M.A.R.C.S. SPARKS

Monthly Newsletter of the Madison Area Radio Control Society
Madison, Wisconsin AMA Charter #665

Volume 44 - May 2005 - Issue 5

Come Fly With Us

MARCS meetings are held on the first Thursday of every month at 7:00 P.M. in Room 201B of the Madison Labor Temple, 1602 S. Park St. in Madison. Visitors are always welcome. We think we have a great hobby and we invite you to come and see and consider joining us.

Officers:
Pres: Tom Lazar, tdlazar@yahoo.com
Vice Pres: Brad Witt, bwitt@chorus.net
Secty: Pat McDonald, mrsmcd21@charter.net
Treas: Ed McDonald, rcace@charter.net

Membership Information: Ed McDonald
249-0734

Flight Instruction Coordinator: Ozzie Johnson
274-0474

Mail Address for official business, **other than for publication in SPARKS**
PO Box 8864
Madison, WI 53708

MARCS Web Site: www.marcswi.org

Web Master: Jeff Alexander
marcs@alexandermail.com
The MARCS web site contains links to War Birds and Electric Flyers Special Interest Group web sites

Editor: Jerry Buss
1809 Browning Rd.
Madison, WI 53704
E mail: jbuss@itis.com Phone 244-8534
Contribution of articles for publication is encouraged. **Deadline for publication is the 20th of the month.**

Minutes of MARCS General Membership Meeting, April 7, 2005

by Patricia McDonald, Secretary

The meeting was called to order at 7:08 by President Tom Lazar with 34 people present.

March Minutes: Minutes of the March meeting as printed in the April issue of SPARKS were accepted as published, with the following amendment. Attendance was low due to the accident on the Beltline. **Old Business:** None

There were no guests or visitors. New member Roy Seals

New Business: Trophies and Service Awards were distributed to those who did not attend the Banquet.

April 23rd is Field Work Day

Dave Rush reported on the Banquet. There was a small group in attendance. The food was good. Tom thanked Jodi for the wonderful deserts. Dave asked that someone else plan next years banquet.

Several members reported on the show in Toledo.

Ozzie Johnson will be this years Flight Instructor Coordinator, he requested a list of members to be instructors by the May meeting.

Bill Rewey reported on EAA. The White Knight will stop in Madison on the 24th on the way to Oskosh.

Mark Johnson volunteered to coordinate the Float Fun Fly to be held on July 17th.

Board members held a short meeting.

Show and Tell: Bob Geimer showed a Giles-202, a 60-Great Planes kit.

Ray Walsh brought a Folker D-VII, a balsa USA kit, US 41.

Bill Kinney presented a Sig Smith miniplane that flies good, its short coupled.

Dave Rush showed several planes. A jet with free flight construction, a Ikarus SU27, a Shock Flyer jet and a P-40 combat plane with Depron construction.

Roy Seals brought H. P. pilots and throw meters.

Copies of an article about the model airplanes used in the Aviator film was handed out to interested members. The Design News Magazine article is available at Http://RBI.ims.ca/4389-572.

MARCS 2005 Calendar of Events

Event	Date	Location
IMAA Big Bird Fly In	June 11	Kettle Field
Thermal Soar	June 18	Long Island Sod Farm
War Birds Over Dane	July 9	Kettle Field
MARCS Summer Fling Hand Launch	July 17	Long Island Sod Farm
MARCS Float Fly and Picnic	July 17	Rille Depp Park, Marshall
Electric Fun Fly	July 24	Kettle Field
Ken Kindschi Scale Rally	August 21	Kettle Field

Raffle winners: Tony Kremm, Fred Bast, Mike Kelly, Hubi Schneider, Dave King, and Bill Kinney.

Program: Brad Witt made a presentation about adhesives titled "Glue Structure and Breaking Things".

Philosophy 101

Perhaps man's history is simpler than we think. Itis summed up in proclaiming the right and doing the wrong.

Georges Clemenceau

A Very Generous Gift

Harry Spray has decided to donate his RC air force to MARCS. It's a lot of stuff and when a complete inventory is available it will be listed here in Sparks and on the club web site for two months, after which a silent auction will be held. I don't know all of the details at this time, but I expect that by next month more information, and hopefully the list, will be available. All proceeds will go to the club treasury.

That's certainly a generous gesture on Harry's part and we appreciate it. Thank you, Harry.

Flight Instruction Coordinator Post is Filled

Ozzie Johnson had agreed to serve as Flight Instruction Coordinator for 2005.

All those wishing to be flight instructors this year should contact Ozzie and let him know what times are good for you to instruct so he can match you to students. Let Ozzie know if you have your own buddy box and what brand it is, or if you will be using the club's equipment.

All members who want flight instruction and who are not already working with an instructor should contact Ozzie at **274-0474.** When you call, please be prepared to give Ozzie information on your available time for instruction and tell him what brand of radio you have.

Thanks for volunteering, Ozzie.

Please Help, if You Can

Following is an e mail sent to MARCS officers and board members recently by a University of Wisconsin student.

My name is Jon Lubner. I am currently a senior majoring in Mechanical Engineering at the University of Wisconsin-Madison. Three other mechanical engineers and I are working on a senior design project that involves using an electric powered glider for self navigating long distance flight. We have a design in place and are currently building the plane in hopes of flying by early May.

I am contacting you in hopes that you could possibly help us with one aspect of our flight. Since much of our budget has gone into the somewhat complicated GPS/computer interface and corresponding flight necessities, we pretty much have no money left for some yet needed components, one of which is a Lithium-Polymer battery charger. If anyone in your organization would be willing to let us borrow their charger for a couple of weeks we would be extremely appreciative. We would be happy to put a deposit on the equipment if requested. If for some reason they did not want to, or could not afford to leave it in our possession for a few weeks we would be willing to travel to their location to charge the batteries when needed. Any help would be great.

Please contact us as soon as possible and let us know if anyone in your group would be willing to help us out. A timely response would be appreciated since we would like to start flying rather quickly (< 1 week) so if you can't help us we will have to find other means. Again this would be of great help to us and we appreciate your time.

The batteries we are using are as follows:
Thunder Power T4200-3S2P (11.1V 4200mAh 3S2P)

Thank you again,
Jon Lubner, University of Wisconsin – Madison
ME349 Senior Design - Team Nightmare
jtlubner@wisc.edu 414-534-0156 (call anytime)

There's Gonna Be a Picnic - But Help is Needed

Mark Johnson is going to organize the picnic and float fly. This is a big job because of logistics in getting everything out

to the park at Marshall and I'm sure he would appreciate some help. If you are able to give him a hand, please call Mark at **(608) 429-4822** or **617-7254.** If we coopereate with him, perhaps he'll do it again next year.

Thanks, Field Work Day Helpers

By Wayne Lanphear

After a wonderfully warm first half of April the field cleanup crew was faced with cold temperature and a strong cold north wind. Seventeen hearty souls turned out and did a great job. Fences were fixed, parts of the fence and posts replaced and straightened as necessary after the onslaught of mowers and runaway models. Trash was picked up and this will be ongoing now that the landfill is directly in the fields backyard, so to speak. Please help by picking up as you wander around the field this summer.

Mark Finley organized a "ditch posse" to clean up the clubs portion of the county road and came back with a major batch of trash. Ed Buechner provided his four wheel drive pickup to haul brush of the north edge of the field and over to the brush pile at the northwest corner of the field. The brush along the creek was trimmed and the leftover brush from the previous trimming of 2 years ago was picked up also. I'm glad Ed brought his chainsaw as mine self destructed about halfway through the job.

The shelter sides were taken down and stored for next year. The sheds were swept out and straightened up. Harley put up a new windsock sewn by his wife. Thanks. Harley also cleaned up the back of the frequency board and provided a new set of photos and notes to aid those who dump one in the boonies this summer.

The mowers and trimmers are operating so please pitch in and do a little trimming/mowing when you see a need. Any one of the board or club officers has a key to the sheds.the following turned out to help and if I missed someone I'm sure I will hear about it! Romy Bukolt, Ed Buechner, Bill Disch, Mark Finley, Wendall Hottman, Joe Imilkowski, Mike Kimmerly, Bill Kinney, Tom Lazar, Ed McDonald, Harley Nelson, Dennis Peterson, Dick Riddle, John Thompson, Don Weigt, Brad Witt. Thanks to all.

The Bent Bird

What the Heck Does Superhetrodyne Mean?

By Don Weigt

All modern radio control receivers are superheatrodyne designs, which convert the received radio frequency signal to a lower intermediate frequency, or IF, where more amplifying and filtering provide good sensitivity and range, and reject many signals that the antenna tuned circuits can't block at the higher input radio frequency, because inexpensive practical filters can't be made selective enough.

Major E. H. Armstrong invented the superheatrodyne receiver near the end of World War I. "Heterodyne" is a Greek word, meaning two different forces. I don't know what puts the "super" in "superhetrodyne", but that is the correct term.

The "two forces" in our receivers are the radio frequency signal from the antenna, and the local oscillator signal generated in the receiver, which differs from the radio frequency by an amount equal to the intermediate frequency. The local oscillator may be at a frequency equal to the radio frequency plus the intermediate frequency, or at the radio frequency minus the intermediate frequency. The frequency difference of the local oscillator and radio frequency equals and creates the intermediate frequency.

Here are the basic parts of a superheterodyne receiver:

First is an antenna circuit. It is tuned to restrict the range of frequencies getting to the rest of the receiver, and to efficiently couple the energy from the antenna into the next circuit. There may be a radio frequency (RF) amplifier to boost the signal before sending it to a mixer.

There is a mixer, which converts the received RF frequency signal to a (nearly always) lower intermediate frequency (IF). Some mixers use tubes or transistors, others use one or more diodes. The mixer's output is tuned to the intermediate frequency, or "IF".

There is an oscillator, which supplies the second frequency to the mixer to make the IF. This is often crystal controlled in higher frequency receivers, anywhere stability is more important than easy channel changing. The frequency of the oscillator is either the sum or the difference of the RF and IF signals to be processed: that is, it may be a higher or lower frequency than the RF, by an amount equal to the IF. For example, if we wanted to receive an RF signal at 3.0 MHz, and our receiver had an IF at 0.1 MHz, the local oscillator (LO) could be tuned to 2.9 or 3.1 MHz (3.0 +/- 0.1).

There are IF amplifiers and filters to select only the desired (converted) narrow signal band, and boost its strength to the correct level for the detector. A detector takes the IF signal as its input and produces a baseband (audio, video, pulse train, data, or other as appropriate) signal. It can be said to "recover" the baseband signal that was sent on the RF carrier. The radio frequency is not the intelligence: it's only the the means to transport the intelligence. That makes "carrier" a very appropriate name for it!

There is some sort of signal strength detection which is used to control the receiver gain. Gain control is needed for proper detector operation and to help reduce distortion. This automatic gain control is often called "AGC".

An amplifier or processor of some sort uses the detector output to drive a speaker or TV video circuit, control a device, log something being measured, or deliver data to a computing device.

Most 72 MHz radio control receivers could receive any 72 MHz RC frequency equally well. The signals are too close together in frequency for the antenna circuits to separate them. The local oscillator crystal controls which signals are received, by determining which ones are converted to the

frequency of the IF amplifier filters. Other very strong 72 MHz signals can cause distortion in the radio or intermediate frequency circuits, and become superimposed on the IF signal. This distorts the detected control signals, and can cause loss of control. It's one source of "glitches". Loss of signal or erratic signal strength are others.

Many of the better radio control receivers use dual conversion designs. This means they have two IF frequencies. Some believe dual conversion is important for reducing interference from other RC channels, and experience suggests it's so. But, that's not really true.... As evidence, note that JR receivers for years have been single conversion designs and work well.

Better receivers use antenna and mixer circuits that have lower distortion to reduce and delay the onset of overload distortion. Dual conversion, by itself, doesn't do that. Better devices, more local oscillator power, more effective AGC, higher DC currents in transistor or tube mixers all reduce distortion. Diode mixers with 2 or 4 diodes cancel some distortion, and so are superior to single diode mixers.

Then, why would a dual conversion receiver be better? Perhaps because they also include some of the improvements just listed. But, there is one type of receiver problem the dual conversion receiver was designed to solve, and where it is far superior: reducing image problems.

What is a radio image? Remember, uperheterodyne receivers' IF stages amplify a signal at a frequency that is the sum or difference of two signals, that product designed to occur in the narrow band of frequencies the IF is tuned for. One signal is from the transmitter. The other is generated in the receiver, by the "local oscillator" or "LO", operating at a frequency controlled by the receiver's crystal.

Earlier I said there were two local oscillator frequencies for any combination of radio and intermediate$_e$ frequencies. You may have realized something else. For any local oscillator frequency, there are TWO radio frequencies that will produce the intermediate frequency (IF)! Oops!

Let's go back to our 3.0 MHz receiver with the 0.1 MHz IF. We saw that the local oscillator could be at 2.9 or 3.1 MHz. Either is 0.1 MHz from the radio signal, and will produce a 0.1 MHz IF signal. But, wait.. If the local oscillator is at 2.9 MHz, a radio signal of 2.8 MHz will also create an IF signal at 0.1 MHz! If the local oscillator is at 3.1 MHz, then a radio signal at 3.2 MHz will also make an IF signal at 0.1 MHz. These unwanted signals that produce IF signals are called image frequencies. They are on the "wrong side" of the local oscillator frequency, but spaced just right to create an intermediate frequency (IF) signal.

To minimize image frequency problems, the RF tuned circuits need to reject (block) them so they can't get into the mixer. That is hard to do if the IF is low and the image frequency is nearly the same as the RF frequency. Practical radio frequency filters pass a band of signals with a width about 2% of the center frequency, or 1% on either side of the intended signal. Even signals several percent away in frequency get through, although far more weakly.

So, the solution to reducing image problems is a higher IF frequency, which means the local oscillator is farther from the radio frequency and the image frequency is double that. But, a higher intermediate frequency means poorer selectivity, less gain, and higher cost. A conundrum!

Dual conversion receivers are a solution to the need for a low IF frequency and a far removed image frequency the antenna tuned circuits can reject. It uses two oscillators and two IF frequencies. The first IF is at a higher frequency, probably 10.7 MHz. That puts the image frequency 21.4 MHz from the transmitter's frequency. This is about 30% of the transmitter radio frequency, and tuned circuits can easily reduce the strength of such far off frequency signals to where only monstrously strong transmitters can interfere.

Then, after only a little filtering at 10.7 MHz, and probably a little amplification, a second local oscillator and mixer convert the first IF signal to the traditional 455 kHz (as used in AM broadcast receivers) for much more filtering and amplification. (The lower IF frequency filtering is where the "narrow" in narrow band comes from!!

The main purpose of dual conversion is to let the receivers' antenna circuits effectively reject the image frequency signals. But, even single conversion receivers with 455 KHz IFs (0.455 MHz) have image frequencies 910 kHz (0.91 MHz) from their transmitter's signals. That's 45 1/2 channels away! (our RC channels are 20 kHz (0.02 MHz) apart.) So, the image frequency for most channels is outside the range of other RC transmitter's frequencies. Also, the image frequencies fall between those far away transmitter frequencies, so the narrow band receivers should reject them.

Dual conversion receivers mainly protect us from other radio "services'" transmissions, which may be exactly on our single conversion receivers' image frequencies, by making the image frequencies easy to filter out in the receiver antenna circuits. They may be accompanied by circuits that are superior in other ways, some of those ways were mentioned earlier in this article. Those other superior qualities are often as important as dual conversion, or more so.

I hope this helps more MARCS members understand what the heck "superheterodyne" and "dual conversion" receivers are, how they work, and why they are used.

Collishaw

The next action that Ray Collishaw saw was when WW II started in 1939. He was promoted to Air Commodore and took over as Air Officer Commanding, Egypt Group in charge of all RAF units in North Africa. He concentrated on strategy and tactics to neutralize the Italian air force and to gain aerial superiority. This was a tough challenge considering that his men were flying outdated Gloster Gladiator biplane fighters and Vickers Wellesley bombers.. While the Italian’s planes were obsolete, the RAF’s Gladiators were far worse. The day the Italians entered the war in June 1940, Collishaw's men

were off the mark quickly, striking at an Italian airbase destroying 18 aircraft in two days with only three losses. He then turned their efforts to bombing harbours, ships and troops to hold up the reinforcement of Italian forces. They sunk the Italian cruiser San Giorgio and blew up an ammo dump. The RAF's successs was based on intelligent planing and aggressive operations that overwhelmed the Italians with their overly cautious tactics.

His pilots were badly outnumbered and outgunned, but he countered these deficiencies with expert aerial tactics, aggressive attacks and trickery. He had only a single modern Hawker Hurricane fighter to use at the front (three others were trainers) dubbed "Colly's Battleship". He made the best of it by constantly moving it from base to base and letting the Italians see it. He came up with the idea of making many, single plane attacks on Italian formations to fool the Italians into thinking he had many Hurricanes. The result was that the Italians spread their superior fighters thinly across North Africa, and seriously diluted their strength.

In September 1940, the Italians under Gen. Grazziani, finally got organized and started a ponderous offensive from Libya into western Egypt. The British pulled back to their main base, Marsa Matruh, allowing the Italians to capture an airbase at Sidi Barrani. The Italians stopped there to regroup and resupply themselves, foolishly tarrying until December. Collishaw implemented a continual harassment procedure that forced the Italian's into having standing patrols over their forts. This was incredibly wasteful of men, fuel and machines. They should have been on the offensive, and yet were not.

While the Italians were in Sidi Barrani someone in the rear area of Cairo found a large stock of old English anti-personnel mines in a storehouse. Bristol Bombay transport/bombers were used to "bomb" the Italian forts with these 20 lb anti-personnel mines. Each Bombay could carry 200. As the plane circled a fort, one man would arm the AP mine, hand it to another who would then toss it out the fusilage door. They kept this up all night alternating planes and forts. It was reported to have lowered the Italian's morale even further.

Reinforcements arrived in the shape of Vickers Wellington medium bombers and two squadrons of Hurricanes. Collishaw used them to good effect during Operation Compass. It was originally designed by Generals Wavell and O'Connor as a reconnaissance in force around Sidi Barrani. The RAF was tasked with harassing the Italians and making sure that their reconnaissance planes and bombers did not find out what was going on in the British sector. They were very successful as the Italians were taken completely by surprise by the opening attack of Compass. He even had a Bombay fly back and forth over the tanks moving to the front the day before the attack to cover their noise. The Bombays were very noisy aircraft. With the overwhelming success of the initial days of Compass, Gen. Wavell pushed through western Egypt and entered Libya. Collishaw's men were extremely busy keeping the Regia Aeronautica at bay and straffing rear areas and lines of communication and retreat almost at will. Eventually the British captured Benghazi. However, the Germans realized they could not afford to lose North Africa so easily and despatched Erwin Rommel to retake it.

A fact of warfare in North Africa worked alternately in the attacker's favour and then in his disfavour. The more successful the attack, the further the enemy was pushed back, the longer became the supply lines for the offense and the shorter became the supply lines for the defense. This is a main reason for Rommel's success in the Libyan desert, and then for the British and American success over him.

In July, 1942 Collishaw was recalled from the desert and was replaced with Air Vice-Marshal Coningham. He was given the a posting in Fighter Command in Scapa Flow, Scotland. This was considered to be a "peaceful" posting where aviators could unwind from long periods of front line duty. Certainly Collishaw needed it. By this time the Luftwaffe had other problems in Europe and did not bother with raiding Scapa Flow. When Ray Collishaw was retired from the RAF in July, 1943 with the rank of Air Vice-Marshal, it may not have been a voluntary decision on his part, as in his autobiography he used the term "was retired from the RAF". It isn't likely that this old warrior would have voluntarily retired in the middle of a war. Still he soldiered on as a regional air liaison officer with the civil defence organization until the end of the war. Following the war he returned to British Columbia as part owner of a mine near Barkerville. Apparently it was a successful operation, as he said in his book that the price of its stock went from sixty cents to over twenty dollars per share. He died in West Vancouver in 1975 at the age of 82.

The early war in North Africa was possibly his finest hour. Ray Collishaw was a man of incredible courage and daring, he applied his knowledge of aerial fighting intelligently and made significant contributions to the Allied efforts in both world wars. He was Canada's most exciting, and one of it's least known, aerial aces and a real hero. He is honored in Canadian Aviation's Hall of Fame.

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Charlie doesn't have a special this month, but stop out anyway.
Every day is special at Charlie's and he has some neat ready to fly trainers..