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# The AMA History Project Presents: Biography of MAYNARD L. HILL

February 21, 1926 – June 7, 2011

Began modeling in 1935

AMA #14



Written by MH (02/1997, c.2000s), JEP (03/1977), MA staff (04/1978); Transcribed and Edited by SS (07/2002), updated by JS (10/2007, 01/2009, 06/2011), Reformatted by JS (09/2009)

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**Birthplace:** Lehigh, Pennsylvania

**Education:**

- Lehigh High School – 1943
- U.S. Navy Aviation Storekeeper – 1943-1946
- B.S. Metallurgy – Penn State – 1950
- M.S. Metallurgy – Penn State – 1951

**Professional Career:**

- Westinghouse Research Laboratory – 1951-1960 - Specialist in gases in metals
- Johns Hopkins Applied Physics Laboratory – 1960-1986 - Specialist in high temperature materials till 1970, then program manager of research into unmanned air vehicles
- H-Cubed Corporation, president – 1986-1992 - UAV research, design and development
- Published 50 articles in Journals – 1952-1992

**Aeromodeling Career:**

- Served as president of various model airplane clubs including the Pittsburgh Flying Circuits Club, the Monroeville Model Flyers Club and the District of Columbia Radio Control Club
- Late 1950s-early 1960s: Served as a member of the FAI Team Selection Committee
- 1960: Placed fifth with Radio Control in the Nationals
- 1962-1963: Vice President of AMA District IV
- 1963: Wrote the AMA Radio Control judges' guide and continued to write Radio Control judges' guides
- 1964: President of the AMA
- 1965-1972: Coordinated FAI Free Flight, Control Line and Radio Control programs within the AMA
- 1965-1973: U.S. delegate to CIAM Fédération Aéronautique Internationale
- From 1965 to the present (1997), served as a government adviser on practical problems of employing Radio Control airplanes for research
- 1967-1969: Radio Control Editor of *Flying Models* magazine
- 1968: Directed first International Judges Training School in Hirzenheim, Germany
- 1970: Served as CIAM Secretary
- 1971: Contest manager for the Radio Control World Championships in Doylestown, Pennsylvania
- Set numerous world records in Radio Control including speed, distance and altitude records

- 1978-1980: Served as a Distinguished Lecturer for the American Institute of Astronautics and Aeronautics

**Honors:**

- 1966: AMA Fellow
- 1968: AMA Distinguished Service Award for International Judges' Training
- 1970: National Aeronautics Association Meritorious Award
- 1973: AMA Distinguished Service Award for Autopilot work
- 1973: Vintage Radio Controlled Society Hall of Fame
- 1973: Howard McEntee Award
- 1977: Model Aviation Hall of Fame
- 2004: John Zaic Memorial Award

*The following was written by Maynard Hill in 1997.*

**Résumé of Aeromodeling Activities of Maynard L. Hill**

**Birth Date:** February 21, 1926, Lehighton, Pennsylvania

**Education:** B.S. Metallurgy, 1950, M.S. Metallurgy, 1952, Pennsylvania State University.  
Aviation storekeeper 3c., U.S. Navy 1943 to 1946

**Academy of Model Aeronautics Activities**

1952 – 1956	Organized early symposiums on Radio Control at Selinsgrove, Penn.
1953	President, Pittsburgh Flying Circuits Club
1957 – 1958	President, Monroeville Model Flyers Club
1959	Chairman, FAI Team Selection Committee
1961, 1963	Member, FAI Team Selection Committee
1962 – 1963	Vice President, District IV, AMA
1963	Wrote AMA Radio Control Judges' Guide
1963	President, District of Columbia Radio Control Club
1964	President, AMA
1965	Chairman, AMA District of Columbia Radio Control Club Technical Symposium on Radio Control
1965 – 1972	Coordinator of FAI Free Flight, Control Line and Radio Control programs within AMA
1966	Director of AMA's FAI Radio Control Team Selection Competition
1968	Assistant Director, Radio Control National Competition
1968	Chairman, AMA-DCRC Technical Symposium on Radio Control
1962 – 1968	Directed DCR meets 1962, 1965, 1967 and 1968
1965 – 1973	U.S. Delegate to CIAM Fédération Aéronautique Internationale

## **Fédération Aéronautique Internationale, Aeromodeling Committee Activities**

1962	Chief Judge, Radio Control WC, Kenley, England
1965	Member, Radio Control Subcommittee
1966 – 1971	Chairman, Radio Control Subcommittee
1966	Prepared new draft of FAI Radio Control Judges' Guide
1967	Chief Judge Radio Control WC, Corsica, France
1967	Rewrote sections 5 and 6 of Sporting Code with R. Czerny
1968	Directed first International Judges Training School in Hirzenheim, Germany
1968	Prepared reports (German and English) on studies of two line systems for Radio Control WC
1968	Prepared report on results of Hirzenheim Judges School
1969	Prepared new draft of Radio Control Judges' Guide
1969	Jury member and judges trainer at Radio Control World Championships, Bremen, Germany
1970	Secretary of CIAM
1971	Contest manager for 1971 Radio Control World Championships, Doylestown, Penn.
1971	Judge Trainer 1971 Radio Control WC, Doylestown, Penn.
1973	Chief Judge, Radio Control World Championships, Gorizia, Italy

### **Honors**

1965	AMA Fellowship
1967	Buffalo Bisons V.I.P. Award
1967	Paul F. Tissandier Award, FAI
1969	LARKS Club Service Award
1969	AMA Distinguished Service Award for International Judges Training
1970	National Aeronautics Association Meritorious Award
1972	H.G. McEntee Medal
1973	AMA Distinguished Service Award for Autopilot work
1977	Elected to the Model Aviation Hall of Fame
2003	National Aeronautics Association Achievement Award
2003	National Aeronautics Association World Record Award
2003	Aviation Week & Space Technology – Laureate Award for 2003
2003	AMA President's Medal

### **Aeromodeling Activities**

Started aeromodeling in 1935

Started Radio Control aeromodeling in 1948

Flew aerobatic Radio Control from 1952 to 1963; placed fifth in the 1960 Nationals

## Established the Following World Records for Radio Control

<b>Date</b>	<b>Type</b>	<b>Record Set</b>
July 5, 1963	Power	Altitude: 13,328 feet
September 8, 1964	Power	Duration: 8 hours, 52 minutes
September 5, 1964	Glider	Speed: 28 mph, with R.B. Givens
June 2, 1965	Power	Closed Course Distance: 184 miles
October 2, 1965	Power	Cross Country Distance: 189 miles
June 28, 1966	Power	Speed: 142 mph
July 26, 1966	Glider	Altitude: 3,660 feet
May 18, 1967	Power	Seaplane Closed Course Distance: 48 km
September 5, 1967	Power	Altitude: 19,650 feet
September 4, 1967	Power	Seaplane Altitude: 18,900 feet
June 1, 1969	Power	Duration: 11 hours, 32 minutes
September 6, 1969	Power	Altitude: 22,800 feet
September 3, 1970	Power	Altitude: 26,990 feet
September 21, 1981	Power	Duration: 20 hours, 0 minutes, 15 seconds
July 4, 1983	Power	Closed Course Distance: 765 km
September 28, 1983	Power	Cross Country Distance: 283 miles
November 28, 1984	Power	Closed Course Speed: 150.9 mph
June 3 – 4, 1969	Power	Duration: 24 hours, 4 minutes, 15 seconds
October 1 – 3, 1992	Power	Duration: 33 hours, 39 minutes, 15 seconds
September 3, 1994	Power	Cross Country Distance: 329 miles with R. Rosenthal
June 26, 1995	Power	Closed Course Distance: 1,250 km with R. Rosenthal
August 29, 1995	Power	Cross Country Distance: 458 miles with R. Rosenthal
August 26, 1999	Power	Closed Course Distance: 1,301 km with M. Scott Hill
August 11, 2003	Power	Distance in a Straight Line: 1,882 miles with Dave Brown, Joe Foster
August 11, 2003	Power	Duration: 38 hours, 52 minutes, 14 seconds with Dave Brown, Joe Foster

### Technical Contributions (see also list of publications)

1950 – 1951	Early experiments on motor-driven escapement servos
1957 – 1958	Coupled rudder and aileron control system development
1964	Developed special glow plugs for catalytic ignition of gasoline-based fuels in model engines
1965	Electric-powered winch for launching gliders
1965	Lightweight Barograph (6 oz.) for Radio Control gliders
1965	Telemetry thermal sensor, Mod I
1967	Telemetry thermal sensor with response proportional to lift and sink (with R.B. Givens)
1968	Studied and reported creep properties of Monokote covering at elevated temperatures

1968	High stiffness wing construction of foam fiberglass balsa sandwich
1969	Developed a radio plane for meteorological studies of Clear Air Turbulence
1965 – Present	Served as an adviser to government agencies on practical problems of employing Radio Control airplanes for research
1969	Developed capacitor discharge system with auxiliary generator for spark ignition of model engines
1969	Automatic temperature control of receivers in cold climate conditions
1969	Adapted Beam YGI antenna to Radio Control transmitter (with R.B. Givens); used for 26,900 foot altitude record
1970	Developed low cost fuels based on gasoline, alcohol and Klotz oil
1967 – 1969	Radio Control editor of Flying Models magazine; published many technical articles on aerodynamics, engines, Radio Control systems, flutter, structures, etc.
1972	Invented Electrostatic Autopilot
1978 – 1980	Served as a Distinguished Lecturer for the American Institute of Astronautics and Aeronautics; lectured nationwide to AIAA chapters on subject of aeromodeling world records
1993	Donated five record-holding aero models to the AMA museum with accompanying technical descriptions

## Published Aeromodeling Articles

MA = Model Airplane News magazine

FM = Flying Models magazine

MA = Model Aviation magazine

RCM = Radio Control Modeler magazine

### 1. “Plans for Future Radio Control Nats”

*MA, January 1964, p. 24, Vol. LXIX, No. 1*

A discussion of how to run four flight lines at the Nats with no conflicts in frequencies and judging.

### 2. “Beat the Russians or Bust – Part I”

*MA, July 1965, p. 28, Vol. LXXII*

### 3. “Beat the Russians or Bust – Part II”

*MA, August 1965, p. 25, Vol. LXXII*

This lengthy article discusses a duration world records of 8 hours and 52 minutes set on September 18, 1964. Trade-offs about diesels, glow and spark ignition are explained. Tank systems, special glow plugs, fuel consumption measurements, reason for five failures and description of successful flights are included.

### 4. “Old Faithful, World Endurance Recon Radio Plane”

*Applied Physics Laboratory Technical Digest, Vol. 4, No. 5, May/June 1965*

This is a condensed version of the technical information in references two and three.

### **5. “Thermal Seeker”**

*MA, January 1966, p. 14, Vol. LXXIII, No. 1*

Describes a way to make a very sensitive pressure switch from a condom and how to telemeter tones to the ground to detect when gliders are in thermals. Device was used to start a Radio Control glider altitude record with Bong Boomer (see reference seven).

### **6. “Shuffle Off to Buffalo”**

*MA, February 1966, p. 30, Vol. LXXIII, No. 2*

Describes setting a cross-country Radio Control distance records of 295.5 km flying across New York State on the New York throughway. Safety aspects are discussed, along with technical data on fuel, airplane, and Radio Control equipment.

### **7. “Bong-Boomer, Altitude Record Setter”**

*FM, February 1967, p. 9, No. 360*

Construction article and description of the soaring glider that set an altitude record of 3,660 feet on July 6, 1966 at Bong Air Force Base.

### **8. “Maynard Hill’s Barograph Recording Altimeter”**

*FM, March 1967, p. 16, No. 361*

Describes construction and calibration of a lightweight barograph used to record altitude during record flight of Bong Boomer (see reference seven).

### **9. “Duel in the Sun”**

*FM, January 1968, p. 12*

Describes altitude record trial September 4 and 5, 1967 during which altitude records of 8,900 feet and 18,960 feet for seaplane, and records of 18,900 feet and 19,600 feet for land planes were set by Hill. The 19,960 feet flight was made with a wing that had badly crushed ribs on one side, good solid ribs on the other, yet the model flew perfectly.

### **10. “Air to Ground Thermal Sensor” (with R.B. Givens)**

*FM, March 1969, p. 20, No. 384*

Describes how to construct a thermal sensor using bi-directional flow thermistor sensor; later made by Ace as a Thermal Sniffer.

### **11. “A 200 Milliwatt Hi Fli System”**

*FM, December 1969, No. 393*

Altitude record flight to 22,800 feet set September 16, 1969. Describes coupling hand-held transmitter to a yagi antenna.

### **12. “Eleven and a Half Hours of Exciting Boredom”**

*FM, September 1969, p. 6, No. 390*

An interesting commentary on a duration record of 11-1/2 hours set June 1, 1969. Lots of technical detail about spark system, alternator for power, fuel mixtures to prevent carbon build-up, effect of sloppy linkages on battery drain and others.

### **13. “27,000 Feet in Catbird Country”**

*FM, January 1971, p. 18, No. 406*

Description of model and technique for establishing a Radio Control altitude record of 26,980 feet.

**14. “Introducing Electrostatic Auto Pilots”**

*AIAA Astronautic Journal of Aeronautics, Vol. 10, No. 11, November 1972, p. 22*

A technical article describing the inventors of a method of stabilizing aircraft using sensors that detect the attitude with respect to an electric field in the atmosphere.

**15. “Electrostatic Autopilots”**

*FM, February 1973, p. 20, No 431*

An article similar to number 14 above that includes circuit diagrams and construction notes.

**16. “There She Goes! Speed Record Trials”**

*MA, April 1977, Vol. 2, No. 12, p. 2*

A description of airplanes and techniques used at a record trial for Radio Control speed records in Houston, Texas. A speed of 203 mph was measured.

**17. “Twenty Hours Non Stop”**

*MA, July 1982, Vol. 8, No. 7, p. 78*

A duration Radio Control record of 20 hours, 0 minutes and 51 seconds was September 22, 1981. Night flying is discussed, an alternator provided power for sensor, receiver light, and a small telemetry transmitter reported that volts and amps were correct. Engine was a four-stroke fitted with magnetic speed ignition, constructors drawing one included.

**18. “Designing a Mini RPV for a World Endurance Record”**

*AIAA Astronautic and Aeronautics, November 1982, Vol. 20, No. 11, p. 47*

A technical condensation of reference 17 with addition of uses of duration technology in remote piloted vehicle.

**19. “World Endurance Record for Radio Controlled Aeromodels”**

*Johns Hopkins Applied Physics Laboratory Technical Digest, Vol. 3, No. 1, 1982, p. 81*

Essentially the same information on modeling as in number 17 and 18 above, but with additional relevance to remotely piloted vehicles.

**20. “Fourth of July Picnic”**

*MA, March 1984, Vol. 10, p. 58, No. 3*

Technical and practical problem of setting a closed course distance record of 765 kilometers on July 4, 1983. Long duration at substantial speed was a big challenge. Laminar flow airfoil had some good, some bad characteristics. Electrostatic autopilot helped until thunderstorms came by. Four-stroke engine with capacitance-discharge spark system used gasoline-based fuel for economy.

**21. “A Closed Course Distance Records for Powered Radio Control Aeromodels”**

*Johns Hopkins Applied Physics Laboratory Technical Digest, Vol. 5, No. 2, 1984*

An article very similar to the article mentioned in reference number 20.

**22. “Electrostatic Autopilots”**

*Johns Hopkins Applied Technical Digest, Vol. 5, No. 2, 1984*

This article describes the basic theories behind the method of stabilization first proposed in 1972 in reference 14 and reports on experiments and knowledge gained during a decade of experimentation on aeromodels and remotely piloted vehicles. Limitations caused by weather are discussed along with possible application of their technology to thunderstorm research.

**23. “A New World Record of 283 Miles Cross Country Distance of Radio Control Aeromodels”**

*Radio Control Modular, Oct. 1984, Vol. 24, No. 10, p. 136*

A specialized model was launched at Green Castle, Pennsylvania and flown through Maryland, West Virginia, and Virginia to Mountain Empire Airport in Marion, Virginia. The model was flown along side and above a convertible traveling at 50-70 mph on Interstate Route 81, which traverses several mountains in the Allegheny chain. Engine, propeller, fuel system and fuel composition are described as are carburetor and filter problems.

**24. “Electrostatic Stabilizers, World Records, and What Happens When Your Hobby Becomes Your Job”**

*Conference Proceedings, Madison Area Radio Control Society National Sailplane Symposium, November 1 – 2, 1986, Madison, Wisconsin*

This paper is a meandering discussion, with jokes, about how you can ruin your hobby by trying to use it to work for military minds.

**25. “Electrical Disturbance Near Thunderstorms Observed by Means of Small Remotely Piloted Vehicles Stabilized with Respect to the Local Field Vector”**

*Proceedings of the Seventh International Conference on Atmospheric Electricity, State University of New York at Albany, June 19, 1982*

A discussion of theory of electrostatic stabilization and the behavior of aeromodels so stabilized when near thunderstorms, mountains and in fair weather.

**26. “A Radio Controlled Glider with Zero Sinking Speed”**

*Conference Proceedings, MARCS 8<sup>th</sup> National Soaring Symposium, October 25, 1993, Madison, p. 81*

This is a description of a powered airplane that set a world record for Radio Control duration of 24 hours, four minutes on June 3 – 4, 1992 and a record of 33 hours, 39 minutes and 15 seconds on October 1 – 3, 1992.

**27. “One Whole Day and Then Some”**

*MA, Vol. 20, No. 7, July 1994*

A description of Old Faithful model that set a world duration Radio Control record of 24 hours in June 1992 and 33-2/3 hours October 1 – 3, 1992.

**28. “329 Mile Cross Country”**

*RCM, Vol. 32, No. 6, June 1995, p. 12*



Description of Stretcher, a Radio Control model, and its record flight on Interstate Route 81 from Harrisburg, Pennsylvania through Maryland, West Virginia, and Virginia, to Mountain Empire Airport near Wytheville, Virginia.

**29. "Racing Against Sunset"**

*MA, Vol. 25, No. 10, December 1999, p.58*

Description of Marvelous Martha and 1301 Km closed course distance record.

**30. "Two Sunsets and Still Flying"**

*MA, Vol. 30, Winter, January 2004, p.18*

Description and history of Hill's records and TAM-5 project that led to the first model airplane flight across the Atlantic Ocean in August 2003.

**31. "Record Setting Transatlantic Flight" (with Rick Bell)**

*MAN, Vol. 132, No. 1, January 2004, p.84*

Technical description of TAM-5 model that crossed the Atlantic Ocean, non-stop, August 9-10-11, 2003.

**32. "A 6-Meter Rig Flies the Atlantic"**

*CQ/VHF Magazine, Vol. 6, No. 4, Winter issue, p.6*

A description of early radio-control equipment along with a discussion of amateur radio's role in the transatlantic flight of TAM-5 in August 2003.

*(Signed) Maynard L. Hill  
February 14, 1997*

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*John E. Patton, past AMA President, submitted the following letter when he submitted an application on behalf of Maynard Hill for Hill to be inducted to the Model Aviation Hall of Fame. Hill was inducted into the Hall of Fame as the result of the application.*

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John E. Patton, AMA 17  
Rt. 5, Box 439  
Frederick, Maryland 21701

March 22, 1977

Hall of Fame Committee  
Academy of Model Aeronautics  
806 15<sup>th</sup> Street N.W.  
Washington, D.C. 20005

Gentlemen:

I am privileged to nominate Mr. Maynard L. Hill as a candidate for the Model Aviation Hall of Fame.

As stated in the precepts, the general criterion for eligibility of an individual for this honor is the “total contributions of the candidate over the years which would improve the hobby and increase its prestige and stature.” I believe there is no other person who can equal the total contributions made by Maynard Hill toward improving our hobby and increasing its prestige and stature.

The attached résumé lists many of Maynard’s accomplishments and honors. One needs only to read this impressive list to understand that here is a man who for 25 years has, many times over, more than fulfilled the requirements to be elected to our Hall of Fame.

Thirteen world records, each one requiring weeks and even months of preparation to a successful final completion, resulting in 13 times the United States of America, the Academy of Model Aeronautics and Maynard Hill being recognized at the world level for outstanding accomplishment.

Maynard’s 15 years of working in various responsibilities in the FAI means that among aeromodelers in most countries in the world, he is well known and respected for his knowledge and abilities.

Maynard’s technical contributions have done much to advance the state of our hobby while his ability as a writer and a public speaker has made it convenient to share his accomplishments with others for the benefit of our hobby at all levels.

His invention of the electrostatic autopilot along with developments in the field of RPVs and the related publicity in nationally recognized scientific journals has done much to raise the status of aeromodeling above the pure hobby or sport category, while his 11 years as an adviser to various federal government agencies, in aeromodeling related fields, has done much the same thing among military and government departments.

As can be seen in the attached résumé, by the honors already bestowed, many others have already recognized the outstanding achievements of Maynard Hill. I believe we are overdue in electing him to our highest honor.

Maynard is a very talented and knowledgeable person whose many outstanding contributions have done much to improve our hobby. He has earned and deserves the honor of being elected into the Model Aviation Hall of Fame now.

Respectfully Submitted,

John E. Patton

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*The following is from the April 1978 issue of Model Aviation magazine, page 60.*

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Maynard L. Hill has been an internationally known aeromodeler for more than 25 years. He is a past president of the DC/RC, the Pittsburgh Flying Circuits, and the Monroeville (PA) MAC. He served as AMA President in 1964.

Maynard's service to aeromodeling included 15 years' work in many responsibilities in the Federation Aeronautique Internationale, including chair of the Radio Control Subcommittee, chief instructor for Radio Control judging (including authorship of the FAI Judges Guide) and Contest Manager of the 1971 Radio Control Aerobatic World Championships in Doylestown, Pennsylvania. He also served as Assistant Radio Control Director at the 1968 National Championships.

Hill's technical contributions are too extensive to describe adequately in this space. They include research and development in control systems, model structures, fields, glow plugs, thermal sensors, antennae, aerodynamics and model use for meteorological studies. He is recently famous for the invention of an electrostatic autopilot for both model and full-scale aviation.

His honors include an AMA Fellowship, FAI awards, numerous AMA club tributes, and the AMA Distinguished Service Award.

As a writer, Hill has been published extensively in the model press. *Popular Mechanics*, *Popular Science* and many technical and scholarly journals as a result of his work with the Johns Hopkins University Applied Physics Laboratory where he is the metallurgist and specialist in remotely piloted vehicles. In addition to Maynard's technical contributions, which have done much to advance the state of our hobby, his ability as a writer and a public speaker have contributed to the sharing of his accomplishments with others for the benefit of model aviation at all levels.

Hill is probably best known for the many world records he holds. Each one required weeks and even months of preparation, adding up to 13 times that the United States, the AMA, and Maynard Hill have been recognized at the world level for outstanding accomplishment. The record flights were in many categories of radio control, altitude (over 20,000 feet!), speed, duration, distance; powered and glider, land and seaplanes.

His invention of the electrostatic autopilot, along with other developments in the field of RPVs (Remotely Piloted Vehicles) in nationally recognized scientific journals has done much to raise the status of model aviation among military, government, and civilian aeronautical agencies.

Maynard Hill has made it easier for all modelers to fly. His efforts have resulted in a good public image for aeromodeling, which has received extensive and favorable publicity. It has been good for him and for the activity as a whole. He fits comfortably in the Hall of Fame and is qualified many times over.

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*The following is Maynard Hill's autobiography, also published as a Model Aviation Online exclusive in the early 2000s.*

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**“Two Sunsets & Still Flying”  
By Maynard Hill**

I was born into the Golden Age of Aviation in 1926. By age 4, I understood that Charles Lindbergh had done a miraculous thing, flying alone across the Atlantic Ocean. During the 1930s, one-eyed Wiley Post was famous for setting altitude and speed records while wearing a pressure helmet that looked like the top of a hot-water heater. Amelia Earhart flew alone across the north Atlantic, and her smile was seen on many newsreels.

Jimmy Doolittle flew fantastic speeds in seaplane biplanes. Howard Hughes built a super speedster and was hugged and kissed by movie stars after setting a boomer of a record. Smilin' Jack was a famous comic-strip pilot who saved damsels in distress and brought bad guys to justice by performing astonishing flying feats. All were heroes!

As were many boys of the decade, I had my mind on model airplanes more than girls did. The thrill of launching a black-and-yellow tissue-covered rubber-powered model of a Corben Baby Ace was enormous! Red-and-white Rearwin Speedsters and all-yellow Piper Cubs were even better. You learned something new or acquired a skill with each model. Success was not always easy; patience and persistence were among the valuable lessons.

By age 9, I had acquired a fairly serious addiction to balsa wood and glue. The habit stuck all through high school and two-and-a-half years in the Navy. By the time I entered college at Penn State, the habit was so severe that I had trouble bringing it under control, even during final-exam week.

What is worse was that I was sharing a dormitory room with Warren "Bud" Yenney, whose lust for balsa and glue was almost equal to mine. Glider wings hung on all of the walls, bookcases were places to store fuselages, balsa, building boards stood tall in the corner, and the floor was often sprinkled with balsa shavings. We locked our door on "Cleaning Lady Day" to keep her from ruining our delightful mess.

Bud Yenney had the audacity to pursue almost any idea that came to him. He had heard of a man named Walter Good, who flew a Radio Control model before World War II. Bud telephoned Walt and asked for a chance to talk to him. In mid-February 1947, I was the passenger in Bud's unreliable 1937 Ford that was pushing hard in a blinding snowstorm to go through the mountains out of State College to Silver Spring, Maryland.

Walt and his wife Joyce welcomed two semi-frozen students to the warmth of their home and hearts. Steaks and apple pie were followed by furious Radio Control talk well past Walt's normal bedtime. Warm beds were followed by a nearly all-day session Saturday. This was the start of a long and wonderful friendship that has been one of the biggest joys of my mostly joyful life.

During the mid-1950s, Walt patiently helped me figure out how to make his single-channel "three-tube" then build his five-tube dual proportional control system. Walt called the system two-tone plus width, which soon became TTPW. California modelers were deep into "bang-bang" reed control, and they declared that TTPW meant "too tough to piddle with."

I was what you might call “illiterate” in the field of electronics. Nevertheless, via telephone calls and treks to Walt and Joyce’s house, after two years of asking dumb questions about mysterious selenium diodes, etc., I got the thing working in the spring of 1957.

By the summer of 1959, I was a virtual hotrod with an original-design mid-wing model called the Pittsburgh Pointer. With it I could fly a pylon course upside-down and do Outside Loops and Cuban 8’s that were smooth, free of the jerk-jerk-jerk often seen in reed-controlled models.

Californian Bob Dunham with his Smog Hog and Midwesterner Ed Kasmirski with his Orion had high-speed thumb-twitching skills, so they flew smoothly and accurately enough to win places on the US team to compete in the first Fédération Aéronautique Internationale (FAI) Radio Control World Championships in Zurich, Switzerland, in 1960. I came within inches of being the third team member.

Team members were picked based on points scored in regional contests, with the Nationals (Nats) as final input. In the east I was narrowly ahead of Harold (Hal) deBolt all during 1958 and the summer of 1959. At the Nats in Los Alamitos, California, my Pittsburgh Pointer rolled 10 inches outside the lime-lined landing circle and scratched off points that otherwise would have been awarded for a “greasy” landing.

Hal deBolt came in fourth and I came in fifth, so he was the third team member. Walt Good was to be the team manager. I regretted my failure at the time, but several years later, I looked at it as a blessing.

In 1960, I left my job at the research laboratories of Westinghouse Corporation in Pittsburgh, Pennsylvania, and took a job at the Applied Physics Laboratory (APL) of Johns Hopkins University in Silver Spring, Maryland. I had grown tired of “basic research” that didn’t seem to be going anywhere useful and I liked the word “applied.”

I do not deny that my friendship with Walt Good influenced the decision. We spent many lively lunch hours talking Radio Control, and we had many sessions on the flying field.

In 1962, Walt pulled some strings with the organizers of the forthcoming second World Championships for Aerobatics. I had written the first Radio Control judges’ guide for AMA, and Walt pointed out that I would make a good chief judge at Kenley Aerodrome, England.

More than 20 years earlier Kenley airfield had housed hundreds of Royal Air Force (RAF) pilots and swarms of Spitfires and Hurricanes at the ready to fight against Luftwaffe bombers during the Battle of Britain. Although that battle was won and past, there was still a military presence; in 1962 the Cold War with the Soviet Union was hot.

The Soviet Union sent a team of modelers to the contest. They were a bit standoffish and reluctant to allow their models to be examined. I was shocked by what I saw from my privileged position as judge.

The Soviet modelers could not purchase smooth-cut balsa in a hobby shop. Their propellers were hand-carved, some capacitors were homemade from waxed paper and aluminum foil, and at least one control transmitter was an olive-drab box with “RCA” embossed on it because it had been shipped by the United States according to the Lend-Lease Act during the war. Clearly, the model-airplane hobby was not part of the “Five Year Plan.”

The contrast with other countries’ models and equipment was astonishing. Tom Brett’s sleek navy-blue-and-gold low-wing Perigee won for the United States and the British team finished first in the team competition with lots of flashy red, white, and blue. All of these models were colorful beauties. All of the pilots had handheld transmitters. The Soviet team, with their dull black-and-white shoulder-wingers and ground-based recycled transmitters came in last.

A blatant anomaly hit me hard. Soviet competitor Pietrov Velitchkovsky wore a small pin on his CCCP-labeled T-shirt. It honored him as a “Hero of the Soviet Union” for having set seven FAI world records for Radio Control aeromodels!

I came home from Kenley with two conclusions. One, communism was very bad! No balsa wood! Two, if Velitchkovsky could set records with such poor stuff, Americans ought to be able to raise the marks considerably with their far-superior equipment.

Fellow District of Columbia Radio Control club (DCRC) members were roused by my preaching at the September 1962 meeting. We laid plans for an assault on the Velitchkovsky altitude record of 7,100 feet. July 4-5, 1963, the Naval Surface Weapons Lab at Dahlgren, Virginia, provided radar and two operators to measure the altitude and two pairs of ships’ 40-power binoculars mounted on an old gun mount. In one of the accompanying photos, you can see me sitting in the mount staring nearly straight up at a model I called “Skyrocket.”

Walt Good and Howard McEntee broke Velitchkovsky’s record. (Howard was an early-Radio Control icon who wrote a column and articles about the subject, which educated many in the 1940s and 1950s.) My model went higher, and a photo shows that my first world record of 13,320 feet almost doubled Velitchkovsky’s.

This was fun! I went on a crusade to break more of the Soviet hero’s records, and by 1968, I held major Radio Control records in duration, speed, distance in a straight line, and distance in a closed circuit. Seaplane and glider altitude marks had also been logged. Velitchkovsky was down to zero listings.

I kept judging at World Aerobatics championships through the 1960s and finally stopped after Gorizia, Italy, in 1973. In training sessions for judges, I steadily emphasized that they should be objective and write scores strictly based on what the airplane does—not who is flying it or how it looks.

Yet when I analyzed score sheets each time for reporting to the FAI Committee, it was obvious that some judges boosted scores of competitors from their own countries and cut others because of national dislikes. Some judges were impressed by competitors who wore neckties or white pants, and others marked down because they did not like airplanes that were painted green. The

tightness of the female mechanics' shorts also brought on occasional errors in judgment. Some of the competitors were angry that the judges were not fair, etc.

Herein lays my love for busting records, where you are competing with Mother Nature and the precise rules of gravity and physics. Performance is measured with stopwatches and tape measures. There are no gray areas; you did it or you failed.

Even though I had left Velitchkovsky in the dust, I continued chasing records because it was fun and educational. By 1991, I had 18 records under my belt. With Old Faithful III and Marvelous Martha, this number was escalated to 23 by 1999. These two models played a significant role in inspiring my dream of flying across the Atlantic Ocean.

Old Faithful flew for 33 hours and 39 minutes October 3-5, 1992. I was the sole pilot because the FAI had a "Hail, Lindbergh!" rule stating that only one pilot was allowed. We beat this rule with technology. Paul Howey made a direction-finding receiver that we put in the wing, and then we placed an amateur radio beacon on the ground slightly upwind of me.

The airplane automatically steered toward the beacon, made a loop downwind when it passed the beacon, then repeated this pattern for most of the flight. I was half-asleep on a chaise lounge most of the time.

After this success, I started joking about building an 11-pound airplane that would fly for 60 hours. I would find someone with a huge 30-knot cruiser yacht (or maybe a Navy destroyer) and gather the big crowd of friends formed setting all of these records, and we would have a big party on the fantail of this ship while the model chased a beacon that was on the mast! What a blast! It was fun to talk about it even though I knew it would not work in a moderate wind.

Marvelous Martha conjured visions of a different approach. First, we chased it down routes 81 and 95 at airspeeds up to approximately 70 mph, as measured with a Global Positioning System (GPS) in the chase convertible. Second, I built a dynamometer.

Using horsepower numbers I calculated what aerodynamicists call  $C_{Dnaught}$ ,  $C_{do}$ ; that is, the drag coefficient caused by the profile and skin friction, exclusive of drag caused by lift. Martha had a  $C_{do}$  of 0.019, which is smaller than the famous super-clean WW II P-51 Mustang's 0.021. The other significant number came from Martha's last record of 808 miles in closed course, piloted by my son Scott on June 26, 1998.

I was angry with the FAI for refusing to list me as a part of a team for the two earlier Martha records. Rob Rosenthal was named record holder for the distance flight. He is a nice person. I like him! However, all he did was pilot the airplane part-time for roughly nine hours. I had worked for two years to develop the model! I certainly would have flown it if I were not nearly blind!

The technical challenge of perfecting a model is difficult, but flying is easy if you know how. So to outwit the ancient mariners of the CIAM (International Aeromodeling Committee), my son Scott, whose first name is Maynard, flew the closed-course distance attempt. I take great delight

in looking at the record book and seeing that Maynard S. Hill holds that difficult record. (See “Racing Against Sunset” in the October 1999 Model Aviation on page 58.)

Martha was flying approximately 70 mph for 13 hours and had two hours of fuel left at the end of the day. There is a law of physics of airplanes that the power required increases at the cube of the speed. In the simpleminded way I like to work, this rule says that if we slowed the model to half of 70 mph, or 35, it should be able to fly eight times as long. That is  $15 \times 8 = 120$  hours at 35 mph, or a distance of 4,200 miles. That is more than New York to Paris!

But hold it! Some drag caused by lift crawls into this picture because of the slower speed. There are equations in textbooks that tell how to estimate this penalty; when I did the arithmetic, the projections still indicated a distance of approximately 3,700 miles.

From this point, I applied my rules of experience. Textbooks assume perfect airfoils and perfect flow, high propeller efficiency, etc. In the real world of small models and low Reynolds numbers in bumpy air, you will do well to get half of that textbook number.

So in the end I still saw 1,875 miles as a possibility. This estimated figure is close to the distance from Newfoundland to Ireland. Besides, if things did not meet this target, there is often a nice tailwind blowing across the North Atlantic.

Similar numbers had come from Martha’s 775-mile record in 1995. So in the spring of 1996 I started thinking seriously about a transatlantic aeromodel. It would have to meet all of the requirements for a true model airplane or I would not try. It would have to weigh less than 11 pounds and use a 10 cc-maximum engine.

Rob Rosenthal showed me how we could measure a model’s track and speed with an onboard handheld GPS receiver. The concept would be to launch under normal radio control then switch to autonomous flight. A miniature onboard GPS receiver would provide position data to steer a programmed route. Landing in Ireland within 500 meters of the pre-designated spot would be accomplished under manual Radio Control by a pilot. Newfoundland to Ireland is not New York to Paris, but it is across the Atlantic! Therefore, that was it.

I chuckle now about the fact that at that time my knowledge of Canadian geography was blurry, to say the least. Labrador, Newfoundland, Gander, and Goose Bay were cold places somewhere near the Arctic Circle from which thousands of American-built bombers and fighters were ferried to England during WW II. I did not even know that Newfoundland was an island accessible only by ferry or airplane.

By September of 1998, I was educated that Newfoundland was a faraway island and that it was going to take some money to put this project into serious motion. At Les Hamilton’s and John Chirtea’s urging, the Society for Technical Aeromodel Research (STAR) was formed. A pro tem board of mostly DCRC members began twisting friends’ arms, asking for contributions to the effort in exchange for membership, which promised only an occasional newsletter. We were off and running.



Paul Howey and Ted Rollins designed and built the front end of an autopilot; i.e., gyro, wing leveler, roll stabilizer, and servo controller coupled to a Futaba receiver. Joe Foster came on board in the summer of 1998 and started on the massive job of software for GPS navigation and altitude hold.

During the winter and spring of 1999-2000, we flight-tested in a horse pasture on a farm that Beecher Butts owned [located near Damascus, Maryland, in Montgomery County.] He was 88 years old and a legend in the area. He earned his pilot's license in 1946, and at 88, he was still flying his ultra light and riding horses. When riding to the hounds, he jumped fences with people one-third his age.

If the grass got too tall for us, he would knock out a runway with his farm tractor. The combination of our admiration for Beecher and the need to rise above the technical struggles we were having in these early days (crashes!) led me to suggest naming our transatlantic model "The Spirit of Butts' Farm."

In April 2001 we were fairly confident that the few remaining problems could be solved by August, so we bought some cheap (therefore, nonrefundable) airline tickets - still a great expense for our treasury. We asked Andy Gutow to make us some crates in which to transport the models.

All sorts of problems cropped up in May and June 2001. Facing the situation square on, we had to postpone our attempt until August 2002. August is the best, and nearly only, month of suitable North Atlantic weather.

Making use of those cheap tickets, John Patton, Roy Day, Joe Foster, and I flew up to Newfoundland to look at the terrain and meet Carl Layden, the Atlantic Province Director for the Model Aeronautic Association of Canada (MAAC). Carl had volunteered to be the Canadian FAI observer for our record attempt. He had told Saint John's newspaper, "The Telegraph," about our expected visit and its purpose, and a pleasant story was published on the day of our arrival.

Bingo! Nelson Sherren, a former RAF Lancaster-bomber pilot, read the article and called Carl to ask us to meet with him because he wanted to help. Nelson is a Newfoundland/Labrador aviation-history buff. He has retrieved parts of busted or sunken WW II failures and owns a spare wing rib of the Vickers Vimy biplane that Captain John Alcock and Lieutenant Arthur Whitten Brown flew for the first nonstop crossing of the Atlantic in 1919.

In 2001 Nelson was president of the 150th wing of the North Atlantic Royal Canadian Air Force Association. He told us he would arrange for low-cost housing on a military base when we came back in 2002 and that he could also provide a large workspace with telephone service at the association's clubhouse on the base.

His word was good; these things were available to us in 2002 and 2003. What a blessing! The arrangements were top-notch, especially since we had envisioned ourselves working out of motel rooms. We spread out on eight workbenches in a 30 x 40-foot room with three computers, a drill press, an oscilloscope, and plenty of folding chairs.

During the winter and spring of 1999-2000, I built five airplanes with 6-inch-diameter fuel tanks. When we got around to measuring speeds, I decided that these models were too fat. They flew only roughly 38 mph when pulled by the allowable horsepower and fuel rate.

During the winter of 2000-2001, I built six airplanes with skinnier fuselages, with 3/4 of the fuel in the fuselage tank and 1/4 of the fuel in a wing tank. The plumbing and fuel-pressure system was complicated. Putting precise amounts of fuel onboard was a nasty challenge. These models flew approximately 43 mph at full weight, but three were crashed during tests in the spring of 2001 and two more were totaled after our 2001 postponement.

During the winter and spring of 2001-2002, I built four more airframes. By this time, I had constructed 21 fuselages and 12 wings. Hundreds of hours of engine testing filled in the spots between constructions.

July 26, 2002, my wife Gay and I started a six-day journey to Newfoundland in a rented Dodge Caravan. I do not have a driver's license because of my degenerated vision, so Gay, who loves to drive, took the wheel while I had a much-needed six-day rest. Preparations had approached frenzy during the final weeks of testing. We had four all-up models packed in the van along with boxes and bundles of auxiliary stuff.

We made the first record attempt with the serial number 19 model, identified as TAM (Transatlantic Model) 1 on our web site (<http://tam.plannet21.com>). The launch was at 8 p.m. local time on August 8. The evening launch was made so that the model would arrive in Ireland during daylight hours. Minimum crossing time would be as short as 28-30 hours if there was a brisk tailwind. That would put it on the Irish coast in the dark. The maximum time had to be less than 40 hours. That was the maximum expected fuel duration.

Joe Foster manually flew TAM 1 to roughly 1,000 feet using a Futaba PCM transmitter. When he toggled the landing-gear switch to put the model on autonomous flight control, it started making lazy circles approximately 300 feet in diameter. The wind blew the circling model toward Ireland, but it soon fell into the ocean.

The cause may have been that the model was too far out of trim for the gyro and steering software to grab hold. We tried for a test-and-trim flight early in the afternoon, but high winds led to a rough forced landing. I think a gear was broken when the aileron snagged in tall grass. We will never know.

TAM 2 was launched two days later after a check flight. This time all looked good. The model made the half-mile leg to the north that Joe had programmed, to avoid flying over a Cape Spear visitors' parking lot. We were on a gravel road roughly 1/4 mile west of the lot.

After passing the 1/2-mile point, TAM 2 took off on a beeline, straight as an arrow, but on a heading toward the Azores islands - not toward Ireland. Telemetry indicated that the engine stopped and the model dropped into the sea 171/2 minutes after launch.

We were doing poorly! I had some ideas about why the engine had stopped, but there was no way to check my ideas with the engine on the ocean floor. The heading error was something else. There was a flaw in the software that was undetected during our two years of flight-testing the steering functions. The reason it escaped detection was that we had never turned the model loose to fly long distances. We flew small ovals and short hops up and down a road using a convertible to keep the model in the pilot's sight.

Any modeler who intentionally programs an auto piloted model to fly out of sight over populated land is reckless and irresponsible. The potential harm done to the hobby would greatly outweigh any inflated ego. We were not irresponsible nor were we reckless. We aimed to fly over the ocean at approximately 1,000 feet of altitude. There would be no swimmers underneath, no airplanes flying that low, and no ships with masts that tall. "Safe" is the word that describes what we were doing.

Weather over the North Atlantic had not been good up to this point, but on August 13, 2002, it was predicted to be bad for the next four to five days. This was partly okay because Joe Foster and Les Hamilton had to recalculate, simulate, and insert new pieces of code from top to bottom; that was 100 pages and 10,000 lines! They were at it for three long days.

I took advantage of this break to retreat to a table in a remote corner of an adjacent room. In spurts, I wrote a eulogy which I hoped would be read at a memorial service for Walt Good; he had died a month earlier, and his service was to be in Florida. I yearned to be there, but I was trapped in Newfoundland. Tears of grief dropped on my writing pad. Walt was a good friend and a fun scientist. He surely would have enjoyed participating in a technical miracle we were seeking.

Nelson Sherren had meteorologist friends in Gander and Goose Bay who faxed, on a daily basis, current conditions, and 24-hour forecasts of wind and frontal systems over the Atlantic. Roy Day pulled predictions from the US Navy Norfolk Web site. Bob Yount in Maryland sent E-mails with recommendations. The situation was no-go August 15-17.

Paul Howey, who was to be the landing pilot in Ireland, was telling us via E-mail and cell phone that it was raining buckets most of the time. What is worse, the rain was blown horizontal by winds that, at midnight on one of those days, tore down the tent in which he and his son Rusty were trying to sleep. They retreated to a bed-and-breakfast.

Nelson's 9 a.m. weather briefing on August 18 informed us that things were far from ideal but not totally negative. We decided to try it. Time was running out; cheap tickets home were for August 22. We drove to Cape Spear under clear skies, only to see a dense cloud of fog over the launch site as we rounded the last bend in the road. We stood in that fog until 8 p.m. and saw no hope for clearing.

We returned at roughly 5 p.m. the next day, set up TAM 3, and launched it at 6 p.m. to beat that fog. This time TAM 3 took off on the 62° track it was supposed to follow and flew on course for the next eight hours.

The last report from the satellites used for tracking stated that it had gone 479 miles before dropping out of sight. The most likely cause of failure this time was that the model hit a rainstorm and severe turbulence. We joked that we could talk like military public-relations people who would call this “a successful test that showed the system to be working properly.” We still had TAM 4 in the shed, but we had run out of time. We packed our goods and started home on August 22, 2002.

Actually, the results of TAM 3 were encouraging. I wanted to keep trying, and, with some reservations about how much time they could give, the team decided to try again in 2003.

I started building slightly modified models almost immediately. I paid the drag penalty of a slightly fatter fuselage to put all of the fuel in a single tank. I shifted the wing position forward to better accommodate a CG (center of gravity) shift as fuel was consumed. I also moved the autopilot to midway between the wing trailing edge and the stabilizer leading edge. This ensured that there was no way rainwater could be sucked in to foul the electronics. We were flight-testing this version two months later and found the drag penalty to be negligible.

I rang in 2003 with three new airframes, numbers 23, 24, and 25, ready for engine testing. In early February, I took on a small consulting job with some of my former colleagues at the Johns Hopkins University APL. They had a high-school senior serving as an intern, and they told me that Cyrus Abdollahi would learn more, and be more useful to their UAV [Unmanned Aerial Vehicle] project, if he came on board as an intern on our TAM effort.

That was a classic understatement. Cyrus was a knowledgeable model builder, a good Radio Control pilot, and a whiz on computers. We started working together in February, and he spent nearly 25 hours a week helping the blind man! We built three more airplanes and did some good flight-testing for STAR and for APL. It is a delight to work with this young man, and I miss him now that he is in college and able to come by only on Sundays.

During the winter and spring of 2002-2003, I continued to test engines down in my shed. You would think that after 12 years of work and five records I would know everything there is to know about an O.S. 61 FS engine. Not so.

After several months of mysteries, I found a flaw in two of my five homemade rear power takeoffs that are used to drive an alternator that powers the whole system. I have acquired 26 O.S. 61 FS's at flea markets and on the Internet. The flaw wandered from one engine to another as I moved it to test engines. It takes as much as 12 hours of running to see if a change has a significant effect, and if you are working to get six engines in proper condition, it is easy to lose track of some the variables.

The culprits were units I had machined back when I had good eyes. Tweed Cottrell made six new ones of superb quality.

By June, there were six airframes; some had been through preliminary flight-testing. Autopilot construction had fallen behind, so I was continually transferring the one workable unit from one

airframe to another. Les Hamilton and Ron Bozzonetti gave up many hours of their hobby time to come out for flight tests.

On July 18, a virgin model (number 26) with a virgin autopilot failed while being manually flown. In the rush, my shake-and-bake routine was apparently inadequate to avoid an infant mortality; the model went down in some woods on the edge of a wheat field approximately a minute after launch. Dedicated STAR member Andy Gutow flew over the woods in a Cessna with Ron Bozzonetti as a second pair of eyes. Nothing was seen; 26, with alternator, gyro, good engine, and autopilot, were gone. Period!

On July 29, Gay and I set out toward Saint John's in a Chevy Astro minivan loaded with five TAM models: numbers 23, 24, 25, 27, and 28. First, Gay drove out to Lexington, Kentucky, to trade our Subaru for the van that our son-in-law Larry Snipes owned, a trade that saved \$3,000 of STAR's funds. The cost under run was a huge help to the budget.

We arrived in Saint John's on Sunday, August 3, and were cheerily greeted by friend and benefactor Nelson Sherren. The rest of the crew, Joe Foster, Les Hamilton, and Cyrus Abdollahi, flew in the next day.

I honed the engine on number 24 for two days, and we went out for trim tests Friday afternoon, August 8. The first launch, now referenced as TAM 4, went up into a fogless sky over Cape Spear at eight that evening. There was a gentle wind from the west and the dirt road sloped down to the west, so this 77-year-old geezer had no trouble heaving it into the air.

People told me that the climb out and smooth straight-line departure into the sky still-painted by the setting sun were beautiful things to see. I have to take their word for it because it is gone from my eyes if it is more than 200 feet away.

Satellite data flowed into our operations room via E-mail messages for the next eight hours. TAM 4 was on course, the engine was fine, the speed was right, and the altitude was correct at 1,000 feet. Then after 430 miles, a bit short of the place where we lost TAM 3 the year before, there was nothing. No further report.

The cause could not be determined because the model went down during a period when all satellites were absent from the North Atlantic. There was no rain, winds were modest, and storms were hundreds of miles to the south. It was a mystery.

Joe Foster postulated carburetor ice because TAM 4 disappeared at roughly the same time that TAM 3 did. My hundreds of hours of bench tests during cold and hot, humid weather did not support that idea. Somebody suggested that the Bermuda Triangle might have a cousin up in Greenland. Cyrus, in his quiet, humorous manner, said that maybe the Icelandic Navy's gunboats needed target practice. We had no clue.

The weather reports Saturday morning, August 9, were favorable. Tailwinds of 10-15 mph in the middle of the flight would help, but there would be crosswinds for a couple hundred miles after launch and the last couple hundred miles near Ireland. Conditions were expected to deteriorate

two days hence, so we decided to try for another launch that night. The hustle to uncrate number 25, undo the safety packing, and stuff it with autopilot and engine put a bit of a strain on a crew that had not slept much the night before.

It was 11:30 a.m. before I could start running fuel tests. Ordinarily I have to run and measure for three or four hours to make sure the needle and filters are okay. For the next two hours, fuel flows swung from crazy highs to saggy lows. I use a fussy medical filter in the fuel line that likes to stay wet. Apparently, this one had dried out in spite of isolation clamps during the seven-day trip. I knew the routine; I had to put in a new filter and start over. But, by that time, it was 2:30 p.m., and we had to go off on a trim flight.

From 4 pm to 5 pm, I measured fuel again, but I was far from sure that it was okay. Soon we would have to start the fueling and weighing process. Carl Layden, the Canadian observer, was waiting in the shop with Contest Director (CD) Les Hamilton to attest to the weigh-in's accuracy. Expletives flashed through my brain before I finally said, "Throw this fluky thing, and hope!"

We did just that at 7:45 p.m. local time. The launch was easy because of a mild west wind. Joe's climb-out was quick and smooth. TAM 5 did a graceful turn toward the northern waypoint then bee-lined out of sight on the 62° heading to Ireland.

All was well at 11 p.m. Data indicated engine rpm okay, altitude okay, speed approximately 43 mph, no tailwind. There was nothing I could do but hope, so I packed off to bed. Les, Joe, and Cyrus stayed on post to sift the incoming data.

There was good news when I entered the TAM shop at 8:30 Sunday morning. The Spirit was still flying and was roughly 560 miles out. However, there were some ominous aspects of the data. The engine was supposed to be regulated and smooth at 3,900 rpm, but readings ranging from 4,100 to 3,100 were coming in. Altitude was also a bit unsteady, varying from 280 to 320 meters (plus or minus 70 feet). Data points came in roughly once a minute for periods of up to 12 minutes.

We could not plot any meaningful graphs, but it was obvious that the model was porpoising from a shallow climb to a speedy dip in the flight paths. We had seen this behavior in Maryland flight tests. I was fairly certain that the engine was lean, making insufficient power to pull the model into its usual smooth cruise condition. If the porpoising stayed mild, the penalty in speed was not severe.

The Spirit trotted along all day Sunday. Over mid-ocean, it picked up a 5-10 mph tailwind and was cruising at 50-55 mph. This tailwind was supposed to be 10-15 mph, but Mother Nature does not always do what man predicts. I went to bed at roughly 10 p.m., fearful that the cool of night would increase the viscosity of the fuel, taking the engine from lean to dead.

Sure enough, when I returned to the shop at 4 a.m., Les and Cyrus said they had had no satellite data for three hours. Les and I agreed that we should call the Irish officials, Joe Dible and John Molloy, and tell them to turn around. They were on a six-hour trip from Dublin. Likewise, we

called AMA President Dave Brown, who had volunteered to land the model. He was at a bed-and-breakfast near the Mannin Beach site.

Within minutes of my saying goodbye to Dave, Cyrus turned away from the data computer he had been monitoring and announced, "We have a satellite!" Cyrus had been a heartwarming example of unusual patience and youthful optimism from the start. The old geezers had given up, but not Cyrus.

We quickly called the Ireland crew. None of them had turned around. (Later we learned that a couple of satellites had not dumped their data and had to go around the earth one more time before reporting to the system.)

Not only was the Spirit still flying, but also it was flying better. It was 5 a.m. Monday morning in Newfoundland, but the Spirit was far enough east to be in warming sunshine. It had flown over the Gulf Stream during the night. Perhaps warmer air voided the viscosity problem. It was obviously happy to be rid of a lot of fuel weight. The elevator had gone from nearly full up trim to a little below neutral. The engine rpm was a comforting, steady 3,900.

At 9 a.m. Newfoundland time (12:30 Ireland time), or 37¼ hours into the flight, the model was approximately 70 miles from the Irish coast. Its speed was down to 43 mph. Its heading was right on target at 95° true heading. We had a real fingernail-chewing cliffhanger on our hands. The engine was supposed to go roughly 37 hours if I had set the needle at the intended reliable, slightly rich setting. I do not chew my nails, but I, and everyone else waiting in the Newfoundland shop, was very tense.

My thoughts drifted to a 1999 cross-country attempt to fly from Leesburg, Virginia, to Savannah, Georgia, a distance of roughly 540 miles. We had flown for 7 1/2 hours. We had passed Ron Clem's distance record of 507 miles when a Niagara Falls-type thunderstorm swamped the model, drenched the crew, and put two to three inches of water in the footwells of my 1972 Ford LTD convertible.

At that point, I realized that the engine might stop a couple miles offshore. I mused at my well-worn slogan "You can't win 'em all!" and hoped I would not have to use it this time. My fears did not materialize into disaster; the model came into sight at Mannin Beach at roughly 2 p.m. Ireland time on Monday afternoon.

Dave Brown, a member of six US World Championships teams in the 1980s, confidently toggled the landing-gear switch to gain manual control of the airplane. He banged the rudder stick hard right to kill the engine. Dave's wife Sally was cell phoning the happiness. Dave glided the Spirit into a dead-stick landing approximately five feet from the designated spot. At 2:08 p.m. Ireland time, Sally's report, "It's on the ground!" raised a whooping cheer in the Newfoundland shop. I buried my head on Gay's shoulder and wept unashamedly for joy.

Special recognition and thanks are due Les Hamilton. He worked hard at the important jobs of chief United States official and AMA CD, and he contributed hundreds of hours to helping with

flight tests, telemetry, and data analysis. Les also served as the secretary of STAR and put many hours into communicating with members.

Joe Foster made a major contribution by designing the electronics and writing all of the software codes for the navigation portion of the autopilot. His work on the codes was massive and technically brilliant. He was also the pilot during many arduous hours of flight-testing the autopilot and airplane performance.

Dave Brown's time is normally consumed by the position of AMA president. He is a skilled Radio Control pilot, and I am grateful that he responded to my request for him to go to Ireland to land the model.

Cyrus Abdollahi, the third member of the TAM crew in Saint John's, is a 2003 graduate of John F. Kennedy High School in Silver Spring. Cyrus helped build and test some of the five models we took to Newfoundland. His patient and enthusiastic study of hundreds of incoming E-mails in Newfoundland at all hours of the day and night was a valuable help in achieving the record.

My wife Gay was the fourth member of the Newfoundland TAM crew. In addition to being a comforting confidant and counselor, she drove our son-in-law's van more than 80 hours to transport the models and the legally blind builder of the model to Newfoundland and back.

Paul Howey designed and built the ARGOS transmitters, which were necessary for achieving our goals. He and Ted Rollins designed and wrote the software codes for the stability- and servo-control section of the autopilot. With his son Russell, Paul generated the artwork for the circuit boards and assembled the electronics and harnesses of the autopilots used in 2002. In the 2002 attempts, he also recruited the amateur radio enthusiasts. Although Paul could not go to Ireland for the 2003 attempt, the project has been fortunate that his ham friends came anyway.

The TAM team included a number of other people here in Washington DC and in Ireland. Ron Bozzonetti and Roy Day helped as pilots during four years of testing. Roy served as CD in 2002. Julian "Tweed" Cottrell helped with engine testing, machining, and autopilot assembly. Art Kresse machined some parts for the engines and made technical drawings of the model. Charlie Calvert helped with the design and fabrication of fuel pumps and flexible alternator couplings.

Bob Yount gathered weather data for months in advance of the attempts and provided advice while we were in Newfoundland. Bill Savage has been a steady help as the editor and producer of 14 newsletters in the past three years. John Patton, who has served many times as CD for earlier records, could not go to Newfoundland. However, he has served faithfully as the treasurer of STAR.

Laytonsville Landscaping owner Doug Lechliden allowed us to use his sod farms for the last two years of testing. This kindness reduced the number of broken propellers and fuselages that we were experiencing on the rougher terrain at Butts' Farm.



In spite of the overly friendly horses and the hazardous mounds they left behind, the use of Beecher Butts' pasture was valuable to our early flight tests. Beecher's vitality and enthusiastic spirit inspired optimism to counter my advanced age and its handicaps.

In Canada, Nelson Sherren arranged for our housing and an operations center. Carl Layden, Craig Trickett, and John Shortall of the Saint John's Aeromodelers Club were eager to fill gaps and solve problems that cropped up.

In Ireland, Joe Dible, John Molloy, and Noel Barrett deserve special thanks for making long journeys from Dublin and Cork to be present as official observers. From the landing crew in Ireland, radio amateur Ronan Coyne set up the Web site that TAM used. Ronan also played a key role in setting up the downlink telemetry. Other Irish crewmembers were Enda Broderick, David Glynn, Aengus Cullinan, and Tom Frawley. Sally Brown's joyful enthusiasm crossed the ocean on her cell phone during the landing. Her communication was a vital contribution.

I am grateful for all of the help that came from these wonderful friends.

Maynard Hill  
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