



CRRC Flight-Log

<http://www.charlesriverrc.org>

AMA Charter 339

April 2014

Next General Meeting

Wednesday April 16, 2014 7:30PM at the
Goodnow Library

Warren Chafe will be presenting a lecture on
personal experience with his engine collection.

CRRC General Meeting Minutes for March 19, 2014

Business Meeting:

Dave Spielman opened the business meeting at 7:30 PM at Goodnow Library in Sudbury, MA.

Meeting minutes and treasurer's report from last month's meeting were approved as written in the February newsletter.

Field Reports:

Davis field is in good condition and ready for the cleanup day, which was held on March 31.

Medfield is in good condition but the road may be a bit muddy or a while.

Upcoming Events and Schedule:

Spring Float Fly will be held on May 17-18. Ruane Crummett is the organizer.

The CRRC open house / demo day at Davis field will be held on July 4.

The altitude limited electric soaring contest will be held on July 19 and 20. Dave Spielman is the contest director. The contest will be limited to 40 participants.

The hand launch glider contest will not be held this year due to a lack of interest.

High School Club:

The high school club program continues to make progress. CRRC has purchased enough equipment to build around 6 trainer airplanes.

Speaker:

John Eppling gave a presentation on current multi-rotor technology aimed at people who want to build their own multi-rotor. He gave a summary of currently available components including frames, control boards, speed controls and some tips on how to set up a home-built multi rotor.

Guests / New Members

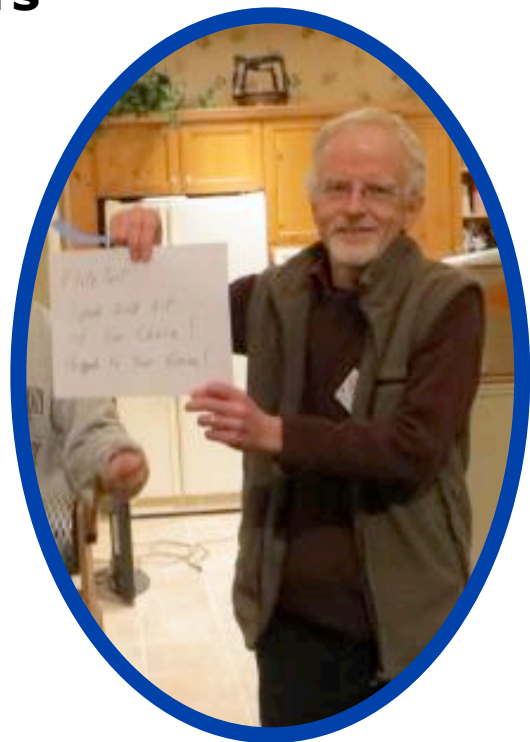
Ingrid Centurion is a former US Army officer and full-scale pilot. She is working with MIT students on practical unmanned (rotary and fixed wing) aircraft applications and wants some help in learning how to fly model aircraft. She came to the meeting with her son Anthony.

Arnold Barnes was formerly a weather expert for the US Air Force.

Raffle Winners



Dan Sullivan
Hobby Zone Duet
a micro-sized twin



Evan Haddington:
Flite Test kit of choice



Ray Harlan
QuadCopter frame

Show and Tell



Paul Daigle and Ruane Crummett had a large gasoline-powered T240 high wing monoplane. The model weighs 15 pounds, has 8 servos and is covered in Solartex covering.



Wayne MacKeil had his completed Flite Test Spitfire made from a CRRC raffle prize.

Show and Tell



Dick Roy had an electric-powered Gentle Lady motor glider.



Dan Sullivan showed his Dream Flight Alula foam flying wing hand launch / slope glider.

Ingrid Centurion showed two of her current projects. The first was a quadcopter that she is making with some MIT students. It has customized software to enable it to be used as a test bed for advanced applications. She also had a Bixler trainer that she plans to use to get some RC flying experience.

Speaker



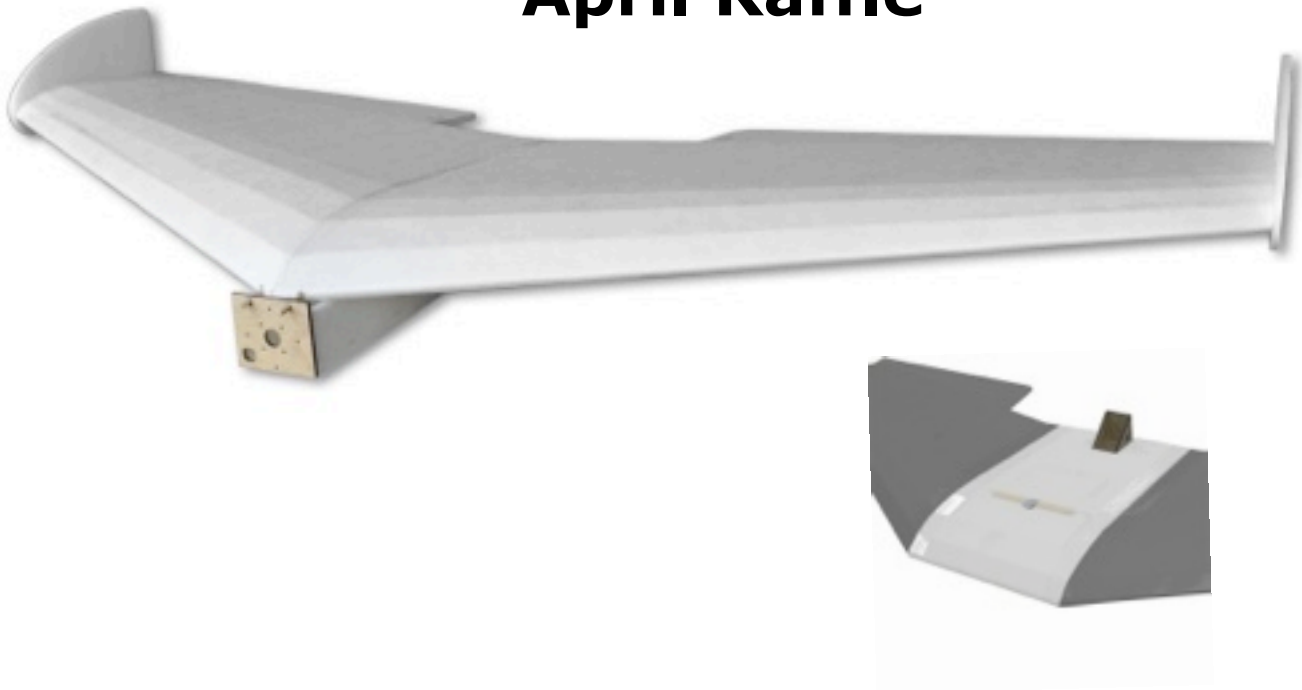
John Eppling gave a presentation on current multi-rotor technology aimed at people who want to build their own multi-rotor. He gave a summary of currently available components including frames, control boards, speed controls and some tips on how to set up a home-built multi rotor.

(See pages 10 through 12 for John's write-up on multi-rotor copters)

Meeting Minutes submitted by Dan Sullivan

Photos by Dick Roy

April Raffle



1) The FliteTest Versa flying wing and blunt nose conversion kit



2) OrangeRx R620 Spektrum/JR DSM2 Compatible Full Range 6Ch 2.4Ghz Receiver w/Failsafe

Presidents letter April 2014

The snow is gone; the snow is gone!
And it's about time too! Truth be told, I still have about a 2-foot high mound in my yard, but it will be gone by the time you read this.

Last weekends Davis field clean up was a success. Two and a half hours work finished it off nicely. The dog owners had removed most of the organic deposits before we arrived. We focused on trash blown into the woods and holes in the field. With wheelbarrow, rakes and shovels, a small crew worked like a well-oiled machine to fill in those shoe-sized holes that were bound to trip fliers. It seemed that there were quite a few of these traps in the far landing zone.



On Saturday April 19th, we will have a chance to do some maintenance to the Bill Martin field in Medfield. This is a shared cleanup weekend with CRRC and MMAC, (Millis Model Aircraft Club). Both groups will get a chance to prepare the field for a fine season of flying. Bring a rake, shovel, key 27 and a plane and lend a hand. Come and meet your fellow fliers from MMAC, get a little dirty and possibly do a bit of flying. The cleanup starts at 9:00 and the flying starts as soon as the cleaning is done. There is a bit of roadwork that we are putting off until we can scope the project. Look for updates on the CRRC Yahoo group in case of flooding. I hope to see you all there.

We cancelled the hand launch contest this year because there just wasn't enough interest in the competition end of the sport. Thanks to all of you who used survey monkey to help make this decision.

Get your floatplanes ready. May 17th and 18th is the CRRC sprig float fly and CD Wayne Mackeil has set up a great event for you. This two-day event on Wayland town beach is an open event to AMA members with electric and fuel powered floatplanes. Sign up for this 9:00 am to 3:00 pm event is on the beach. Lunch and refreshments will be available for a nominal fee. Look for details on the CRRC web page.

cont'd next page

The Lincoln Sudbury High School Flyers club is coming together. At our last general meeting in the Spring House Pond Clubhouse, a future member of the LSHS club was in attendance and reported that several of his friends would be joining along with him. This is spectacular news for the future club. The students are now looking for teacher chaperones to help facilitate the LSHS club. Brian Rickman has ordered building supplies and electronics for the students to start their first project, a high wing trainer made of blue foam board. With any luck, we could see them flying their projects at Davis field by mid may. If you are interested in supporting this project, please contact Brian Rickman.

The next club meeting on April 16th features vintage and current model aircraft engines. Our own Warren Chafe will be presenting a lecture on personal experience with his engine collection. This should be a fun and interesting meeting. John Eppling has selected a few raffle prizes to help coax you to come. First prize is a slope soaring jet donated by Larry Wetmore's family. Guests are welcome to come and see what we are all about.

Davis Field is being shared with CRRC and Sudbury Youth Soccer this spring. Flying will run from 9:00 to 11:30 both Sunday and Saturdays and can resume again at 3:30 when the teams vacate the field. The exception is Saturday May 3rd when Cub Scout rocketeers will take over the field. Weekday flying is open all spring from 9:00 am till dusk. CRRC will have full day weekend flying once soccer has ended in June.

The Sudbury Park and recreation department continues to work with Gale Associates on renovation designs for Davis Field in 2016. Sudbury residents have been voicing their concerns to the Park and Rec committee and have offered many reasons why the field should be preserved as is. One compelling reason is that Davis Field serves the community as a Town Green where people come to meet, walk their dog, play sports, play Frisbee and most importantly fly model airplanes. Monthly Park and Rec meetings have been focused on determining how to fill the needs of the many users, which includes over 2,000 soccer kids. The Sudbury members of CRRC have attended some of these meetings helping to voice concerns to preserve flying space. The latest meeting reviewed several field renovation options; one of which is potentially workable. It includes 2 multiuse rectangular fields adjacent to a 190 space paved parking lot and a 90-foot baseball diamond at the far left corner of the flat field near the contest landing zone.

There is still time to influence the outcome of the design and maybe point Park and Rec to invest different location. Visit Sudbury Park and Recreation's web site to see more about this topic. Sudbury residents are encouraged to attend the Park and Rec meetings and get involved. The next meeting is April 15th at 6:30.

I'll see you at the meeting and on the field.

Fly Safely,
David Spielman

Multi-Rotor Copters

John Eppling

For anyone wanting to get into multi-rotor copters, there are many inexpensive options available. Most of these are small quadcopters that you can fly in your living room. The prices range from under \$30 to between \$100 and \$200. You can find these at many local hobby stores and on-line stores. If you have never flown a quadcopter (or a helicopter), these small, indoor quads are great for learning the basics.

While many of you may never go beyond the simple ready-to-fly, indoor quadcopters, some of you may want to move to larger, outdoor models that are capable of handling winds, carrying FPV gear, and longer range. Once you start moving up to this class of models, it is hard to keep the price in the \$100 to \$200 range. It can be done, but you will probably have to do a lot of custom parts selection as well as do a lot of work to save money. In this article, I will present some options and resources that will allow you to build a capable tri- or quad-copter for less expense than buying a ready-to-fly model like the DJI Phantom (\$500-\$800). In particular, this article will concentrate on solutions that do not require you to do extensive research and modifications to get all the parts to work together.

The following components that are necessary items for a multi-rotor copter:

1. Frame
2. Flight controller
3. Motors
4. Speed controller

Of course, it goes without saying that you will also need a receiver, transmitter, and battery, but I assume that you have those items covered.

You will find links at the end of the article for the products mentioned in this article.

Frame Options

Probably one of the cheapest frames that you can get is the HobbyKing Q450 V3 fiberglass frame (\$13) with built-in PCB. The PCB (Printed Circuit Board) option is very nice because it helps to eliminate the need to buy or build a power distribution component. Once you start getting into quads and maybe hex copters, you will start running out of room for all the wires needed just for power. In the PCB version, you solder connectors for the battery to the PCB, and you solder the speed controllers directly to the PCB board.



Figure 1 HobbyKing Q450 V3 PCB frame

The HobbyKing frame looks like a knockoff of the DJI Flame Wheel frames (the DJI version is about \$32).

If you enjoy FliteTest (www.flitetest.com) videos and articles, you can support them by buying the AnyCopter, Bat-Bone, and H-quad frames. These are more expensive (about \$40-\$70) kits, but you would be helping to support the FliteTest website and content. FliteTest has build videos as well as other informative and entertaining videos (and podcasts).



Figure 2 FliteTest H-quad kit



Figure 3 FliteTest Anycopter Quad kit

While the FliteTest kits may be more expensive, the parts are relatively cheap to replace if broken. Also, you don't have to wait weeks for HobbyKing to deliver. Although at \$13 a kit, you could just buy several as backup.

There are many other vendors that sell frame kits in addition to ready-to-fly options. A google search will provide a lot of links. Some of the better known vendors that carry the less expensive frames are:

1. Ready To Fly Quads (<http://witespyquad.gostorego.com/>)
2. Xheli (<http://www.xheli.com/>)
3. Atlanta Hobby (<http://www.atlantahobby.com/>)

QuadroCopter (<http://www.quadrocopter.com/>)

Tri, Quad, or Hex?

The advantage of having more motors is that you can carry higher payloads and there is some redundancy, especially in the cast of 6 (or 8) motors. That is if one motor fails. If a single ESC burns out and shorts the flight battery, then there won't be much that is going to save the flight.

The advantage of a tri-copter is less cost, but you will need a server to provide a tilt mechanism for controlling yaw. The tail motor must be physically tilted to provide yaw, while quad, hex, and octocopters rely on varying the torque on counter-rotating props for yaw. In general, the tri-copter will be more maneuverable, but if you are just getting into multi-rotor copters, maneuverability should not be a concern. If you want to do FPV, you want a more stable platform anyway.

Flight Controllers

Flight controllers have come a long way in the past few years. The least expensive, proven solution used to be the HobbyKing KK2.0 flight controller (\$30). There now is a 2.1 version. The advantage of the KK2.x controller is a built-in LCD display that allows you to make adjustments at the field without having to connect to a PC. The default settings are fairly good, but depending on the particular model, some adjustments need to be made for optimal flying. There are many good youtube videos on how to do this (I'll discuss the adjustments that you can make for multi-rotor copters later in this article).

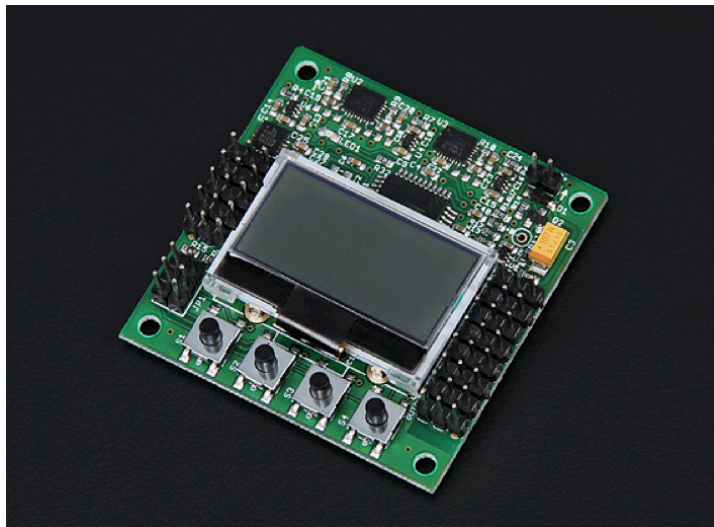


Figure 4 HobbyKing KK2.0/KK2.1 Flight Controller

The latest low price controller is the Multiwii based controllers. While these have been around for a while, the latest reports show that there have been much improvement in the latest versions. The best is that the Flip MWC Flight Controller 1.5 is \$15 from Ready To Fly Quads. Flitetest videos suggest that very little initial adjustments will be necessary for standard quad copter models.

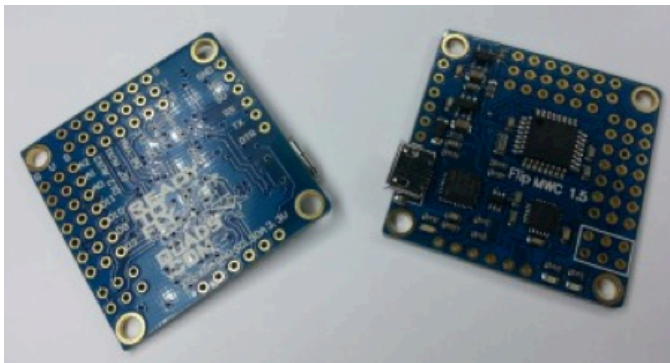
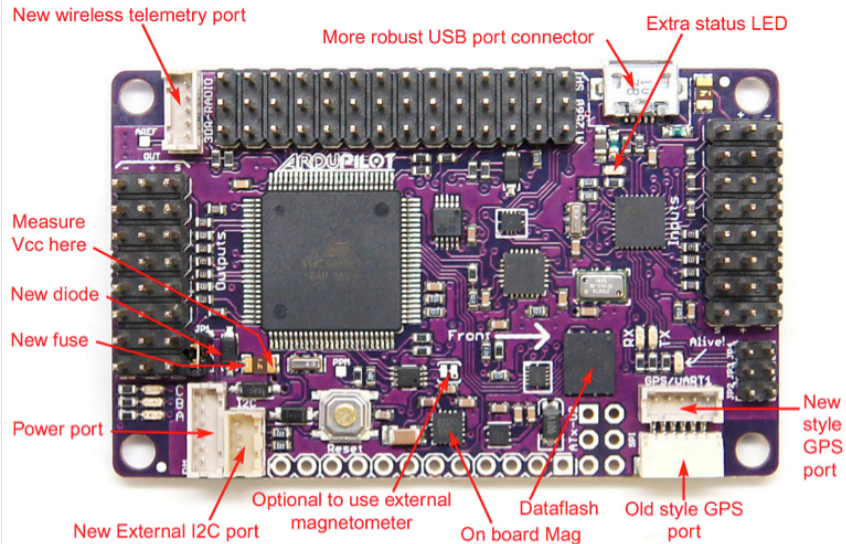


Figure 5 Flip MWC Flight Controller 1.5

The above two flight controllers are great options for your first home-built quad. They are inexpensive and capable; however, they are basically no-frill versions that give you basic flight control. Once you master basic flight, you may want to move up to more capable versions that provide GPS and other sensor options. For these controllers, you are moving into the \$150-\$300 range for flight controllers. The DJI Naza flight controllers (\$170-\$1300) have been available for a while. Recently, the APM 2.5 and 2.6 flight controllers provide a complete solution for sophisticated flight control and PC based flight planning. The APM (ArduPilot based) is an open source flight control and autopilot solution. The best place to obtain the APM controllers and software is 3DRobotics (<http://3drobotics.com/>).



Figure 7 APM 2.6 Flight Controller with case



In addition to the flight controller, you can get a matching GPS/compass module as well as other sensors, such as sonar altimeter, wind speed, etc. The standard APM unit contains a barometric altimeter. The sonar altimeter sensor is used to determine exact height above the ground (limited in height above ground). A GPS/compass option will bring the price of the controller to \$240.

Flight Controller Gain Adjustments

The controller adjustments consists of adjusting the P and I gains for each axis. For long time I had no idea what these adjustments did, and I would blindly go from one extreme to another. Here is a simple explanation (plagiarized from various on-line sources, especially from user MathieuDD on FliteTest forums).

- P stands for proportional
 - Motor strength component due to P gain is $(P * d)$, where T is throttle position and d is amount of angle away from desired position
- I stands for integral
 - Motor strength component due to I gain is $I * t$, where t is the amount of time away from desired position
- Total motor strength = $T + (P*d) + (I*t)$, where T is throttle position
 - Actual implementation may vary, ...

If P-gain is too low, copter will flip over. If P-gain is too high, it will oscillate. It is better to be just slight bit too high in P and way too low in I. If I-gain is too low, it will be slow to respond and may drift, but it isn't fatal, so start at 0 (unless otherwise instructed) and increase.

Powering Flight Controller

Each speed controller will plug into the flight controller, and most speed controllers will provide power on one of the pins. If the ESC's have analog BEC's, you can plug all of them in; however, if the ESC's have switched BEC's, you will smell smoke if you plug them all in! For switched BEC's, only one of the ESC's should supply power to the controller by pulling the power pin on all but one of the BEC's. Castle Creations now sells speed controller packages where only one of the controllers provide power.

Motors

There are a wide variety of brushless motor solutions. FliteTest provides suggested motor/ESC combinations for their AnyCopter, BatBone, and H-quad kits. These would be good starting points for the other similar sized multi-rotor frames.

Speed Controllers

Most brushless speed controllers will work for multi-rotor copters; however, I suggest that you use speed controllers designated for multi-rotor models. Some of the ESC brands are:

- Trunigy Plush (HobbyKing)
- Multistar (HobbyKing)
- ZTW (<http://www.altitudehobbies.com/>)
- Maytech (<http://www.altitudehobbies.com/>)

The ZTW and Maytech ESC's from Altitude Hobbies has special firmware (Simon K) preinstalled. The advantage of the Simon K firmware is that they are designed for multi-rotor use. All the motors must start up at the same time; otherwise, your copter can flip when trying to take off. Without the Simon K (and even with it), you must calibrate the ESC's before your first flight. The calibration method will depend on the flight controller and the ESC being used.

Forums

There are the usual RCGroups forums for most things. The APM flight controller has a dedicated forum at <http://ardupilot.com/> For the Multiwii controller, see www.multiwii.com. There is also <http://www.openpilot.org/> for controllers based on the CC3D Openpilot (we didn't discuss this in this article).

Conclusion

Multi-rotor copters are becoming more popular, and every day, there seems to be a new website and new on-line vendor for multi-rotor copters that are ready-to-fly as well as kits and controllers. If you want to get a completely ready-to-fly multi-rotor model, there are several good options. However, if you want to save a little bit on the cost or just want to do some of it yourself, getting started can be quite daunting with so much information out there. Hopefully, the references mentioned in this article will help you get started in the right direction for a successful DIY build and first flight.

Links

http://www.hobbyking.com/hobbyking/store/_49725_Q450_V3_Glass_Fiber_Quadcopter_Frame_450mm_Integrated_PCB_Version.html

<http://shop.flitetest.com/multirotors>

http://www.hobbyking.com/hobbyking/store/_44296_Hobbyking_KK2_0_Multi_rotor_LCD_Flight_Controller_Board_US_Warehouse_.html

<http://witespyquad.gostorego.com/flight-controllers/flip-mwc-flight-controller.html>

<http://store.3drobotics.com/products/apm-2-6-kit-1>

<http://www.altitudehobbies.com/>

CRRC 2014 Altitude-Limited Soaring Contest



July 19 and 20
Davis Field, Route 117
Sudbury, MA

**Join us for some friendly competition at the 2014 ALES Contest.
Contest 2 of the NE regional trio.**

Awards for 1st, 2nd and 3rd places

Planes must be equipped with a CAM or similar circuit that cuts off power to the motor at 30 seconds or 200 meters of elevation, whichever comes first.

CAM circuit loaners will be available free on the day of the event. Also CAM circuits will be on sale for \$45.

Scoring will be man-on-man thermal duration with the flight time starting when the motor is turned on.

Entry Fee: \$15 each day or \$25 for the weekend
(Includes lunch and drinks)

Registration Limited to 40 contestants
Register on line at <http://ales.acm.alnet.com> or at the field
Sign-in: 8:00 am, Pilots meeting: 9:05 am

For more information, contact CDs:
David Spielman: dspielma@gmail.com or 508-277-4403
Brian Rickman: brian.rickman@gmail.com or 774-249-2494
Visit www.charlesriverrc.org for field information
GPS: N42.4173 W71.400

This is a rulebook contest with emphasis on friendly competition

Indoor Flying



The Milford Youth Center (MYC), located in the old Armory Building, 24 Pearl St, Milford, MA

Millis Modelers have scheduled this winters indoor flying sessions. The first hour instruction is provided to interested parties at no charge.

The fee for pilots \$15.00 per session this year.

Sessions are from 8:00-11:00 PM. All sessions are on Saturday.

The date is 4/19/14

Please note that the front door is not in service, enter on the left side of the building.

Western MA RC FLEA MARKET/ SWAP MEET

Franklin County Radio Control Club

Saturday, April 28, 2012

9am to 2pm

Franklin County Tech School

82 Industrial Boulevard

Turners Falls, MA 01376

Admission: Free

Tables \$15.00 at the door,

\$10.00 before April 23

Contact: David Korpiewski

413-695-2191

Davidk@cs.umass.edu

www.franklinrc.com

Setup time 8:00am

Indoor/Outdoor spots available

Officers

President

David Spielman
president@charlesriverrc.org

Vice President

Neil Kaufman
vicepresident@charlesriverrc.org

Membership Secretary

Ray Harlan
membership@charlesriverrc.org

Recording Secretary

Dan Sullivan
secretary@charlesriverrc.org

Newsletter Editor

Robert Sisson
newsletter@charlesriverrc.org

Treasurer

Dave Marshall
treasurer@charlesriverrc.org

Webmaster

Bert Cohen
webmaster@charlesriverrc.org

Chief Instructor

Dick Williamson
chiefinstructor@charlesriverrc.org

Raffle Chairman

John Epping
xofficio@charlesriverrc.org

Treasurers Report

2014 Activity Report	
	March
Starting Balance	
Checking	\$4,813.60
Cash Box	\$25.00
PayPal Acct	\$803.40
CD Accounts	\$6,918.27
Total Starting	\$12,560.27
Income - CDs	
Interest	\$0.46
Total Interest	\$0.46
Income - Checking	
Membership	
Raffle	
Total Income	\$0.00
PayPal Activity	
Membership	\$90.00
Sudbury High School RC Club	-\$242.11
Total activity	-\$152.11
Expenses - Checking	
Bank Fee	\$16.00
Total Expenses	\$16.00
Ending Balances	
Checking	\$4,797.60
Cash Box	\$25.00
PayPal Acct	\$651.29
CD Accounts	\$6,918.73
Grand Total Ending	\$12,392.62

David Marshall, CRRC Treasurer

Calendar

April 16, 2014
General Meeting at Goodnow

April 19, 2014
Billy Martin Field Clean-Up

May 17 and 18, 2014
CRRC Float Fly
Wayland Town Beach

May 21, 2013
General Meeting at Goodnow

June 18, 2014
General Meeting at Davis

July 4, 2014
CRRC Flying Demo at Davis

July 5 and 6, 2014
Hand Launch Classic

July 16, 2014
General Meeting at Davis

July 19 and 20, 2014
ALES Contest at Davis Field

August 9 and 10, 2014
Soar In ESL Contest at Davis

August 20, 2014
General Meeting at Davis Field

August 30, 2014
RES and 2 Meter Glider Contest
at Davis Field

September 20 and 21, 2014
CRRC Float Fly at
Wayland Town Beach

General Information

Keys to the Bill Martin Field

To get a key for Bill Martin Field in Medfield please email Ken Antonellis at kxa@verizon.net. Ken is the key-master. Effective March 25 the key for the 2014 season is key #27. Ken may have keys at the meeting. A \$5 deposit is required the first time you receive a key.

New Wings

No new Wings this month.

Flying Sites

Go to the [CRRC Website](#) and select the Flying Sites tab to see the various sites. The site page will give current weather and site information.

Building and Flight Instructors

To start your your instruction please call the Chief Instructor, Dick Williamson. You will be match with one of the Instructors. All Instructors are qualified AMA pilots and willing to give assistance to fellow club members.

Types of instruction - B = Building, G = Glider, E = Electric, F = Fuel, H = Helicopter

Dick Williamson - B, G, E
978-618-5475 - Sudbury

Fritz Bien - B,G, E
978-369-1720 - Concord

Tom Bauer - B,G, E
781-235-7344 - Wellesley

Brian Rickman - B, E
774-249-2494 - Marlborough

Derick Veliz - B, E
978-337-7867 - Acton

John Weigel - B
508-655-2138 - Natick

Richard Gammon - B, G, E, F
508-835-2049 - West Boylston

Ken Antonellis - G, E, F
508-653-8369 - Natick

Bruce Schneider - G, E
978-460-0305 - Hudson

Lincoln Ross - G, E
978-800-0608 - Maynard

John Nilsson - G
978-368-7136 - Clinton

Dave Walter - G
978-562-5400 - Hudson

Jon Leehey - F
508-358-5721 - Wayland

Tony Davids - H
978-568-9598 - Stow

Tree Climbers

LloydKeyes(Wayland)
508-358-9197 or
508-341-0110

Michael Lynch
(Wayland/Sudbury)

Paul Harrington (Medfield)
508-376-2573

Monkey Men (Marlboro)
508-481-8461

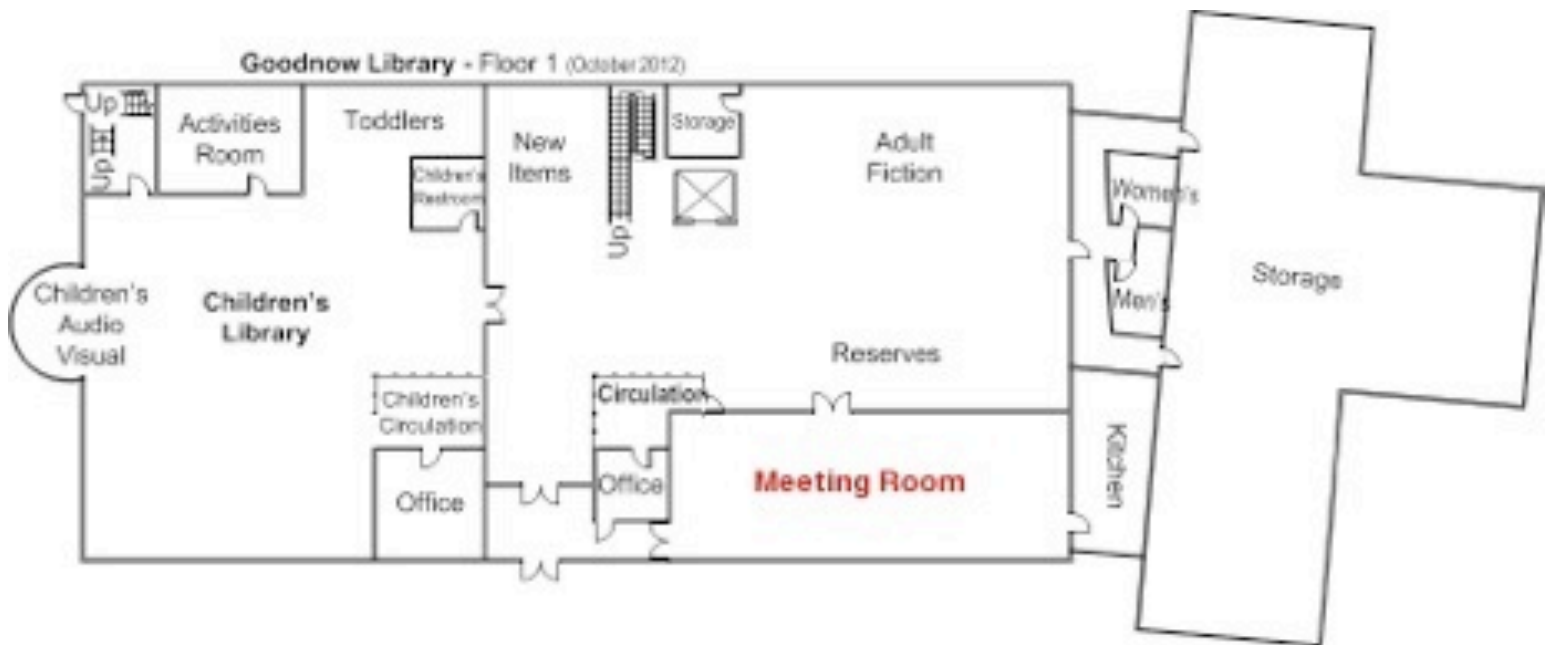
Scott (Sudbury)
508-203-3845

Tony Morais
A1 Tree Services
(Framingham)
508-626-0088 or
800-657-7788

Stephen Canessa
The Tree Guy
978-460-1000

Hartney Greymont (Medfield)
Sean Comer
781-444-1227
thescomer@gmail.com

Editors note: If you know of any tree climbers or tree services please send contact information to the Newsletter Editor



April Club Meeting Guests are Welcome

Wednesday April 16, 2014
7:30PM at the Goodnow Library
21 Concord Rd, Sudbury, MA 01776



2014 MEMBERSHIP APPLICATION

Name
Street
Town State Zip
Telephone
E-mail

IMPORTANT: You must be an AMA member in order to receive your CRRC membership card.
AMA No.

Birth Date (AMA req'd)

To receive membership card and field pass, bring this application to a club meeting, or mail to the membership secretary (address below).

Ray Harlan

Membership Secretary CRRC

15 Happy Hollow Road Wayland, MA 01778

508-358-4013

Email: membership@charlesriverrc.org

Please make check payable to: **Charles River RC**

You can pay by check or use PayPal.

(PayPal to membership@charlesriverrc.org)

SAVE \$5 - EARLY BIRD DUES RATES ARE LISTED

	MEMBERSHIP CATEGORY	On or before Mar 1, 2014	After Mar 1, 2014
☐	OPEN Member	\$40.00	\$45.00
☐	JUNIOR member, (Under 19 before Jul. 1)	\$10.00	\$10.00
☐	SENIOR member, (If age 60 before Jul. 1)	\$30.00	\$35.00
☐	SENIOR member, (If age 75 before Jul. 1)	Free if AMA member	Free if AMA member
☐	Full time STUDENT	\$20.00	\$25.00
☐	Family member additional to OPEN membership	\$20.00	\$25.00

Please chose from the options below:

☐ DO NOT include my personal contact information in the club phone book

Help reduce operating costs by downloading the newsletter from the CRRC website.

☐ I DO NOT have access to a computer or the Internet - Please send me the Newsletter via US Mail.