



The Antenna

April 2015

Four generations of radios with vastly different (improving) reliabilities and interference rejection capabilities:

- a 1960s Orbit AM reed radio on 27 MHz,
- a 1970s Blue Max, kit-built 4 channel proportional 27 MHz AM radio,
- a 1980/90s Udisco-Futaba Gold 72 MHz FM radio
- a relatively new Spektrum Dx8 on 2.4GHz spread-spectrum

Read Brian Davies article on interference and 2.4 GHz radios in this issue



Next Club Meeting: Wednesday, May 6, 2015. 7:30PM, CARFF Clubhouse

In this Issue: 2.4 GHz Radio Interference

April Meeting Minutes

NEXT CARFF EVENT: Annual CARFF Auction, Saturday May 2, at the Sylvan Lake Community Centre, 4725 - 43 Street, Sylvan Lake. Doors open 09:00 for consignments; 11:00 Auction Start

2015 Executive, Standing Committees and Contacts

CARFF EXECUTIVE

President	Jon From, 403-886-5515, jon@cloud9aviation.ca
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Director	Tony Lindhout, 403-347-8463, tslindhout@shaw.ca
Director	Will Gross, 403-346-6119, ti2wgo@hotmail.com

CLUBHOUSE MANAGEMENT TBA

FIELD AND MAINTENANCE COORDINATOR Rob McCoy (403) 347-1363

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AUCTION Rob & Gale McCoy

NEWSLETTER EDITOR Eraldo Pomare, 403-343-2072, pomare@telusplanet.net snail-mail: 1 MacKenzie Crescent, Red Deer, AB, T4N 0H6

WEBMASTER Vince Mulhall, 403-755-1953, cell: 403-872-1911, vmulhall@shaw.ca

COUNTY OF RED DEER BYLAW ENFORCEMENT 403-343-6301 (Call will be forwarded to member on duty). Primary contact: Stephen Poburan If no answer call Bob Dixon 403-505-9030. **Fire Burning Permit:** Not Required.

Field GPS Coordinates: N52° 12' 6", W113° 42' 18" (N52° 12.106', W113° 42.304')
CARFF on Facebook <https://www.facebook.com/groups/1418503868392501/>

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Interference Issues for the 2.4 GHz Band

A review by Brian Davies

At the February meeting of CARFF a presentation was made regarding interference on the 2.4 GHz radio band that many of us use for our aircraft. I offered to follow this up.

The obvious issue is the loss of control. The other issue is, where is this interference coming from?

There are two main sources that could affect our radio system. One is interference from other flyers and the second is interference from other users of this radio frequency band.

The band we use is the ISM (Industrial, Medical and Scientific) band. We are low power unofficial users of this band as are many others such as Wi-Fi routers and portable phones.

With regard to the local user interference I reviewed a Master's Thesis by Frank Cervantes at Carleton University in Ottawa (2004). Eraldo kindly sent this to me. Here is the link:

<http://www.csit.carleton.ca/~msthilaire/Thesis/Frank%20Cervantes.pdf>

This article is very technical but well organized. About 80 pages of technical descriptions and math, followed by a half dozen pages of conclusion and the rest of the 113 pages is charts, diagrams and bibliography.

In a nutshell they tested two brands of 'system on a chip' devices in a couple of modes, synchronous and asynchronous. The researchers also tested multiple users and measured packet collisions and errors. All of our systems use Frequency Hopping Spread Spectrum, FHSS. FHSS employs pseudo-random algorithms for selecting the channel hopping sequence. The model they defined used a system of 40 channels in the hopping sequence and 15 simultaneous users. The frequency modulation techniques were studied as well, since some errors could be caused by this. The timing was 20 ms per transmission and 60000 transmissions, which relates to a 20 minute flight.

Two clocking systems were tested as well, an accurate version with a drift of 1.5 ppm and the second, which is common in our equipment with a drift of 60 ppm. Cost is the big factor between these two.

The broad conclusion from this study is that:

1. An accurate clock in a synchronous system led to the best performance but it is costly.
2. Our typical system of lower accuracy clocks in an asynchronous system still only led to 5% errors per 10000 packets. This was determined to be acceptable at duty cycles in the 60 to 70% range. Therefore chances that we are interfering with each other is low, especially considering that we only allow about 5 planes up at a time. Granted pilots warming up are still using their transmitters but I contend that having 15 radios on at one time would be rare indeed.
3. The other cause for loss of packets is the signal fading due to base level noise, range and the orientation of the antennas.

Other users of this band could cause issues that may be harder to identify.

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Certainly a local rural Wi-Fi node could affect us by increasing base band noise and/or de-sensing our receivers. De-sensing occurs when the automatic gain control (AGC) senses a strong signal and turns down the receiver gain thus making our transmission too weak to receive. Intermittent transmissions would be very hard to track.

As mentioned in the MAAC article most cell phones can run apps that can check local Wi-Fi nodes. I have a couple on my iPhone. Mine won't see other users such as my DSM radios and GoPro camera. I am not sure about the Android apps since I have no way to test them.

Both iPhone and Android systems have apps that when used with plug in RF modules become spectrum analyzers. These are costly, for example, one for iPhone is \$300 USD and others for both systems go up from there. There is a brand called RF Explorer that sells stand alone spectrum analyzers for less than \$400 USD that would be applicable.

The good news is that as an Amateur Radio Operator (Ham) I have a couple of friends that have test gear that could be of help. If we have any reason to believe that we are experiencing interference I am sure I could get some help.

I hope this was useful.

Brian

EDITOR'S SOAPBOX

Eraldo Pomare

With the outdoor flying season just about to get underway, I find April is a great month to check & cycle batteries in my transmitters & glow powered planes. Any pack that delivers less than 80% of it's nominal mAh rating goes to the recycle bin. This year, an interesting problem is becoming evident - receiver packs seem to be going the way of the dodo bird. I've checked both the Great Hobbies and Horizon Hobby websites and found that there are very limited choices. I suspect that the electric flight revolution, LiPos with BECs and A123 LiFe batteries have had an impact on turn-over. I have not yet checked on Hobby Extreme's stock, but would suspect it to be similar to the above.

Remember: Batteries are the prime cause of non-pilot induced crashes!

There is a request in this month's minutes for member's names and phone numbers to be published in this newsletter. Unfortunately, I believe I can't do that due to privacy legislation; the newsletter gets posted to our website and goes into the public domain. The best I can suggest is that we post the list in the clubhouse, or that we have a secure portal in our website where information can be accessed by members only.

This year's Mall Show was well supported by the club; there seemed to be a lot of public interest in our Airshow too. great job CARFF. Let's follow that up with a great Auction at the beginning of May!

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CARFF GENERAL MEETING

DATE: April 1st, 2014

In attendance: Gale McCoy, Rob McCoy, Lorn Brooker, Harvey Fodor, Ethan Brown, Jon From. Wayne Hutmacher, Chris Warner, Tony Lindhout, Scott Nelson, Craig Parker, Greg McMaster, Ron Joyce Non-Members Dale Brown

Call to Order: 7:43PM

Agenda:

Additions: Shirts / Pilot Station Moved to Open Discussion
 Moved: Tony Lindhout Seconded: Lorn Brooker Carried

Minutes: Moved as circulated : Wayne Hutmacher Seconded: Scott Nelson Carried

Financial Report: Bank account: \$10,872.93 GIC: \$5,436.45 Total: \$16,309.38
 Move acceptance of finical report: Gale McCoy Seconded: Wayne Hutmacher Carried

Old Business:

1. Safety Review April/May
 - Email will be sent out 1 week prior to the Safety review meeting at the field house
2. CARFF Mall Show
 - Big thanks to everyone , it was a big success
3. CARFF Plane Purchases
 - 19 planes 1 set of floats left , 1 plane will be reserved for the raffle
4. CARFF Air Show July 26, 2015
 - No changes

New Business:

1. Pay Rob McCoy \$2310.00 for purchased planes
 Moved: Lorn Brooker Seconded: Wayne Hutmacher Carried.
2. CARFF Auction update by Rob McCoy May 2, 2015
 - May 2, 2015 location will be the side Room.
 - Bid Card moved from 10% to 15% commission.
 - \$10 Min Bid up from \$5.
 - Auctioneer has been acquired for the event.
 - Recording Table will be taken care by Gale.
 - Lockup will be taken care by Tony, Email will go out for Signup.
 - Kitchen will be taken care by Scott.
 - Food will be taken care by Wayne, Ethan will look into Hotdog cooker.
 - Loading of the table will be Friday May 1 @ 4:00pm .
 - Advertising on Kijiji , is going well with lots of hits.

Please contact Rob McCoy for any Question or concerns on the CARFF Auction

Open Discussions:

1. Shirt/Jackets for the Club, Wayne Hutmacher will contact a company and get some samples
2. New Pilots station for the Club
 - Dale Brown will make a prototype station from the pictures that Wayne supplied, from his trip
 - Decision will be made after looking at the prototype and the price of each station
3. MAAC AGM will be in Delta Edmonton April 19, 2015 @ 1:00pm, please see the MACC Magazine for more details
4. Request was made to send out a complete members listing , Members will be listed along with the Minutes of the April 1, 2015 meeting

Adjournment: Lorn Brook moved adjournment 8:26

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Mall Show 2015

2015 Calendar of CARFF Events

May 2, 2015 (Sat)	CARFF Auction, Sylvan Lake, Rob McCoy - <i>all hands on deck please.</i>
May 6, 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse
Jun 3, 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse
Jul ? , 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse. Date TBA (Canada Day)
Jul 26, 2015 (Sun)	AIRSHOW 2015. Organizer: Jon From **New Date**
Aug 5, 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse
Sep 2, 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse
Oct 7, 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse
Nov 4, 2015 (Wed)	Club Meeting , 7:30 PM, Red Deer Flying Club
Dec 2, 2015 (Wed)	Club Meeting , 7:30 PM, CARFF Clubhouse **Election Night**

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