# Propwash

The Newsletter of the Mercer County Radio Control Society
May 2006

## Club Donates $2,000 to the Sunshine Foundation Dreamlift

Amidst the marching band, dancing girls, and Star Wars Storm Troopers, MCRCS members Doug McMillan, Jans Brower, and Joe Raimondo delivered a club check for $2,000 to the Sunshine Foundation during the May 2nd, 2006 Dreamlift event at Trenton-Mercer Airport. Despite his youthful good looks and cheerful countenance, Doug was unable to win a spot on the 6:00 news from the attractive young female reporter who was covering the event. One could only marvel at his enthusiasm in trying, though.


**Doug McMillan, Jans Brower, and Joe Raimondo presented the MCRCS check to the Sunshine Foundation.**

The Mercer County RC club's donation is raised primarily through food sales and raffles at the annual Jumbo Jamboree, which is scheduled for later this month. The contribution, over the course of seventeen years, has become an annual tradition for the club. While the first contribution was only a few hundred dollars, the club's ability to support the Sunshine Foundation has grown over the years to the current level. To date, the club has contributed over $30,000 to the Sunshine Foundation to support its Dreamlift operation.

The Sunshine Foundation, formed in 1976 by a retired Philadelphia police officer, answers the dreams of seriously ill, physically challenged, and abused children from across the United States. The Dreamlift programs give the participating children an opportunity to visit one of the happiest places on Earth, Walt Disney's Magic Kingdom. The Sunshine Foundation, since its inception, has sponsored over 80 Dreamlifts. For more information about the Sunshine Foundation, visit its web site at www.sunshinefoundation.org.


**Members pose with Cathy DiConstanza, President of the Mercer County Chapter of the Sunshine Foundation.**

**Cheering the travelers off to Disney World.**

# Building Contest Opens the 2006 Season

The 2006 MCRCS Building Contest took place as scheduled this year, with the static judging occurring on April 19th at the Lawrenceville Library and the fly off happening at the field as planned on April 30th, opening day of the 2006 flying season. Joe Raimondo served as the Contest Director again this year.


**Rick DeBastos tightens a support in preparation for the static judging.**

**From some angles, it is difficult to recognize Jans Brower's Monocoupe as a model.**

While it could be argued that most club meetings are entertaining, the one at which the static judging occurs is invariably the most interesting, affording members an opportunity to see what their colleagues have been up to for the past winter (or in some cases, the past few winters). This year was certainly no disappointment. Ten members supplied eleven entries, which were:

## Scale

| | |
|---|---|
| Jans Brower | Monocoupe |
| Tom Dyl | Corsair |
| Bob Levanduski | Fokker D VII |
| Mike Luciano | P-47 |

## Almost Ready to Fly (ARF)

| | |
|---|---|
| Rick DeBastos | Stearman |
| Jim Feschak | AT-6 Texan |
| Frank Figurelli | Fulton 330 |
| Bob Scott | P-51 |
| Dave Vale | J-3 Cub |

## Old Timer

| | |
|---|---|
| Fred Doldy | Quaker |

## Non-Scale

| | |
|---|---|
| Bob Scott | Fokker DR-I |

The Scale class is usually the one that attracts the most attention, and with good reason. Scale builders often spend a couple of years researching and crafting their models and figuring out how to build a flying model that is, at least from the eye of the camera, indistinguishable from the real thing. Some achieve this best up close and personal on the ground while others achieve it more effectively in the air. But this year's Scale entries delighted observers for their realism from many perspectives. Jans Brower's Monocoupe cabin, for example. Or the simulated sheet metal on Tom Dyl's Corsair. Perhaps the cockpit detail of Mike Luciano's P-47, down to the pilot with oxygen mask under the sliding canopy. And at times, watching Bob Levanduski crawl under his Fokker D VIII, it was hard to remember it was just a model. The detail work combined with the large sizes of the scale entries often gave the feeling that you could almost climb into the cockpit and take one of these up. Contest Director Joe Raimondo commented that, "The degree of workmanship in the scale class was excellent, the best that I have seen!"

**Tom Dyl fine tunes the power plant of his Corsair prior to the flyoff.**

**Ten pilots entered eleven airplanes in this year's competition.**

**Contest Director Joe Raimondo keeps the records as Rick DeBastos prepares for his qualifying flight.**

**Fred Doldy holds his Quaker, the only entry in the Oldtimer category.**

**Mike Luciano's otherwise impressive P-47 experienced engine trouble and failed to qualify.**

**Jim Feszchak contemplates his AT-6 Texan.**

**Frank Figurelli starts his Fulton 330.**

The ARF category may not command the same kind of respect afforded the scale category because of the massive "head start" afforded these builders by the manufacturers. But that doesn't mean the final result will be any less impressive than their built-from-scratch counterparts. The overall impression provided by Rick DeBastos' Stearman with its meticulous cockpit detailing; the electrification of Dave Vale's Cub; the crisp realism of Bob Scott's P-51 and Jim Feszchak's AT-6; and the obviously attractive flyability of Frank Figurelli's 330; all made this most popular class interesting as well. While the ARF entries don't represent the same investment in time, or the same percentage of size as do the scale entries, the final result is often almost as impressive.

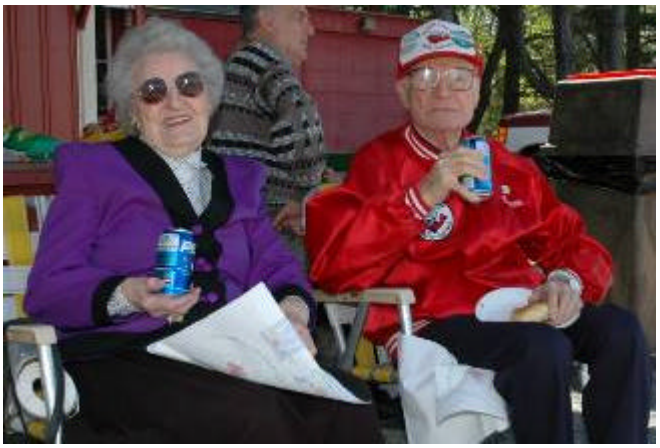
**Bob Scott displays his P-51. Although Bob's models were small, he compensated by entering two.**

**Bob Scott commands his non-scale sheet-foam Fokker DR-1 tri-plane to fly.**


**Stan Karczewski assists as Jans Brower prepares to start his Monocoupe.**

**Dave Vale dwarfs his giant scale Cub.**

**Bob Levanduski starts his Fokker D VII with the assistance of Jenny ace Keith Zimmerly.**



**No event would be complete without Helen McDonald, Warren Kruse, and a piece of Helen's cake.**

Fred Doldy nailed the Oldtimer class with his Quaker, the sole entry in that class. It's unfortunate that Fred had no competition in this class because his well-crafted model could certainly have withstood a serious challenge. Finally, Bob Scott provide the only entry in the non-scale class with his clearly recognizable but non-scale replica of the famous Fokker DR-1 tri-plane. Bob can work wonders with a few sheets of foam.

While the static judging is interesting, the real excitement in the building contest comes at the fly off, when these impressive-looking models have to demonstrate that they can really fly. This year, there was only a

week and a half between the judging and the fly off. Some airplanes were flight tested in that week; others were not.

**Jim Feszchak cooked hamburgers and hotdogs for the hungry flyers …**

**… who responded with levels of excitement ranging from energetic enthusiasm …**

**… to unbridled glee.**

On April 30th, the weather was perfect, starting the day at about sixty degrees with a mild wind almost straight down the runway. With a heavier wind predicted for later in the day, participants were eager to fly early and, after coffee and a quick donut, observers were treated to exciting demonstration flights, often the first time these airplanes had ever flown. Clearly, the big scale models held the most interest as they taxied out and roared down the runway on their maiden flights. Some flights were more exciting than others, Tom Dyl's demonstration of a missed approach perhaps offering the high point of the day.

But as the window for flight ended at 2:00, all entries but one had successfully completed their flight tests without mishap. Mike Luciano's P-47 was the only entry that failed to qualify, grounded because of engine trouble. Fortunately, the problem occurred on the ground and the airplane will fly another day. (But, following the strict rules of the contest, not as a competitor.)

After the flying, lunch was served. Armand Graziani and David Vale arranged for hamburgers, hot dogs, and charcoal grills. Jim Feszchak volunteered to cook them. And Helen McDonald supplied desert in the form of her famous chocolate cake.

All in all, it was a great contest and a great way to open the 2006 flying season at Warren Kruse Field. Joe Raimondo added, "I personally want to thank the judges Keith Zimmerly, Sal Lucania, Jim Meighan, Doug McMillan and David Vale for their efforts in judging the airplanes. Some of the scores between the judges were within one point of each other and in some cases, they were identical. I would expect them to be this close, considering that they had over 160 years of building experience between them." From Joe's perspective, the contest is over now. For the rest of us, it will end with the awards meeting in December when we learn who the winners are.

## Family Picnic Set For June 11th

The annual MCRCS family picnic will be held this year on Sunday, June 11th at Warren Kruse Field. This is a great opportunity to bring the whole family and have a great time flying, eating, and displaying the hobby to family and friends. The kitchen will be open and free food will be provided. Although the menu is uncertain, it is certain that no one will go away hungry.

The specific program for the day is undecided, as well, but there has been discussion of a Piper Cub all-up. And if more than one member shows up with a Zagi, a combat demonstration is virtually certain. In the event of bad weather, the picnic will be rescheduled for June 25th. (Note that this is one of the few club events that we can reschedule if the weather interferes.)

# Secrets of Spread Spectrum

**The gospel according to Mark Goresky as revealed to David Vale**

On February 23rd several members of MCRCS were treated to the first of the 2006 RC lectures sponsored by the Washington's Crossing RC club. Mathematician Mark Goresky, the featured lecturer, enlightened attendees on the theory of spread spectrum communications, a technology destined to change the shape of RC.

**Mathematician Mark Goresky is an avid electric flyer.**

Every discussion of the theory of spread spectrum, it seems, begins with the story of Hedy Lamar. Ms. Lamar, legendary glamour icon of the early twentieth century, former erotic film star, and ex-wife of an Austrian arms dealer, invented the first spread spectrum algorithm while playing a duet on the piano with her neighbor, Trenton native George Antheil. Pondering her ex-husband's difficulties with remotely controlled torpedoes (and now on the side of the U.S.), she hit on the idea of encoding the directional information in the notes and spaces of a song while varying the frequency according to a predetermined tune. She and Antheil patented the concept, in which the tune was represented (literally) as a piano roll.

One of the first secrets revealed in Mark's presentation was that spread spectrum technology, at least as implemented in current RC equipment, has absolutely nothing to do with Ms. Lamar's idea of frequency-hopping. The frequency-hopping algorithm literally bounces the carrier frequency around the frequency spectrum, thus spreading it out; it is used in some current technologies, Bluetooth being a notable example. But the equipment we're likely to use in RC is based on the CDMA (Code Division Multiple Access) method; the fact that CDMA spreads the spectrum is entirely an artifact of its technique of modulating the carrier wave.

So start by forgetting everything you can recall or can imagine about frequency hopping. Then think of a package of binary information, encoded as a string of zeroes and ones. These binary elements of information, or bits, are represented by switching the carrier on or off according to a predetermined schedule. Say, for example, we've agreed to sample the carrier every millionth of a second. So the transmitter switches the carrier on for every time slice in which it wants to transmit a one and off in the event it wants to communicate a zero. Such switching the carrier on and off is akin to amplitude modulation (AM), common in inexpensive RC systems, but modulates the amplitude of the carrier signal to an extreme, ensuring that it is either fully on or fully off. (In reality, the carrier isn't simply switched on and off like this, but rather is phase-shift modulated to prevent large blank spots in the signal, which would look very similar to signal loss. The on/off modulation remains a good conceptual crutch, however, for those of us with limited electrical engineering background.)

Now an odd thing happens when you modulate a carrier frequency. While the carrier itself is a rather pure signal representing but a point on the frequency spectrum, a modulated carrier has "sidebands" that spread out from the carrier in either direction an amount equivalent to the frequency of modulation. Switching the carrier on and off, as we're doing, is equivalent to modulating it with what are called "square waves", square-shaped waves (on an oscilloscope) that are effectively made up of the dominant frequency of modulation (how often we switch the carrier on and off) and every multiple of that frequency out to infinity (in decreasing amplitudes, of course). The effect of this is to make the spectrum of the frequency of the signal really wide. They could have called this "sloppy carrier" technology, but spread spectrum sounds a lot better.

That was the first step. Of course it wouldn't be very interesting if all CDMA did was communicate binary information with a sloppy signal. It gets interesting when we realize that we can eliminate interference by sending redundant binary information. We start by giving each transmitter a signature, a sequence of bits uniquely its own. Let's say the signature is 32 bits long. If the receiver watches the incoming bit stream, bit by bit, and remembers the last 32 bits received, it can recognize it has received a communiqué from its transmitter each time the 32 bits it received match the transmitter's signature. That would be a one. And if the bit pattern represents the complement of the signature (that is, every single bit is wrong), that would be a zero. Everything else would be noise.

This idea can be improved upon by adding a discrimination feature that recognizes patterns close to the signature (say 30 of the 32 bits are right—or wrong). Then we can tolerate some interference. Add a method of digital error correction (for the rare occasions we guess wrong about a bit) and the result is a clean binary signal that can be used to translate control positions to an airplane (or a torpedo). That's the theory of spread spectrum. It's a new method of transmitting a digital package of information. Producing and using the digital package are unchanged from how it is done currently in our PCM digital proportional radios.

A few interesting facts may clarify some other features of the technology. The dominant modulation frequency in the Spektrum RC system offered by Horizon Hobbies is about 1 MHz, with harmonics spreading far beyond that. To support this modulation frequency, a broad range around a high frequency is required. The unregulated 2.4 GHz range (a range shared with your microwave oven) was ideal. The 2.4 GHz signal is highly directional, meaning that if your transmitter antenna is oriented perpendicular to the receiver antenna, the signal will vanish. Thus, the Spektrum system uses two receivers with antennas at right angles to one another. The Spektrum system divides its frequency spectrum into eighty channels and picks two idle ones for communication. In order to identify these channels, the transmitter is also a receiver. Since it can receive as well as transmit, expect telemetry information to be available in the future so you can read the altitude and speed of your aircraft from your transmitter. (This is already available in Spektrum's surface systems.)

So how did Mark become such an expert in Spread Spectrum? It turns out that those 32-bit signature codes are not just any set of 32-bit codes you might pull out of the air. Some work better than others. Although there are 4.2 billion possible 32-bit codes, only 33 of them are flawless in allowing a receiver to distinguish among several transmitters on the same frequency. Among the remaining codes, some work better than others. The problem of identifying the ones that work well is solved by a branch of mathematics in which Mark specializes. As he put it, commenting on spread spectrum, "It's a fascinating subject, certainly one of the many miracles of modern science. For me it's especially exciting because some very modern, abstract and interesting mathematics is used in finding these spreading codes. The mathematics was not developed with these applications in mind, and if you asked the people who worked on the math, they would almost certainly have said, 'No possible application. Not now, not in the future.' Who would have guessed?"

Mark Goresky provided an extremely interesting presentation, of which only the highlights are presented here. For more detail, see his slides in PDF form on his web site at www.markgoresky.org. In addition to a number of otherwise revealing charts and tables, you will also find a revealing picture of what I took to be Ms. Lamar. Nude. In conversation with Mark, I learned that this picture may not have been of Ms. Lamar. But judge for yourself.

## Jumbo Jamboree is Memorial Day Weekend, May 27th and 28th

The MCRCS will host its annual Jumbo Jamboree at the club field on Saturday and Sunday of Memorial Day weekend later this month. The Jamboree, jointly sanctioned by the AMA the IMAA, will be open to large scale aircraft meeting the IMAA size and safety requirements. This year we should expect to see some large scale airplanes fresh from the Building Contest, including Jans Brower's Monocoupe, Tom Dyl's Corsair, Mike Luciano's P-47, Rick DeBastos' Stearman, and Bob Levanduski's Fokker. And there will be the perennial crowd pleasers from the past, which will undoubtedly include something big from Keith Zimmerly.

The Jumbo Jamboree is not limited to club members, but rather has quite a wide draw of modelers from several states. It is also a spectator event. Anyone with even a casual interest in scale aircraft will be thrilled by the sights and sounds of military and civilian aircraft from the previous century of flight as the airplanes go thundering past. So invite your family and friends to make a day or two of it. As always, admission is free.

The MCRCS kitchen continues to provide some of the best food in the hobby. Coffee will be available as early as 7:30 and breakfast will be served at 8:00, including standards such as pancakes and sausage and egg sandwiches. Lunch will start about 11:30 and will include the hamburgers, hotdogs, chicken-burgers, sausage sandwiches (with onions and peppers, of course), Bar-B-Q sandwiches, and French fries. All profits from the food and raffles will go toward the club's 2007 contribution to the Sunshine Foundation.

Friday, May 26th is set-up day for the event. If you are available to help that day, your assistance will be appreciated. Setup begins about 9:00 and should be done with some daylight left for a bit of flying (about noon).

Other than the flight line, probably the most exciting place to be is in the kitchen. If you would like to join the talented chefs on the kitchen team, contact David Vale at 609-430-9635 or cdavidvale@gmail.com.

## For Sale

GWS "SLOW STICK" with upgraded brushless motor, gear drive, Castle Creation Phoenix 10, two Blue Bird micro servos. Total list $169. SALE $125 Bob Bennett: 732-462-4893.

## Upcoming Events

### May

3rd Meeting at WWL
17th Meeting at WWL
26th Setup for Jumbo Jamboree
27th-28th Jumbo Jamboree

### June

7th Meeting at WWL
11th Family picnic at Warren Kruse Field
21st Meeting at WWL

### July

5th Meeting at WWL
19th Meeting at WWL

## *Club Information*

The Mercer County Radio Control Society is a New Jersey-based AMA Chartered Gold Leader Club. Its field is in Assunpink Wildlife Management Area off Exit 11 of Hwy 195. It meets at the West Windsor Branch of the Mercer County Public Library on the first and third Wednesday of each month at 8:00 PM. The club publishes this newsletter for members approximately six times a year and operates a web site at www.mcrcs.com. This newsletter is available, in color, on the web site.

### Officers

President: Doug McMillan
VP, Membership: Sal Lucania
VP, Events: Armand Graziani
Secretary: James Feszchak
Treasurer: Jans Brower

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