

NEWSLETTER OF THE CHARLES RIVER RADIO CONTROLLERS, INC



CRRC FLIGHT-LOG

<http://www.charlesriverrc.org/>

AMA CHARTER 339

JANUARY 2004

VOLUME 41 NUMBER 1

2004 CRRC Officers

PRESIDENT

Ken Antonellis

508-653-4513

kantone107@aol.com

VICE-PRESIDENT

Jeremy Harkin

781-894-6683

jeremy_harkin@yahoo.com

MEMBERSHIP SECRETARY

Dick Williamson

978-4438549

williamson@ll.mit.edu

RECORDING SECRETARY

Dave Walter

978-562-5400

dwalter@ultranet.com

TREASURER

Scott Anderson

508-839-7758

scottand100@copper.net

Ex-Officio and RAFFLE CHAIRMAN

Derick Veliz

978-266-1739

dveliz@omr-architects.com

WEBMASTER

Joel Foner

508-653-3560

jfoner@fonerassoc.com

NEWSLETTER EDITOR

Jeff Newcum

508-655-6417

newsletter@charlesriverrc.org

General Meeting

Wednesday,
January 21st
7:30 pm

Verizon Labs
Sylvan Road, Waltham
Exit 27b off I95/128

Presentation

A comprehensive Look
at building
techniques
and
assembly.
We will set up
tables around
the room and members can
look at the various demos



****No model Show-n-tell at this months meeting****

Table of Contents

President's Message	2
Collings Foundation update	2
Tree Climbers	2
Instructor/Builder program	3
Video and Book Library	3
Treasurer's report	4
Secretary's report	4
What's it about - Thermal Soaring ..	5
Operation of a YS91AC	6
Indoor flying at TeamWorks	7
Frozen Finger Fun Fly report	8
2004 CRRC Membership form	10
The Web Guide	11
Monthly Meeting map	11
The Last Word	12

1st Prize



- (1) 555 FM Receiver
- (2) HS-55 Servos

2nd Prize



**Building
Technique and
assembly Prize**



President's Message



Happy Holidays to all and I hope that the New Year brings good times and excitement to all of you. It is not too early to start thinking about how we can improve these good times and excitement for our club as well. At our next meeting, we will display the talents of many of our members with their building

and repairing skills. I bet even us old timers will pick up a tip or two.

Our Frozen Finger Fun Fly was held on January 1, 2004 at Medfield at 9:00 AM. Thanks to Fritz for being the CD. His official duties were to bring coffee and donuts. Fritz did extremely well in this respect. This was also a get together for both the Charles River and The Millis Club.

Throughout the year, members of the board may be asking for your help. We are asking for all members to simply do one thing to lighten the load and to lessen the appearance of any cliques! Perhaps it is to help with the auction, volunteer to help during a contest or perhaps to CD an event. It is really easy with the help that we are anticipating.

Well enough of my babbling, will see you at the meeting. Let's get together and have some fun!

- Ken!

MEMBERSHIP STATISTICS

Here are the updated CRRC membership figures. The table summarizes the membership status, and compares recent years.

Year	Renewals	New Members	Peak Totals
1999			135
2000	112	62	174
2001	124	50	174
2002	138	58	196
2003	156	39	195
2004	60		60

TREE CLIMBERS

Tony Morais

A1 Tree Services- Framingham, MA
508-626-0088 800-657-7788

Kenny Greeno

Office Phone: 617-661-8591
Cell Phone: 617-201-5300

Brian Pikarski

Burlington, MA
617-797-2136

Paul Harrington

(508) 376-2573 [Medfield Area]



THE COLLINGS FOUNDATION
STOW, MASSACHUSETTS

**2004
FUN-FLY
UPDATE**

I just wanted to drop you a line and mention that we are planning to schedule the Collings Foundation 2004 Open House/Fun Fly for June 12th and 13th and would like to extend an invitation to CRRC as well as the Crow Island Radio Control Club. We are hopefully giving your club enough time to organize and publicize! Please let me know what you and the group think about that date.

Best regards,
Ryan Keough
National Coordinator, Wings of Freedom Tour
Collings Foundation



CRRC BUILDING AND FLIGHT INSTRUCTORS

This is our list of qualified and willing instructors. Power planes are flown only at the Bill Martin Flying Field in Medfield. Sailplanes and Electrics can be flown at the Davis Farm Field on Rte. 117 in Sudbury. For directions to the fields go to <http://www.charlesriverrc.org>. If you have any questions about the construction of your airplane, or want to have an experienced pilot preflight check your airplane before heading to the flying field, then call any of the building instructors.

BUILDING

Ruane Crummett
Wayland 508-655-2234
Fritz Bien
Concord 978-369-1720
Joel Foner
Natick 508-653-3560
John Weigel
Natick 508-653-3560
Pete Young
Watertown 617 923-4184
Derrick Veliz
Acton 978-266-1739

ELECTRICS

Bruce Schneider
Hudson 978-562-9900
Fritz Bien
Concord 978-369-1720
Dave Walter
Hudson 978-562-5400
Derick Veliz
Acton 978-266-1739
Pete Young
Watertown 617 923-4184
Lincoln Ross
Waltham 781-891-0332

HELICOPTERS:

- None Available at present-

POWER

Chief Instructor
Ruane Crummett
Wayland 508-655-2234
Bob Scott
Norwell 781-982-0268
Pete Young
Watertown 617 923-4184
Ken Antonellis
Natick 508-653-4513

Jon Leehey
Wayland 508 358 5721
Dave Walter
Hudson 508-562-5400
Fritz Bien
Concord 978-369-1720
Neil Kaufman
Sudbury 508-443-9647



SOARING

Dick Williamson
Sudbury 978 443-8549
Dave Walter
Hudson 978-562-5400
Bruce Schneider
Hudson 978-562-9900
Fritz Bien
Concord 978-369-1720
John Nilsson
Clinton 508-368-7136
Pete Young
Watertown 617 923-4184
Lincoln Ross
Waltham 781-891-0332

.....< CRRC LIBRARY >.....

The club keeps a library of videos and books. They are made available at club meetings. If you cannot come to the meeting, and would like to borrow a video or book, call Ken Antonellis at (508) 653-4513.

Videos:

1996 World Masters Aerobatic Championships
AMA - The Pioneers (25 min)
Byron - New Generation of Modeling Products (17 min)
Byron - R/C Wars
Combat Models - Fighter town

Demo (8 min)
Coming of Jets & History of the DC3
Dynamic Soaring
Elmira '97
Endless Lift
Hot Stuff Video (60 min)
Local Flying (Medfield)
Military Aircraft
Monokote 1 & 2
Old Buzzard Goes Flying
R/C Helicopters
R/C Info and Tips
R/C Ornithopter Research Project R/
C Soaring from the Ground Up
R/C Video Magazine, Vol. 1-13

Scale Aircraft Documentation
The Light Stuff (Daedalus Project)
Wring It Out, Vol. 2

Books:

1993 Don Edberg Complete Source Book
AMA - Sound and Model Aeronautics
Aviation Heritage Magazine - B2
Flying Wing
Completely Cars - Harry Higley
Trainers (R/C Magazine)

TREASURER'S REPORT

Report Date 12/31/03

Starting Balance 11/30/03	
Checking	4,935.75
Savings	5,619.76
Cash	25.00
Total Starting	10,580.51
Income	
Dues	670.00
Events: Indoor Flying	100.00
Raffle:	122.00
Interest: Savings	3.81
Total Income	895.81
Expenses	
Monthly Bank Fees	11.33
VOID -- #1333	
Indoor Flying: Teamworks # 1334	450.00
Field: Millis Model Aircraft Club mowing May-Jul #1335	365.00
Denny Maize –WindDancer recognition award #1336	125.00
John Leehey Raffle Prizes, etc. #1337	186.19
Mike Comier Newsletter expenses #1338	35.42
Total Expenses	1,172.94
Ending Balances	
Checking	4,658.62
Savings	5,623.57
Cash	25.00
Total Ending 12/31/03	10,307.19

Approved as printed: Scott Anderson



Secretary's Report: December 2003 General Meeting

Derek Veliz opened the business meeting at 7:40 pm.
Secretary's report was approved as printed in newsletter.
Treasurer's report was not printed in newsletter.

Field Reports

Medfield

Very little flying at Medfield recently due to cold temps
and snow on the field.

Davis

Lots of water on the field.

TeamWorks

The recent indoor fly went smoothly. No carnage this time.

Old Business

None

New Business

John Weigel volunteered to attend
the BOD as member at large.

Dick Williamson reports that 47 members
have already renewed for 2004.

Dick and Joel Foner spoke about a recent proposal to
add on-line membership renewals to the web site.

The on-line system would likely involve a
PayPal payment system. Joel will do a cost/benefit
study and present his findings to the BOD.

The Frozen Finger Fun Fly is coming up on Jan 1.
The site will be Medfield.

The Collings foundation has contacted the club with
interest in hosting another fun fly this year. The tentative
date is around same time as last year,
the second weekend of June.

Raffle

Cobweb Slow Flyer – Sam Weisman
Wright Brothers Book – John Pickle
Cool Tool – Dave Walter

New Pilots

none

Guests

Phil Risone

John Pickle

Close of business

Derek ended his term as president by handing over the gavel to incoming president Ken Antonellis. Ken closed the business meeting at 8:30 pm.

Show And Tell

John Nilsson – On-board altitude data logger

Jeff Newcum – Stevens Aero Groove 480

Lincoln Ross – an .049 control line model

Jose Veliz – “Poly Pusher”

Mark Drela – Polecat Aero's Wind Dancer kit, presented to Dick in appreciation of all his work for the club.

Fritz Bien – Wright Flyer electric by Dare Models

Show and Tell Prize – Fritz Bien

Speaker

Dick Williamson and Mark Drela gave a presentation on the history of the Wright Brothers and their aircraft.

Pictures of the meeting and presentation can be seen at:

www.charlesriverpictures.org

Then click on Dec Meeting 03

Recorded by Jeremy Harkin

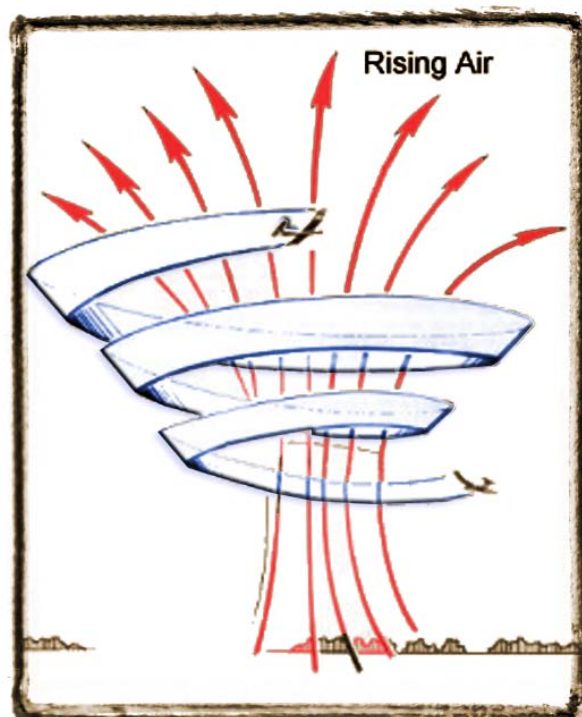
What's it about?

Thermal Soaring

Thermals are rising bubbles of air caused by the uneven heating of the ground by the sun.

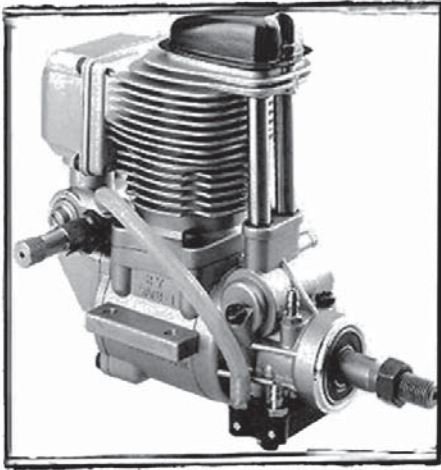
Thermals can be found in any terrain, and under any weather conditions, but some conditions and terrain are more likely to produce thermals than others. The plane is launched using a launch system such as a winch to an altitude of 400-700 feet, then flown in search of thermals. A plane in a thermal exhibits certain subtle visible signs. With experience, thermal pilots learn to recognize these signs and circle in the thermal to gain altitude and extend flight times. Thermal planes typically have long wingspans, and are flown at great distance in search of lift. For the beginner, thermal flight times are generally only a few minutes, but with practice thermal flights of 20 minutes to well over an hour are not uncommon. Typical thermal competition events include duration, distance, speed, and precision landing.

Below: A typical thermal turn



-Article from Bradley J. Smith's website at
<http://www.moneysmith.net/Soaring/soaring.html>

Operation of a **YS-91AC**, and other YS engines



The YS-91AC 4 cycle engine is often cited as significantly more powerful than any other comparable (in cubic capacity) 4-cycle engine. Why is this and how can YS be so confident in their claim?

Well, they claim is that the engine is fuel injected and it is supercharged. Let us see if these claims are true. If you were to take the classic descriptions used by the automobile or aero engine manufacturers on their fuel injection and supercharging techniques you may wonder at the truth of YS statement.

The 3 primary ways of supercharging an auto or aero engine are:

1. Use a belt driven or electric fan (blower) that increases the density and pressure of air into the engine air intake
2. Use the exhaust gasses to drive a turbine to get the same effect (this is often referred to as a "Turbocharger")
3. Cool the air to make it denser, therefore more air molecules per cubic foot, therefore more air molecules into the engine per intake "gulp".

First of all let's get some terminology sorted out. When I refer to "**Intake**" I mean the primary breathing area of the engine – in a carbureted engine this mean the air entering the carburetor. When I say "**Inlet**" I am referring to the point that the fuel and air, either separately or as a mixture enter the cylinder.

Normalizing the three methods to their very basic function we can easily see that all three end up doing much the same, provide a greater density and/or pressure of air to the engine. With the greater density there are more molecules of air per cubic unit, therefore more fuel per cubic unit can enter the engine at a given mixture ratio. So, if the action of providing this greater density and pressure of air to the "**Intake**" is the function of supercharging, then the YS is not supercharged. In the YS, the air is sucked in through the carburetor by the vacuum in the crankcase caused by the upward travel of the piston – just like all other non-supercharged model engines.

So, is there a legal case coming up? Is this false advertising? Well definitely "No!" If we revisit what is happening in the "Supercharging" of an engine just one step further and submit that the high pressure/density of air going into the "**intake**" is a means to an end rather than the end itself then YS can redeem itself. As we said, the reason we offer a higher density and pressure of air to the "**intake**" is to be able to increase the amount of fuel/mixture getting to the engine. More fuel, more power. In a regular non-supercharged 4 cycle engine, the vacuum that draws the air into the carburetor is also the vacuum the transports the fuel/air mix to the

upper cylinder and it does this once every two revolutions of the crankshaft. YS take a different approach. They use the bottom end of the crankcase and the piston travel to first suck in the air and then to pump it out of the carburetor into the "**Inlet**" manifold (air chamber). A rotary valve connected to the rear of the crankshaft facilitates this. This 2 cycle "Suck/Blow" operation – once for each revolution of the crankshaft – provides the fuel mixture to be presented in higher density and pressure to the "**Inlet**" manifold (Air Chamber), and therefore into the upper cylinder. The mixture stored in the "**Inlet**" manifold is the result of two charges per power stroke. This happens even without pressurizing the air "**intake**". The end product is the same as that for a traditionally supercharged (pressurized air "**intake**") engine. So is the YS really supercharged. I say Yes!

Fuel injected? Now there's the other question. How can a fuel-injected engine have a carburetor and no fuel injectors? Well, you are thinking in the terms of traditional auto and aero engines again. Don't. YS have been very innovative. The complex auto and aero engines that use fuel injectors do so as a means to an end. Where have we heard that before? By injecting fuel through computer controlled injectors you can easily meter the amount of fuel per power cycle. This leads to more power and better fuel economy. So, instead of applying high-pressure fuel into the air *inside the cylinder* to create the mixture, the YS engine causes the fuel to still be pressurized but as part of the mixture in the Air Chamber – not in the cylinder. The supercharging effect that we already discussed

provides that pressure in the Air Chamber (“**Inlet**” manifold). We saw that to do this, YS forced the fuel mixture into the manifold (Air Chamber) at crankcase pressure **twice** per power stroke. The disk valve in the crankcase keeps the pressure in the Air Chamber during the non-power stroke. So the mixing of fuel and air is done before entering the cylinder and twice per power cycle.

So if the purpose of fuel injection on an engine is inject high pressure **fuel** into the cylinder, then the YS engine is not fuel injected. But since the mixture is injected at high pressure into the cylinder (By virtue of it’s “**Inlet**” manifold pressure) then we could say that the YS engine has “**Mixture Injection**” rather than fuel injection. So, I pose this question. Is

the raw liquid from the tank the fuel or is the mixture the fuel? Let’s look at one of Webster’s entries for “Fuel”:

fu·el pron. (fyoo·el)

1. Something consumed to produce energy, especially:
 - a. A material such as wood, coal, gas, or oil burned to produce heat or power.
 - b. Fissionable material used in a nuclear reactor.
 - c. Nutritive material metabolized by a living organism; food.

Based on this, I submit, since both the liquid and the air are consumed by the engine to produce energy, that it is the mixture that constitutes the actual “Fuel”.

If so, then YS engines are “Fuel Injected”

Now it can be understood why the YS 4-cycle engine “O” rings and gaskets must seal perfectly.

One more thing. Because the YS engines draws raw fuel into the on each revolution, it can’t rely on carburetor vacuum. Therefore, the YS engine has a pressurized fuel system that uses crankcase pressure, supplied through a check valve to pressurize the fuel tank. This ensures the “On-demand” fuel system on which the YS engine relies.

So, 30% – 35% more power than more traditional 4-cycle engines? I believe it. No lawsuits coming from me.

- **Colin Towers**
Quinapoxet Model Flying Club

Indoor Flying at TEAMWORKS

Below are pictures from another great indoor session at TeamWorks, which took place Saturday, January 10th. The next session will be February 14th from 9 pm till 12 pm. We look forward to seeing you there!



Anker Berg-Sonne explains how his Butterfly works to a young spectator



John Weigel sets up his model for another flight. It flies very nice.



Romeo Nelson is taking off with his low flying Bleriot with blinking LEDs.



Michael Cormier and **Jeremy Harkin** talk about his Lithium Polymer setup



Bill Johnson flies his GWS Tigermoth with ease.



Another overpowered brushless **Wayne Nelson** creation. A very sweet T-IFO.

2004 FROZEN FINGER FUN FLYGEA



Ken Antonellis's
Northeast Aerodynamics Sport-Aire



Jean Riu's
great flying Chipmunk



**Lincoln Ross, Ken Antonellis, and
Ron Chickowski talking shop**



It was a time to catchup with friends
and enjoy some flying



Tomer Jackman brought 3 guest that
were amazed by the models



Fritz Bien's electrified Klemm L-25



Dave Walter showing the guys what's
soaring is all about





Several of the Davis crowd also showed up. Dave Walter brought only gliders, as he was confused as to the location of the fun-fly. He proceeded to show everybody that he could launch as high as many of the planes with engines dare fly. Dick Williamson showed how the Zagi can adapt to all fields, and Derick showed how fast electrics have gotten.

RIGHT:

Scott and his NSP Impulse

It uses a Mega 22/20/3E, using 3 cell LiPo's (equivalent to about 9 cells NiMH in voltage), at 3:1 gear ratio, I was only drawing 180 watts with a 15x10 prop. It may draw more if I had been using 9 NiMH cells, but I didn't try it. I do know 10 cells with 2.5:1 and a 16x10 prop draws 415 watts.

Here is his flight report. I had one flight at the FFFF. I used the 2x3s1p 2100 LiPo's. I flew it first thing in the morning before the wind picked up. It seemed to fly slowly, but when I pointed it straight up, it kept going up and up. Inside and outside tight loops - it pulled right through them but, all in slow motion, it seemed. I started horsing around with it a little, lost orientation, and had a nervous few seconds before reacquiring it and righting it. An all red plane... Landed it without incident.

- Scott Anderson



Scott Anderson's NSP Impulse



Fritz's Bien's Ultraspport - built in 1991 and Ron Chichowski is fueling up



For the second year in a row, the Frozen Finger Fun-Fly started out to be a total disaster. The temperature was in the 40s so nobody could get frozen fingers. Fortunately, the wind picked up a little after 10:30 so at least some of us got cold fingers.

I arrived at 8:50 AM, following our club president in through the already unlocked gate. There were the usual suspects at Medfield, the 2 Bills from the Millis club, Scott Anderson and a couple of others from our club. Scott was already in the air, since he had an electric which is exempt from the 9:00 AM curfew. Having brought coffee and donuts, I set about doing that first-of-the-year duty of stuffing my face first. Everybody else were too busy getting their planes ready to be in the air at the stroke of 9.

By 10:30, Jean Riu counted 26 cars in the parking lot. Many people just came to watch and gab, but most flew. There were some very impressive flyers, notably one kid from the Millis club who performed 3-D maneuvers with a greatly overpowered plane. Jean flew a very nice looking Chipmunk, Tomer flew his Wingo, Scott flew a NSP Impulse, as well as his Ultra-Stick, Ken had his Seniorita and Train-Aire, I had out my Ultrasport and Klemm L-25.

Medfield is in excellent condition, with pilot stations set up by the Millis club made from materials they imported from their lost field. Unfortunately, the field layout was not known to them, so that instead of our old 4 pilot stations, we now have 7. This made the control of the flight-line more difficult, as it was easy to be the 5th plane in the air without knowing. There was a "new" system, used by several other clubs, of a pin-waiting system established for sharing frequencies. We'll have to amend the rule book to explain its use.

The coffee finally got cold, so I quit at about 12:30, while more people were still arriving.

- Fritz Bien



THE CHARLES RIVER RADIO CONTROLLERS, INC

2004 MEMBERSHIP APPLICATION

AMA Charter 339

THIS FORM EXPIRES ON MARCH 1ST 2004!

Name _____

AMA No. _____

Street _____ Birth Date (AMA req'd) _____

Town _____ State _____ Zip _____ Tel. _____

E-mail _____

Channel Number(s) _____

I PREFER TO RECEIVE MY NEWSLETTER

☐  **ELECTRONICALLY**

☐  **Via the US Mail**

To receive membership card and field pass, bring this application to a club meeting, or mail **with a copy of your Year 2004 AMA LICENSE**, appropriate dues, and a **SELF ADDRESSED STAMPED ENVELOPE** to:

Dick Williamson /Secretary CRRC
P.O. Box 398
Lincoln, MA 01773
Telephone 978 443-8549
E-mail: williamson@ll.mit.edu

- ☐ I DO NOT want my address to appear in the club phone book

REMEMBER THE MARCH 1ST DEADLINE!	Renewal before March 1st
OPEN Member	\$30.00
JUNIOR member, (under 19 before 7-1)	\$15.00
SENIOR member, (if age 60 before 7-1)	\$20.00
full time STUDENT	\$15.00
Family member additional to OPEN membership	\$15.00
There will be a \$5.00 penalty for joining AFTER March 1st	

I'M INTERESTED IN THE FOLLOWING:

- | | | |
|--|--------------------------------------|--------------------------------------|
| ☐ TRAINERS/SPORT PLANES | ☐ ELECTRICS | ☐ PATTERN |
| ☐ GLIDERS | ☐ HELICOPTERS | ☐ RACING |
| ☐ INDOOR/PARK FLYERS | ☐ SCALE | ☐ GIANT SCALE |
| ☐ OTHER (specify) _____ | | |



The Web Guide

www.hobby-lobby.com

615-373-1444

Retail sales of mainly R/C Parkflyers and Beginners models. They also carry Glow powered models, Sailplanes, Helicopters, Boats, Brushed/Brushless motors and related accessories.

www.towerhobbies.com

800-637-6050

Retail sales of R/C Parkflyers, Beginners models, extensive line of Glow powered, Boats, Trucks, Cars and related accessories.

www.nesail.com

802-655-7700

Retail sales of R/C Parkflyers, Beginners models, Electric 3D, Electric Aerobatic, various Brushless motors, Glow powered aerobatic models, and an extensive array of Sailplanes of every variety and related accessories.

www.ezonemag.com

An on-line magazine that covers the cutting edge of electric flight and the events that are electric specific. Ezone is the front end to RCGroups.com, a discussion website that covers all areas of the R/C world.

www.liftzone.com

An on-line magazine that covers the soaring models, accessories, and events. Liftzone is produced by the folks who created Ezone and links to RCGroups.com, a discussion website that covers all areas of the R/C world.

www.rcuniverse.com

An on-line magazine/community that features reviews, stories, and information regarding every aspect of the R/C hobby. RC universe was recently dubbed "best in the industry" for finding information on radio control models by Inside R/C (a TV show devoted to the R/C hobby).

www.charlesriverrcpictures.org

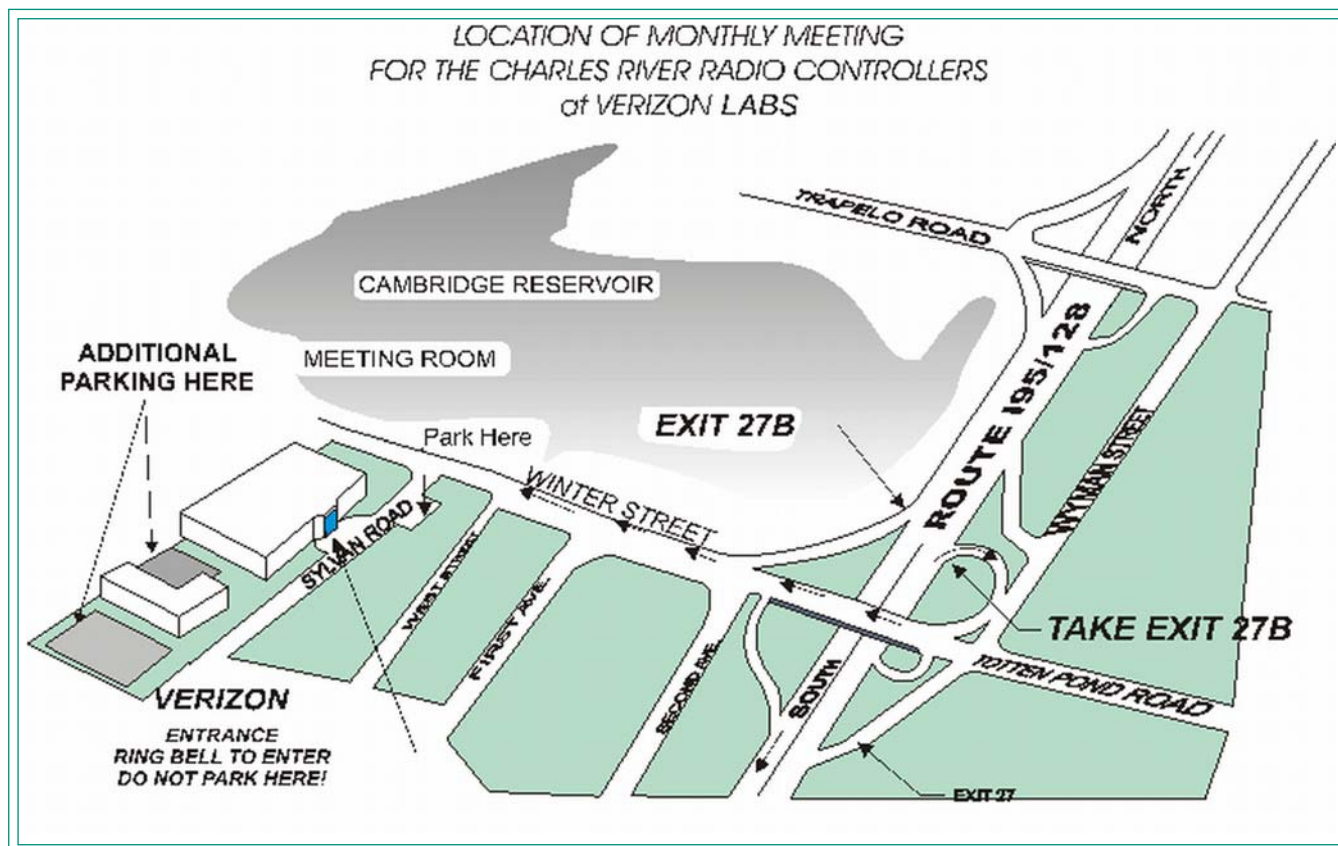
An archive of photos from CRRRC club events, contests, meetings, area events, and weekend flying. There's even a video that reviews the 2003 season and events.

www.slopeflyer.com

Slopeflyer.com is a resource for people interested in r/c slope flying and slope related news. There is an extensive listing of slope soaring sites to fly and most site listings have local contact info so interested slope pilots will know who to contact in a particular area.

www.fatlion.com/sailplanes/sailplanes.html

A great website for people who are interested in getting started in or just finding out what's the latest and greatest in the Radio Controlled Sailplane hobby.



Last year I started contest flying with the club. We go to 5 Eastern Soaring League contests that are in Pennsylvania and New York. The group comprises of about 9 members that are very diverse, yet very helpful and enjoyable. Contest flying is a mix of fun, skill, concentration, and camaraderie. Initially, I thought that contest flying is only for a select few who had years of experience and the best equipment. I was wrong. Contest flying is for all skill levels, from your novice pilot to the accomplished pilot and all levels in between. I find the competition secondary to the knowledge and enjoyment that I gain from the other members while we compete. One of the major advantages that I realized was the addition of the Mantis to my hangar. The Mantis is one of the sweetest, predictable, and durable sailplanes that I've ever flown. The Mantis is a fairly inexpensive and extremely competitive option for novice and accomplished pilots. I've

The Last Word



The CRRC tent during pre-contest setup



Eight Manti in tow
Got Manti?

"Contest flying is for all skill levels, from your novice pilot to the accomplished pilot and all levels in between."

recently purchased an Aegea wing and tail (The next iteration of the Mantis design. Designed by our own Mark Drela) from Phil Barnes. He's an absolute master of composite construction and he's also a highly competitive pilot.

If you've ever wondered about competing and thought it wasn't for you, I urge you to reconsider. We have such an extremely knowledgeable club with truly dedicated members. At the least you'll learn the finer points of soaring and even share a laugh or two.

- Jeff Newcum



Jeff Newcum/Editor
16 Lake Street
Natick, MA 01760
www.charlesriverrc.org
newsletter@charlesriverrc.org