A "REVOLUTION IN POWER" – MARINE INBOARD ENGINES

By Richard J. Dodds, Curator of Maritime History, and Richard A. Day Jr., Heritage Engine Collection

Part I: Early Engines and Their Makers

Editor’s Note: In the Bugeye Times of Spring and Summer 2001, the museum explored the development of the outboard engine in America and its impact on water recreation. This article looks at the other side of the story – the rise of the marine inboard engine and its effect on watermen and the recreational boater.

"During the comparatively few years that the internal combustion engine has been a commercial factor, a vast change and improvement throughout the Chesapeake region has taken place indeed, the gasoline motor has done more for the region than has any other one thing during the past century." So wrote the Oysterman and Fisherman magazine in May 1913. Writing in more general terms, a 1979 article in National Fisherman stated, "Nothing so momentous as the gasoline engine had affected boats since someone learned to direct a floating log" (Bill Durham, "The Revolution in Power, 1904 - 14," vol. 59, no. 13, April 30, 1979).

Prior to the mid-1890s, most fishermen relied on sails and oars to make a living. For the recreational boater of the time, the alternative to sail was the naphtha launch or steam launch. The latter was relatively expensive and required the employment of a licensed steam engineer. In a waterman's community like Solomons at the turn of the nineteenth century, a naphtha or steam launch was something of a rarity. One of the few contemporary references is found in the Calvert Gazette newspaper of October 10, 1885, which recorded the building of the small thirty-two-foot (keel length) steamboat Lance by N. D. Sollers Jr. and Sr. on St. Leonard Creek. For a few years she was employed in towing scows loaded with lumber, but on one occasion took a party on a three-day cruise to hunt ducks and geese.

The early development of marine gas engines is ably documented by authors like Stan Grayson in his Old Marine Engines, now in its third edition. By the mid-1890s a small number of companies were producing small two-cycle marines engines, but of questionable service. A two-cycle engine has two strokes: power and exhaust on the downward stroke, and intake and compression on the upward. A four-cycle engine, on the other hand, has an intake, compression, power, and exhaust stroke every two revolutions.

For a number of years there was an ongoing debate over the merits of two-cycle and four-cycle types. A similar controversy continued after 1900 over the two-port or three-port, two-cycle engines. The former took in fuel via a vaporizer with its built-in check valve at the base. The latter took in a fuel/air mixture from a vaporizer or carburetor through a third port cast in the cylinder wall. The third port eliminated the need for the check valve, but at the expense of much tighter manufacturing tolerances and lowered engine performance due to engine wear. All of which was compounded by the lack of a satisfactory solution to the lubrication of the two-cycle engine, a problem not solved until about 1909 with the then "daring innovation" of mixing the lubricating oil in the fuel. Within the next two years the major manufacturers of two-cycle engines adopted this practice, and it is still in use today in many outboard, inboard, lawn mower,
"CRADLE OF INVASION" WEEKEND RETURNS FOR SIXTH YEAR

On August 8 through 10, the museum will commemorate for the sixth year the first naval amphibious training base, established in 1942 on the Dowell peninsula here at Solomons and continuing throughout World War II. This base was important not only to the war effort but also to the surrounding community, as over 70,000 sailors, marines, soldiers, and Coast Guardsmen were trained for service. While the base was essentially self-contained, its impact was felt in an area that was ill prepared to handle such an activity. The "invasion" affected the Solomons area as well as preparing troops for their foreign "invasions," an integral aspect of the military strategy during World War II. The museum's annual program honors both the troops and the community.

This year, for the first time, the event has signed on its first corporate sponsor: Northrop Grumman will sponsor a Frankie Condon concert on Sunday, August 10, free and open to the public. The corporate sponsor program was launched this year to provide sponsored opportunities to entertain special guests and clients. As Karen Stone, curator of education, explains: "We want the event to work on many levels - for the public, for the veterans returning to the base, and just as importantly, for corporations looking for a worthy venue."

There will be activities of interest on all three days of the weekend, some of which are included in the enclosed calendar for July through October. For a complete listing of activities and times visit the museum's web site and click on WWII. For further information and tickets call Karen Stone at 410-326-2042, ext.32.

Bob Dylan: The Rock Legend Performs at CMM

Only two days in the month of May saw no rain, and one of those days was Sunday, May 11, the day 4,500 people gathered at the Calvert Marine Museum to hear the music of the legendary rock performer Bob Dylan. This sold-out performance brought fans from all over the country to Solomons. Guests from as far away as Oregon purchased tickets and sent us rave reviews about our venue and the opportunity to see Bob Dylan in such an intimate and wonderful atmosphere. After performing many of his classics, Dylan returned to the stage for a two-song encore and helped raised thousands for museum programs and exhibits.

#1 Female Country Vocalist Martina McBride coming to CMM

On Saturday, August 30, Martina McBride, country music's female country vocalist of the year for 2002 and 2003, will perform on the Washington Gas Pavilion stage at the Calvert Marine Museum. Tickets will be $50 for premium seats, and $40 for reserved seats.

Only CMM members can purchase tickets prior to the public. In order to get the best seat possible please read the instructions below:

- Members can order up to 8 tickets beginning Thursday, July 10 (and as many additional tickets as desired after August 6, when tickets go on sale to the general public). Orders will be accepted via fax (410-326-4175) or mail using the enclosed ticket order form. Tickets will be issued on a first-come, first-served basis, so orders received prior to July 10 will be put in order after all orders are received July 10, so please do not submit your form early. We expect that the fax machine will be busy the entire day of the 10th, so please be patient in transmitting your fax. Member ticket orders will be ticketed and mailed during the first week of August.

- After all member tickets have been issued, remaining tickets will go on sale to the public on Wednesday, August 6. Tickets can be purchased by calling 1-800-787-9454 beginning at 12:01 a.m., using Visa or MC. Or you may come to the museum store beginning at 10:00 a.m. on August 6 and purchase tickets using Visa/MC, check, or cash.

We expect this to be our most popular performance yet, and are proud to bring such a wonderful performer to Southern Maryland. Thank you for supporting the museum through membership — we hope you enjoy the show. For questions regarding the Martina McBride concert or member advanced sales, please call 410-326-2042, ext.16, 17, or 18.
YEAR-END APPEAL DONORS 2002
Otter Exhibit Expansion Project

The boards of the Calvert Marine Museum and the Calvert Marine Museum Society, the director, the museum’s staff, and especially our otter thank the following 209 donors for their contributions of over $13,400. The donations to the otter exhibit expansion have enabled us to begin construction on a new habitat. Thanks for your never-ending support.

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Quality Built Homes • Solomons Veterinary Clinic • Spring Cove Marina • Mr. & Mrs. Richard Alu • Mr. & Mrs. Doug Alves • Mr. & Mrs. Sheldon Arey • Mr. & Mrs. Gunter Arndt • Mrs. Teresa Baird • Mr. & Mrs. Steve Balinski • Dr. & Mrs. Martin Barley • Mr. & Mrs. Paul Berry • Mr. & Mrs. John Bidne • Mr. & Mrs. Jim Billiter & Family • Mr. & Mrs. Jim Bodycomb • Mr. & Mrs. Daniel Boesz • Mr. & Mrs. Michael Bonanno • Mr. Peter Bonbrest • John & Pam Bone • Mrs. Garnett Bow • Mr. & Mrs. Bill Bozma • Capt. & Mrs. Donald Brown • Mr. & Mrs. Gordon Burton • Mr. & Mrs. David Butler • Ms. Michelle Cheseldine • The Cirillo Family • Mr. & Mrs. William Cloyes • Lara & Terry Cogar • Mr. & Mrs. Melvin Conant • Mr. & Mrs. Brian Concannon • Mr. Howard Cook • Mr. William Cross • Mr. & Mrs. Robert Currie • Mr. & Mrs. Charles Dammann • Michael Davis & Elizabeth Petersilia • Mr. & Mrs. Richard Day, Jr. • Joan & Gail Dean • Mr. & Mrs. Fred Dellinger • Mr. & Mrs. Lou Demas • Mr. Leon Dement • Ms. Lynn DePont • Mrs. Cynthia Dickerson • Mr. & Mrs. Robert Douglass • Ms. Rosemarie Drury • Michael Dunlap & Jo Ann Bolton • Mr. & Mrs. Ralph Dwan • Mrs. R. 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SPRING ACTIVITIES
FAMILY DISCOVERY DAY, DEDICATION OF
THE PATUXENT SMALL CRAFT CENTER,
ANTIQUE BOAT & MARINE ENGINE SHOW,
AND TENNISON CRUISES.

The first live auction held by the CMM Volunteer Council was a great success on Family Discovery Day, May 3. In the background are the displays of the Chesapeake Antique Boat & Marine Engine Show, held on both May 3 and 4. Photo by Bob Hall

Model-boat-making was an even more popular event than usual at Family Discovery Day. This event supports the Patuxent Small Craft Guild. Photo by Bob Hall

Participating at the May 3 ribbon-cutting for the enlarged Patuxent Small Craft Center were (left to right): State Senator Roy Dyson; George McKeon, representing the contractor; Al Lavish and George Surgent (cutting the ribbon) of the Patuxent Small Craft Guild; County Commissioner Susan Shaw; and Bill Lake. Photo by Bob Hall

SHARK POSTER ON SALE
The new shark poster, illustrated in the spring Bugeye Times, is now on sale at the Museum Store for $9.95 (member discounts apply). JUST IN TIME FOR SHARKFEST! ON JULY 12.

On Mother's Day, May 11, museum members and guests boarded the Wm. B. Tennison at the J. C. Lore Oyster House for a special dinner cruise, one of several special cruises planned for this season (see calendar). Photo by Bob Hall
Volunteer Spotlight

Wes Stone, Joan Sweeney, Doris Sweet, Don Sweeten, Bev Walker, Sandy Younger, and Tom Younger.

When volunteers cumulatively reach a thousand-hour milestone in their service to CMM, they receive due recognition with their names added to the thousand-hour plaque in the lobby of the Exhibition Building, a signed certificate from the governor, and a gift (this year it was the book *Chicken Soup for the Volunteer Soul*). The 2002 thousand-hour volunteers were Paul Adams, 7110.25; Dave Aldridge, 1229; Paul Berry, 17398.5; Doris Fisk, 1047.5; Bob Hall, 2261.75, Frank King, 1006.25; Bill Lake, 7010.5; Ann Michnowicz, 1009; Pam Platt, 1246; Richard Rogers, 1141; Ruth Showalter, 4069.5; and Bev Walker, 2115.75. Marilyn Ruark reached the 2500-hour mark with 2585 hours.

The Group Achievement Award went to the Touch Tank volunteers who faithfully keep this interactive exhibit available to the public and during school group tours. They received a hand-carved plaque by Skip Edwards. It is currently installed at the Touch Tank. Volunteers for this included Theresa Boxwell, Debra Carlson, Linda Densmore, Jackie Donaldson, Richard Gould, Mary Hansen, Mary Heflebower, Michelle Nestlerode, Fred Ruark, Margaret Stamper, Don Sweeten, and Bev Walker.

The Volunteers of the Year, Ann Michnowicz and Richard Rogers, were also presented with a plaque created by Skip Edwards, as well as tickets to the Martina McBride concert and free tickets to events during the Cradle of Invention weekend. More information about their achievements is in the spring issue of the *Bugeye Times*.

And though not everyone was presented with awards, all Calvert Marine Museum volunteers are important to the operation of the museum and are appreciated for their efforts.

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Member’s trip to MCI center for Washington Capitals action

CMMS Members will take to the ice this fall for fast-paced National Hockey League action with the Washington Capitals. Stay tuned to your fall *Bugeye Times* for the date and game selection. We are hoping to book a game in early November. The Capitals 2003-2004 schedule will be announced in July and the Members’ game will be chosen soon after, so please visit our website at www.calvertmarinemuseum.com for the latest information.

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Membership Surveys

We would like to give a special thanks to all members who took the time to share their ideas with the Development Office. Almost 100 membership surveys have been received to date, including surveys from:

- Linda Arminger
- Joan Armistead
- Ginny & Gunther Arndt
- John & Donna Bailey
- Helen Bauer
- J. Tyler Bell
- Kathleen Burch
- Gretchen G. Connolly
- Grenda Davis
- Jane W. Farrow
- Wanda Florence
- Magda W. Freeman
- The Gonzalez Family
- Dr. & Mrs. H. Paul Gabriel
- Kurt & Gwyneth Hein
- Col. & Mrs. James R. Hill
- Chris & Kelly Jarboe
- Mr. & Mrs. James E. Jones
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- Jane Kostenko
- Judith & Gerald LaMarque
- Judith D. Landis
- Jim & Betty Lane
- Al Lavish
- Lisa Lister
- Bob Lit
- Judith MacWilliams
- Gail Madara
- Kenneth G. & Sigrid J. Morris
- Dave Mozgala
- Kent & Nancy Mountford
- Martha B. Schneider
- Nel Sprague
- S. C. Surgent
- Mark & Marilyn Swenson
- Mary Jane Wenke
- Nancy & Chris Williams
- Joyce & Nelson Windsor
- Michelle Wolf
- Joanna Woods

Of the first fifty surveys received, data show that:

- 80% became members because they feel the museum is an asset to the community and want to support it
- 62% would like to see Chesapeake Bay lighthouse cruises as a member benefit, while 40% would like to see additional summer concerts
- 84% feel the variety of special events and educational programs provided by the museum reach a wide variety of audiences
- 76% enjoy the newsletter and read it quarterly, while only 38% would be interested in receiving their newsletter electronically

There is still time to submit your survey. Look for final results of survey data in the future.
A "Revolution in Power" - Marine Inboard Engines

(Continued from page 1)

chainsaw, and weed-whacker engines.

The majority of small boat marine engines produced before 1912 — the "golden age" of inboard engines — were single cylinder, or "one-lungers," of the two-cycle type, popular because the then available four-cycle engines were heavier and more complex and expensive. Most two-cycle engines did not have the required camshaft(s), pushrod(s), rocker arm(s), valve spring(s), or valve(s) of the four-cycle engine.

Two methods were used to ignite the fuel/air mixture in either two-cycle or four-cycle small boat marine engines of the period. Most gasoline-fueled marine engines from about 1890 to 1905 employed "make and break" ignition involving two electrodes located inside the combustion chamber. The timed mechanical separation of the electrodes created an electric arc, which in turn exploded the fuel/air mixture within the cylinder. This system of ignition was very reliable, although it took a certain amount of attention to insure proper lubrication and adjustment. It did not rely on high voltage to create the arc within the cylinder as did the high voltage "jump spark" system soon to be favored by the automotive and pleasure boating industries. The "make and break" system was well suited to the low rpm of the early marine engines and was tolerant of moisture, so watermen in those very early years stuck with it despite its need for occasional mechanical adjustment. It did seem to baffle the weekend yachtsman, while the watermen learned to deal with its idiosyncrasies. The "make and break" ignition system would later be replaced by the now familiar "jump spark" ignition system, which was better suited to higher-speed engines.

Commencing about 1905, with the significant advances made by the automotive industry in regard to reliable spark plugs, the weekend yachtmen began to switch to new two-cycle engine designs with "jump spark" ignition. For engines of all types the "jump spark" and four-cycle engine design took over by 1912, even in the small boat marine engine. The end of the era of the two-cycle small boat marine engine for working watermen came by the 1930s. This was brought about by two significant factors: the working life of a cast iron marine engine was basically determined by the length of time it took for the salt in the iron to rust out the cylinder water jacket, typically fifteen years; the second factor was that working watermen were not earning very much money, and a new engine was a very significant investment, so they tended to keep their engines running as long as possible.

Since the heavy displacement hulls of the period were badly shaken by the typical one-cylinder two-cycle marine engine, an engine might outlast three hulls.

Marine engines were started by turning the heavy flywheel mounted on the forward end of the crankshaft, much like the cranks on the front of early automobiles. This practice began to be supplemented with electric starters in many marine engine designs about the end of WWI. It can be said, however, that the practice never ended for the small two-cycle marine engines, even those produced as late as the 1990s. Working watermen wanted very simple and uncluttered engines that were reliable and easy to maintain.

Many of the early engine companies were based in New England, one of the earliest and well-respected being Palmer Brothers. Frank and Ralph Palmer started in 1887 manufacturing telephones and electrical supplies on the Mianus River in Mianus, Connecticut. They liked to go out on the river in the evenings, and this led them to wanting to put an engine in a small boat. In 1893/4 they built their first marine engine, a 1 1/2 hp, horsepower with "make and break" ignition. This engine is believed to be the first successful small two-cycle marine engine built on the East Coast.

The reason they were successful was that they understood electricity about as well as anyone else for that time. Ralph Palmer recognized that the principal reason the available engines failed was that their "make and break" ignition system permitted the contacts to remain closed too long ("dwell"), which in turn discharged the available batteries of the period much too quickly. In addition, the contacts did not make a quick "snap" or "break" which limited the size/heat of the arc to ignite the fuel/air mixture in the combustion chamber. Ralph designed a simple and effective system with a short "dwell" and quick "snap" that was used in their line of two-cycle engines until the mid 1920s. It was so good that other makers quickly adapted it in various versions on their engines. Ralph Palmer did not patent the design, but he did patent an inertial governor for the igniter in 1901 to keep the engine from over-speeding whenever the propeller came out of the water in heavy swells.

The Palmers' engine was so successful that watermen neighbors began requesting they make more. Starting in 1895 they built approximately 100 engines. When they found they could sell more engines if they were installed in small launches, they sold almost every small boat builder on the New England coast building hulls for them. Their own boatbuilding operation was moved down the Mianus River about two miles to Cos Cob.
The Heritage Engine Collection

Richard A. Day Jr., otherwise known as Dick Day, has a passion for old marine engines. He acquired his first one in 1935, a circa 1910 model made by the Lackawanna Mfg. Co. of Newburgh, NY, which he still owns. Richard grew up in New Hampshire, and spent his summers before World War II boating on Narragansett Bay with his cousins. At that time there were plenty of laid-up boats and early marine engines that no one wanted.

In the 1930s, Dick developed an interest in radio mechanics, but his studies were interrupted by World War II. A three-year stint in the army took him both to Europe and the Pacific. After discharge, Dick joined RCA working on military contracts that took him all over the globe. After seven years with RCA he went on to supervise the installation of radio stations for the U.S. Government in various parts of the world, retiring in 1984. During these years he picked up old marine engines — many of which had lain forgotten in an outbuilding — that came to form the basis of the Heritage Engine Collection. The collection now consists of some thirty engines, with parts for a similar number. In order to repair and restore engines, Dick has also accumulated a collection of large machine tools, most of which are antiques in their own right.

Dick's particular interest is the marine engines of one of America's most famous makers — Palmer Brothers of Cos Cob, Connecticut. As Dick puts it, "I like Palmers because they run better than most of the early engines." He has written extensively on antique engine restoration in general, and the history of Palmer and its engines in particular. For a number of years, Dick has maintained a database of all known surviving Palmer engines. He helped to found Mystic Seaport's annual Antique Marine Engine Exposition and CMM's Antique Boat & Marine Engine Show. For many years, Dick has also exhibited his engines at the museum's Patuxent River Appreciation Days. This is perhaps the only opportunity for those in Southern Maryland to still hear the characteristic sound of the "one-lunger" in action, once such a familiar sound on the waterfront. For many years old-time watermen would come to PRAD to sit and listen to the distinctive sound, but their number dwindled, with no such visitors in the past three years. On permanent display at the museum are four engines restored by Dick — a Palmer ZR-1, ZR-3, and NL-1, and a Red Wing Model AA — and the restored steam engine from the Calvert Packing Company.

Dick's interest in old marine engines is shared by his wife Barbara, daughter Elisabeth, and sons Jon and Richard. Dick and his brother, Thomas, are also involved in The New England Museum of Wireless and Steam in East Greenwich, Rhode Island. Calvert Marine Museum is fortunate to have such a well-known authority on early marine gas engines as Dick Day living in Southern Maryland and sharing his collection and information with our staff and visitors.

Dick Day outside his workshop with the first Palmer engine, built in 1895, which he acquired in 1984.

(now part of Stamford), Connecticut, in 1901. The entire engine production was moved to Cos Cob in 1907. They abandoned telephone electrical equipment manufacturing in about 1903.

In addition to the first Palmer engine made, there are at least two other known surviving engines from the period of 1895 to 1900. Starting in 1900, a whole new series of marine engines — both two- and four-cycle — were put into production. Palmer Bros. engines were soon being sold nationally and internationally. By 1914 the company had made about 30,000 engines.

Palmer engines were a favorite with Chesapeake Bay watermen. In later years the end of the factory building sported a large painted sign proclaiming it as "The Fishermen's Friend for 50 Years."

The surge in the marine engine industry prior to World War I was nothing short of explosive. It was just one ingredient in the wider growth of mechanization that started after the Civil War. Creative entrepreneurs, more tinkers than trained engineers, developed internal combustion engines that found their way into most aspects of life — in industry, agriculture, and transportation. Everyone who had a machine shop and foundry was tempted to build a marine engine. The late Max Homfeld, before his death in 1993, recorded almost 800 manufacturers of inboard marine engines. Many had a short-lived existence and did not survive the leaner post-World War I years. In addition to Palmers, early engines popular on the Chesapeake were the Lathrop (J. W. Lathrop & Co.), Mianus (Mianus Motor Works), Regal (Regal Gasoline Engine Co.), and Ferro (Ferro Machine & Foundry Co.). Other names included Gray (Gray Motor Co.) and Kermath (Morton Motor Co., later Kermath Motor Co.), US Motors, Lockwood Ash/Sears Morongo. Palmer Bros. for example, had dealers and service centers in all the principal Chesapeake Bay ports frequented by the watermen. Other major manufacturers also had service centers in a number of the larger ports.

- TO BE CONTINUED -
VOLUNTEER SPOTLIGHT—

Volunteer Recognition for 2002 –
The Reception on May 8
By Leslie King, Volunteer Coordinator

During these times of world chaos, understated events are often more meaningful. Choosing simple elegance for the 2002 Calvert Marine Museum Volunteer Recognition Reception on Thursday, May 8, was a way to focus on the volunteers who had worked so hard during the past calendar year.

Aside from enjoying appetizers and beverages, the award ceremony itself was especially significant this year, with support from the museum’s Board of Governors. Keynote speaker and chairman of the BOG, RoxAnne Cumberland spoke about the many ways volunteers strengthen the museum and its mission. She also graciously helped director Doug Alves present awards.

The first set of award certificates went to volunteers who worked a hundred or more hours during the 2002 year. Award recipients included Paul Adams, Dave Aldridge, Vivian Aldridge, Charlene Barrett, Paul Berry, Robert Bohn, Bill Boxwell, Bob Boxwell, Debbie Carlson, Margaret Clarke, Fran Damerell, Peg Dann, Grenda Dennis, Doris Fisk, Bob Hall, George Halvosa, Liz Halvosa, Dan Heflebower, Philis Hurley, Frank King, Mary Konrad, Bill Lake, Al Lavish, Barbara Lojacono, Buck McClellan, Ann Michnowicz, Shirley Mihursky, Ellie Mowbray, Gale Parks, Jean Phelps, Dave Peterson, Bob Platt, Pam Platt, Bill Poffenbarger, Sandy Roberts, Richard Rogers, Marilyn Ruark, Bette Scher, Ruth Showalter, Cheryl Snelson, Skip Snelson, Ned Sprague, Margaret Stamper.

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