Professed? Well, the spell checker liked it. Maybe I should have said Confused! That one I understand. Been there and done that – a lot!

73 (Best Regards) WA6IVD

Ken

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April Float Fly - Monday, April 11, 2011

Well I guess I will start with well, "It's Spring!" First let's talk about the birds and the bees'. You know what I am talking about. While I was flying my new stick model float plane I found it was time land, so after many tries I got back to the lake, my engine stopped and I could not taxi back to the dock.

I went to fish it back to shore and a large Sea Master landed on top of my airplane for a brief moment, then fell exhausted into the water. The first thing I thought of was that in a few weeks little propellers would be born in my garage. I got my airplane back with it's feathers ruffled a bit and I wondered what the little props will look like, hmmmmmmmm.

So let's talk about the spring opener at Legg Lake float fly. We had some interesting guests including one guest (actual name unknown) known only by his 110" PBY electric powered true scale model with retractable floats. The builder waited for Larry Chapman to test fly it, which Larry handled very carefully. The airplane just seemed to water loop and it did not take off. I was glad to see it go home safe.

We had eighteen pilots this time, Sam Garcia came back this year and rejoined the club. Good to see you Sam!

OK next, our safety inspector, Jay had made a remark about doing acrobatics too close to shore. Let's try to keep aerobatics out over the lake and away from shore.

Now it's time to talk about food, I will start with CUPCAKES, Frank Walther's daughter made red velvet chocolate cupcakes that took first place and we also enjoyed Bob's potato salad, Felix's hot dogs, Phil's chili, Jay's cookies, and George's hamburgers. What a feast! We had a super good time, all in about 4-1/2 hours, so that's about it.

Don't forget airplanes fly better off of water.

"We Love the Park!"

Paul J. Moren

Note Worthy

Put another candle on the cakes of these

Birthday Pilots

Carl Bailey	4
Jim "JP" Peterson	8
Jim Riccio	9
Paul Carothers	12
Don Schelling	13
Chester R. Polek	14
Don Eberly	17
Darwyn Wolff	19
Anthony Giandomenico	19
Steve Schooler	22
Ron Regwan	26
James Patton	29
Ed Powers	

New Members

Don Burmingham
Mark Grant

Is 2.4GHz All It Is Cracked Up To Be?

A substantial number of crashes of radio control model airplanes on 2.4GHz frequency prompted me to write this article on the so-called *"interference free"* radio control systems on the 2.4GHz band.

The electromagnetic wave spectrum is subject to the immutable laws of physics.

The propagation characteristics of the 2.4GHz wavelength and the environmental effects for this frequency are more complex than on the 72MHz band. To better understand this, we have to look at the electromagnetic wave spectrum where 72MHz band is in broadcasting region and the 2.4GHz band is in the microwave region. It is easier to see the huge difference between 72MHz and 2.4GHz frequencies when we convert 2.4 gigahertz to megahertz. Now it is 2400MHz versus 72MHz. When frequency increases, wavelength decreases. Therefore, the 2.4GHz wavelength is shorter and closer to visible light on the electromagnetic wave spectrum. Since the visible light is also an electromagnetic wave, the 2.4GHz wavelength behaves more like the visible light and travels in straight lines until it is reflected, deflected, diffracted or absorbed. Reflection and diffraction will create interference.

When parallel rays of light are reflected by a concave mirror, it greatly increases the intensity of the light at the focal point. A parabolic dish antenna works the same way for a 2.4GHz electromagnetic wave. Since we cannot focus a high gain directional parabolic dish antenna between our constantly moving model airplane and our transmitter, we have to

Continued at **2.4 GHz** *on page 5*

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2.4 GHz *continued from page 4*
use an omni-directional vertical antenna system, which has much lower signal intensity.

Interference
The FHSS (frequency-hopping-spread-spectrum) and the DSSS (direct-sequence-spread-spectrum) techniques can share the same band. However, they interfere with each other causing a degradation of performance. Range decreases as number of clear channels decreases. Bandwidth drops each time when FHSS encounters a blocked frequency on a crowded spectrum.

The crowded spectrum on the 2.4GHz band reduces the bandwidth, increases the ever-present background noise, increases the adjacent channel leakage ratio, reduces the range, and causes overlapping. Overlapping is a direct interference.

Unlike the 72MHz wavelength, which penetrates most objects, the 2.4GHz wavelength behaves more like visible light. The signal absorption from objects on a model airplane like the engines, electric motors, batteries, servos, pushrods, landing gears, switches, wires, etc., may cause path interference.

Signal reflection from objects in terrain like fences, walls, buildings, trees, hills, power lines cause line of sight interference. High speed date transfer reduces the receiver's sensitivity on 2.4GHz band. There is a trade-off between speed and range.

The signal strength decreases quadratically as distance increases at constant radiation levels. This is called path loss. When frequency increases, the path loss also increases. This is one of the reasons why the 72MHz radio has a better range than the 2.4GHz radio. We can see this clearly when we look at the Wireless Range Calculator:

Frequency	Distance	Loss
100MHz	0.2 mile	62 decibel
2400MHz	0.2 mile	90 decibel

These calculations are under non-existing ideal conditions, less Fresnel (pronounced Frehnel) effect.

When we fly our model airplane on 2.4GHz, the area around us is known as the Fresnel zone. Since we have to use an omni-directional antenna system, the electromagnetic waves will scatter and diffract from objects and from the terrain around us. When the diffracted wave reaches the receiver antenna, it is slightly lags behind the signal which traveled to the receiver antenna in a straight line that creates interference due to the phase canceling effect.

The Fresnel effect also deals with the behavior of electromagnetic waves over a water surface. As mentioned before, the 2.4GHz radiation behaves more like visible light, so we have to think of reflections and shadows. Flying a 2.4GHz radio control model over a reflective surface like water, snow, ice or wet terrain negatively affects the radio link. Occasionally a 3D aerobatic model plunges into water while hovering. When the rudder is near the water surface, the prop wash creates a chaotic wave pattern, which generates a myriad of false-signals.

The Fresnel effect and the described interference on the 2.4GHz band work pretty well. We successfully tested this at different locations. Unfortunately, the "unbreakable Tx-Rx link" broke when our model was over 0.2 miles away at 45 degree angle. Despite the fact that a 90 decibel signal loss over a thousand feet (0.2 miles) is rather significant, we should have had control at this distance. There are too many factors, which can determine the overall range on 2.4GHz.

The 2.4GHz receivers are not immune to ignition and electrical noise as advertised. Occasional arc from the high tension insulators could break the bind. *Continued at* **2.4 GHz** *on page 6*

2.4 GHz *continued from page 5*

Latency

Latency is the time between stimulation and the beginning of response caused by propagation delays. There is a huge time difference in latency claims by different radio manufacturers. Some latency claims are in milliseconds others are in microseconds! This is confusing since one millisecond is one thousandth of a second and one microsecond is one millionth of a second.

Velocity of electromagnetic waves is 186,283 miles per second. The velocity of the electric signal through the conductors is nearly the speed of light. With an adequate power output, our radio signal will travel one microsecond which is one millionth of a second to reach our model airplane one thousand feet away. This applies to all brands of radios on 72MHz or on 2.4GHz. As we know, nothing travels faster than the electromagnetic waves. Therefore, I don't see how latency could be improved "50 %" over the leading competitors regardless of different processing.

A seven-millisecond latency of fourteen-millisecond latency claim is irrelevant since the human being, the RC pilot, has a painfully slow 200-millisecond latency and cannot differentiate between seven or fourteen milliseconds.

Conclusion

At huge events, like Nationals, the 2.4GHz pin-free radio system makes life easy for competitors and organizers. However, there is a huge difference between flying on 2.4GHz band in the beautiful country side near Muncie where chances are good that there won't be any noticeable interference and flying on 2.4GHz band in the middle of one of the largest concentration of population and industries in Los Angels or other urban areas.

The 2.4GHz radios under harsh conditions work most of the time, however most of the time is unacceptable. Illegal signal boosting, ham radio, and rolling hills around further aggravate the situation. In any case, we should hold on to our assigned frequencies on 27MHz, 50MHz, and 72MHz band.

Despite glowing reviews, the so-called "bulletproof 2.4GHz technology" has had range and reliability problems since day one. A bench test inside a building in a controlled environment where the receiver is a few inches away from the transmitter is meaningless.

The 2.4GHz wavelength is not the best choice to control model airplanes. Furthermore, we ended up with complex radio systems on the overcrowded band on the electromagnetic wave spectrum. The bottom line is that glitch-free software, error-free computers, and interference-free radio link is only an illusion.

References

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CLUB WEB PAGE ON THE INTERNET
http://www.sgvrcl.org
Club members and newsletter readers are welcome to join our e-mail list. Sign up at: http://groups.yahoo.com/group/sgvrcl

NEW MEMBERS
New members are welcome and encouraged to join the SGVRCL, Inc. Please contact club Membership Chairman Kim Seligmann. His contact information is in the list to the left.

MEETING INFORMATION
Business Meeting
2nd Tuesday of the month: 7:00 p.m.

General Membership Meeting
4th Tuesday of the month: 7:30 p.m.

Note: There is no December General Membership Meeting!

CLUB MEETING LOCATION
The club has a new location for all club meetings. Sincere thanks go to Bob Chase for arranging the use of the El Monte Airport Administration building our meetings. This new building, which has conditioning and heating, is a first class venue our club meetings.

The building is located smack dab in the center the airport off of Santa Anita Ave. Look for the building

R/C Flight Instructors
Chief-Instructor:
Ken Meade (626) 282-1461
Skip Adams (818) 652-6806
Carl Balmer (714) 827-4164
Felix Cervantes (626) 572-8044
Jim Seely (562) 692-4680
Lynn Burks (909) 860-5451
Larry Chapman (626) 338-3859
Steve Lopez (562) 908-4429 (Helicopter Instructor)

Board Meeting Minutes
in order to save space in the newsletter, a copy of the minutes of last month's board meeting has been put online at **sgvrcl.org/boardmeeting.pdf**

Model of the Month Contest
Now that we have acquired such a nice room to hold our meetings, let's keep it that way by making sure that the models we bring to our meetings have their fuel lines capped off and are drip free of oil. The last thing we need to do is wear out our welcome by leaving drip spots behind!

Park Police Dispatch Number
800-834-0064
This is the 24-hour dispatch number for the Park Police. You may want to jot this number down and stuff it in your wallet for future reference. When you've seen someone flying unsafely, this is the number to call if the flyer refuses to abide by the field rules.

Change Of Address
If you need your newsletter sent to a new address the quickest and easiest way to let me know is through email. Send it to: webmaster@sgvrcl.org. You can also call me on the phone (626-695-2919) or send a note to the club post office box:

SGVRCL, PO Box 1645
Duarte, CA 91009

Schedule of Club Events

April 2011

April 2
Poker Fun Fly
Whittier Narrows Field

April 11
Float Fly - Legg Lake

April 12
SGVRCL Board Meeting

April 26
SGVRCL Club Meeting

May 2011

May 9
Float Fly - Legg Lake

May 10
SGVRCL Board Meeting

May 14, 15, and 16
Quickie 500, 422 & 424
Race (Short Course)
14th is practice day

May 24
SGVRCL Club Meeting

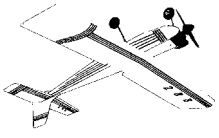
June 2011

June 5 and 6
Pattern Contest
Whittier Narrows Field

June 13
Float Fly - Legg Lake

June 14
SGVRCL Board Meeting

June 28
SGVRCL Club Meeting



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