How to Build the 16-Foot Champion Hydroplane Margaret III

By Gerald T. White

No. XV in The Rudder's Series of Working Plans

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For many years The Rudder has made an effort to publish from time to time complete detailed plans and building specifications of boats of the best type for their particular services. Thousands of these boats have been built all over the world and many of them have been exceptional in point of speed or seaworthiness. In recent cases we have arranged the plans so that they were reproduced to scale so that from the builder's standpoint they were just as good as if the architect's original tracings were lying on your shop bench. Plans that are not reproduced to scale are of little value to the practical man, for, unless he has enough knowledge of naval architecture to make his own scale for the reproductions, the published plans do not help him out on measurements.

We believe the greatest How to Build triumph of The Rudder is the publication of these plans of Margaret III. Never before in the history of the sport has it been possible for a magazine to show complete plans of a world's champion racing boat during the period that the boat held her title. Plans of champions are usually locked up in safety deposit vaults and as jealously guarded as would be the plans of a perpetual motion machine. Racing boats often travel with members of a crew on guard in the freight car for fear some rival boat owner will steal one or more points of superiority from the hull during shipment. When hauled out at the course the hulls are draped with canvas, and woe betide the man who tries to crawl under the covering to take a look at the bottom.

There have been hydroplane plans published before this, but in every case they were boats that were either the dreams of their designers, or else craft that have not covered themselves with glory in actual operation. Here our readers have a chance to duplicate, line for line the greatest hydroplane of her class that has ever been designed.

For the benefit of those who do not follow the racing game closely we will give a short history of Margaret III, the fastest 15ft cubic inch hydroplane in the world.

One of the most enthusiastic racing men in the country is L. E. Selby of Pekin, Ill. Mr. Selby races at all of the Mid-West regattas and is the sort of man that is not suited with anything but the best. Two years ago he decided to have a hydroplane built that would be a winner. He had the several classes of
Margaret III, Champion Hydroplane

the Mississippi Valley Power Boat Association and the International Power Boat Union to draw on, and he decided that the 151 cubic inch class was one that allowed the greatest speed on a minimum outlay and provided the greatest amount of competition and real sport. He then made up his mind that as the fastest hydroplanes in the world were designed by C. C. Smith of Algonac, Mich., designer and builder of the many Miss Detroit, Miss America's etc. that Smith would be the logical man to design his new boat. After some coaxing Mr. Smith agreed to turn out a boat that would beat anything in the class. In the usual thorough Smith manner he constructed a model which Selby turned over to Simmons of Chicago who had the contract to build Margaret III.

The new boat was to be 16 feet long and to be powered with a 3 cylinder, 18-25-h.p. Pierce-Budd racing engine. With such a small engine it seemed as if high speed could not be obtained but when the boat was finally at Burlington, Iowa during the 1920 Fourth of July regatta of the Mississippi Valley Power Boat Association, the racing experts of the country who had assembled there were thrown into consternation with her speed. Over a course of over 30 miles an hour. For the power this constituted an official world's record. Another remarkable feature of the boat was the fact that she could be turned completely around at full speed in literally less than her own length. Racing men who had driven boats for years agreed that she was the most remarkable craft ever built.

It is needless to say that she cleaned up everything at Burlington. Last summer she raced in the annual regatta at Peoria and again won, although Cliff, Paddock driving Miss Quincy IV gave her a good deal of competition. This competition forced Margaret's speed up to the wonderful rate of 32.4 miles an hour over a triangular course. As far as anyone can find out, Margaret's extreme speed is unknown to any but her owner. Many boatmen believe she is good for close on to 35 miles an hour.

The next race for the wonder-boat was at Chicago, during the big Pageant of Progress Races. Although she did not exceed her former speed it was because the competition was not so keen. Another feature of the boat's performances is that she always enters an additional class above her regular rating and usually wins there as well. At Burlington she won the 224 cubic inch class, at Peoria she won the 215 cubic inch race and at Chicago won the 476 cubic inch and ran second to the 80-h.p. Ethel IX in the 320 class.

For those who do not understand the cubic inch class and method of rating, we will explain that in the Middle West the racing associations have adopted a system that rates boats on the amount of power installed. There are no limitations placed on the hull, this allows designers to work out the fastest possible hull without trying to beat some rule. The engine power is rated by means of the number of cubic inches of cylinder space. This is found by multiplying the area of each piston by the length of the stroke. Boat owners are allowed to turn the engines up as fast as possible. This system is absolutely simple and, coupled with the cash prize awards to winners, has produced the finest high speed racing this country has ever seen. Classes are arranged so that practically all of the available racing engines fit into some class in a satisfactory manner.

When the writer of this article saw Mr. Selby at Peoria, we suggested; not without misgivings; that we would like to look at the lines of the boat. Although we had seen many examples of fine sportsmanship from Selby and the other racing men in the Valley association we were somewhat taken back when he handed up the blue print of the boat. The lines had been taken off the model by Elliott Gardner, the naval architect. At that time we had no idea of publishing these lines as we felt that such a thing would be entirely unfair to Selby. Later on Selby, and his dare-devil driver "Baldy" Steinmetz, mentioned that fact that the publication of complete plans of the boat would do a great deal to increase the popularity of hydroplane racing all over the country. He said if we would get Chris, Smith's consent, he would be glad to give us full details of the boat. The assembling of this data took some time, but asSmith said he was willing to do anything that would help the game, we have finally arranged the mass of material furnished and pass it on to you.

It should be distinctly understood that neither Selby, Smith, Steinmetz or anyone else receives one penny in return for the years of experimentation that has made a boat like Margaret III possible. All agreed that the goods of the sport was their only thought. In selecting "Baldy" Steinmetz as the medium through which these plans are being placed in your hands, we feel that we have been complimented far above anything else that has ever been said. With true Valley spirit, Selby says all the credit for boat's performance belongs to Smith, Steinmetz and the engine. Steinmetz gives the credit to the others. Smith says the driver, engine and owner deserve everything and we suppose if the engine could speak it would disclaim any honor.

In connection with Margaret III, Cesare Guasti, the great Italian hydroplane expert who has collected theoretical data on almost every hydroplane of prominence in the world, writes us, "Indeed, I believe that Margaret III is the best hydroplane in all America, in fact, I venture to say that if Mr. Smith will build Miss America III with the hull and balance of weight similar to Margaret, and with the 1,800-h.p. which powered Miss America II, he will obtain a boat perhaps 15 knots faster than Miss America II." These remarks were made after Mr. Guasti had plotted curves on the performance of most of the hydrods in America.

There is so much detail to arrange in connection with these plans that it is impossible for us to give the complete drawings and specifications in a single issue. Herewith we give the preliminary plans and in June we will finish the set and give complete building directions for this champion boat.

A boat of this kind is a comparatively simple one to construct, although it is absolutely impossible for you to vary from the lines a particle without its seriously effecting the speed of the boat. Whatever else you do, don't make a single change without writing us for advice. If you have some other engine in mind and want to know whether it will be suitable, let us know the exact bore and stroke, the number of cylinders, the extreme revolutions per minute and the exact weight. Exact! Don't guess!
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(Concluded from May)

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Note—We cannot guarantee safety, speed nor seaworthiness of this boat if built at variance with the drawings and specifications. If changes are contemplated we should be consulted.

In THE May issue we described the wonderful racing record of Margaret III and told you something of the sportsmanship of her owner, L. E. Selby of Pekin, III, and her designer Chris C. Smith who gave us the privilege of reproducing her plans so that all boat enthusiasts could build a hydroplane of the highest class. Although this is being written only about two weeks after the preliminary plans in the May issue have been in our readers hands, the response has been remarkable. We never knew there were so many red-blooded men with the love of speed inborn.

We believe the racing of small hydroplanes will be given a great impetus by the publication of these complete plans and specifications and we earnestly ask that every one who contemplates building a Margaret drop us a line immediately advising us of the fact. It may be possible that a little later we will try and arrange races between boats built to these plans. A series can be run in various localities and then the winners can possibly get together for a Championship meet. At any rate it will be of the utmost value to you to advise us of your intention of building, for we will arrange to notify every builder of any information which will be of value to them as the work progresses. We would also like to be advised immediately if there is any help we can render to builders. Although the plans and the specifications have been carefully checked over, it is humanly impossible to guarantee the absolute accuracy of the drawings or the specifications. If errors should happen to creep in we wish to hear of them at once so that we may correct them and notify all builders.

It will be of the greatest assistance to our effort to popularize class racing of these boats if you will co-operate with us with whatever information you may obtain and also let us have photographs of the boat, either running or under construction.

Professional boat builders will probably not find it necessary to lay down this boat full sized on the floor in chalk, as they will construct the frames and other parts directly from the drawings. Amateur builders should not attempt to do anything with the actual construction until they draw the lines of the hull on a smooth floor in chalk, full size. The lines can be drawn full size on a roll of heavy wrapping paper if the smooth shop floor is not available. In either case the body lines, shown on each side of the Offset Table, must be drawn full sized on wrapping paper. It is only necessary to draw one-half the section, as both sides are of course alike. You will note that the Offset Table only gives dimensions for one side of the frame. In drawing the body lines on paper, do not draw one on top of the other as shown on our plans, but make each one separately, with its own center and base lines and then cut out so that you have an accurate shape of every frame. After all are cut out, draw a line 5/16 of an inch in from the bottom and sides and cut off the strip between the two lines. This makes the deduction for the thickness of the planking, as the lines and offsets are made to outside of plank. At the top cut off a strip the same width to allow for the covering board or planksheer. The remaining pattern will be the exact shape to which the frames will be made. Be sure to mark each pattern with the proper number and also to mark the frames when made with that number and also with the centerline so that they can be set up properly on top of the keel.

We believe the construction is plainly shown in detailed plans and further described in the following specifications. In case anything seems vague, write us for help immediately.

SPECIFICATIONS

**Inner Keel**—White oak 3/4 in. thick and 4 in. wide. Tapered gradually from frame 9 to the stem width. After the frames are set up the bottom of the keel will be beveled off so that the planking will lie flat.

**Outer Keel or Filler**—White oak 2 in. by 3/4 in., screw fastened to inner keel and shaped on outside to follow angle of bottom planks.

**Step Construction**—All pieces of white oak. The main step-piece is 3/8 in. thick running from side to side inside the planks. It notches over the forward half of the keel, the latter being screwed into it. The step-backing is 3/8 in. by 1 3/8 in. and bolts to the step-piece after notchting over the after keel. The shutter piece is 1/2 in. thick and is screwed in place after the fore and after planking has been put on. Screw to the step piece. Planking is screwed to step-piece and step-backing with 3/4 in. No. 7 brass screws.

**Stem Knee**—Natural growth hackmatack knee 2 in. wide and shaped as shown. Make a paper pattern of this from the full-sized lay out on the floor. The stem should be carefully rabbeted for 5/16 in. planking and fastened to the keel with at least 3 through bolts through filler, keel and knee. The joint between knee and keel must be laid in white lead and very carefully made.

**Transom**—Mahogany or oak 3/4 in. thick and in one width if possible. If a wide enough board cannot be obtained, make it of two pieces held together with 3/4 in. dowels. Place several oak cleats up the transom on the forward side to prevent checking and warping. A cleat should also be screwed fast on the forward face of the transom to provide a little greater width for the after
Margaret III

Lines and Offsets for the Construction of the World's Record Holding Hydroplane Designed by Chris C. Smith. It Must be Borne in Mind that Offsets are Given to the Outside of Planking and to Top of Covering Board. After Paper Patterns are Made for Each Frame, the Thickness of Planking and Covering Board Must be Deducted. The Drawing is Reproduced to a Scale of 1/2-Inch Equal 1-Foot.
Margaret III

Inboard and Beam Plan Showing the Method of Construction Used on this Wonderful Boat. Note the Full-Length Girders to Which the Engine Beds are Attached. The Proper Fitting and Fastening of these Girders is of the Utmost Importance. The Numerals on the Line Between the Two Plans Give the Frame Numbers Corresponding to the Offsets and Lines. In Building this Boat Be Sure that the Engine, Rudder, Seat and Tank are Installed Exactly in the Same Fore and Aft Position as Shown. The Drawing is Reproduced to a Scale of 1/4-Inch Equal 1-Foot.
Margaret III

Cross-Section Through Step, One-Half Actual Size, Cross-Section Through Keel, One-Half Actual Size, Cross-Section Through Hull, 1½ Inches Equal 1 Foot, Drawings For Strut, 1½ inches Equal 1 Foot, Drawings for Rudder, 3 Inches Equal 1 Foot. In the Case of the Strut, Patterns Will Have to be Made From the Boat to Insure a Proper Fit. The Rudder Can be Made from the Drawing, the Length of the Post Being Taken from the Boat.
ends of the planking to bear against. Notch transom over the keel the same as with a frame but be sure to get a water-tight job by using white lead.

**Bottom Frames**—All frames are of spruce and are sawn to shape. The bottom frames are in one piece from chine to chine, 2¾ in. wide and ¾ in. thick. Notch over inside keel and screw fastened from the outside.

**Side Frames**—Of spruce same dimensions as bottom frames. Fasten to bottom pieces as shown with two bolts and notch at the corner for the chine. Note; On the original boat the side frames from about No. 7 forward were slightly hollowed on the outside to provide a little flam to the forward sections above water. As this point is one that makes no difference to the speed or seaworthiness of the boat we have eliminated it to save labor. Those who wish a fancy hull can arrange this curvature to suit.

**Seam Battens**—Notched into every frame and also into stem knee and cleats on the forward face of the transom. Of spruce ½ in. thick and 1½ in. wide. Fastened to frames with ½ in. No. 7 brass screws. Spaced 5½ in. centers on bottom and 6 in. centers on sides.

**Bottom Planking**—Philippine mahogany in single lengths dressed 5/16 in. thick. Fastened to frames and seam battens with ¾ in. No. 7 brass screws closely spaced with the heads perfectly smooth with the outside.

**Side Planking**—Same as bottom planking except of white pine. Can be made of mahogany if desired. The lower edge of the lower side plank rabbets into the chine as shown.

**Chine**—Yellow pine, 1 in. by 2 in. notched into all frames, and stem and stern cleats. At the stem it must be tapered so as to not notch too deeply. The upper outer edge is rabbeted to suit as shown. Planking extends over the bottom without a rabbet. The forward chine pieces run from the stem to the step. The after chine pieces run from the transom past the step and fasten to frames 5 and 6 to help strengthen hull.

**Deck Beams**—Spruce, ¾ in. by 3 in. fastened to frame heads and cut to the curvature shown on the construction plan. An extra beam carries the coaming between Nos. 7 and 8 as shown.

**Coaming Braces**—Short pieces of ¾ in. by 2 in. spruce fastened to frame heads in way of cockpit to support covering board and brace coaming as shown.

**Decking**—Located as shown, same thickness and material as planking, covered with 6 ounce canvas laid in marine glue or white lead.

**Planksheer or Covering Board**—Same as decking, 4¾ in. wide. Canvas covered.

**Girders**—Full length of hull as far as possible. Spruce 1¾ in. by 6 in.-notch down ½ in. over every frame, bolted through every frame with ½ in. in galvanized bolts and screw fastened to transom. As the strength of the boat depends upon these girders it is necessary to have a perfect fit and clear material.

**Breast Hook**—Spruce, ¾ in. thick fitted between upper seam battens at the fore end and against the stem as shown. Screw fastened from outside the plank.

**Engine Bed**—Spruce 1½ in. by 8 in. bolted to girders and shaped to take engine base. In case the engine used is not a Pierce-Budd 18-25 h.p. the bed will have to be arranged to suit the machine.

**Coaming**—Mahogany ¾ in. by 3 in. Set so as project ½ in. above covering board. At the fore end is rounded and backed up by a filling piece to suit.

**Flooring**—½ in. by 6 in. strips laid down in the w of walking space and screwed to frames.

**Moulding**—1 in. mahogany half round all around sheer line over the heads of the tacks holding down the canvas. Screw fastened.

**Rudder Bearer**—Oak ¾ in. by 7 in. Screwed girders. This piece takes the strain of the rudder.

**Tank Chock**—Two pieces of spruce ¾ in. support by posts from the girders and forming a saddle for tank.

**Seat**—Mahogany 1¼ in. thick resting on two rise screwed to the frames and set at a convenient angle. The fore and aft location must be the same as shown.

**Steering Gear Support**—1½ in. spruce fastened No. 3 frame and shaped to support steering wheel as any desired instruments. Extends from side to gird only.

**Cleats etc.**—A 5 in. brass cleat will be fastened to the forward deck with an oak block under to take the strain. There is a ring bolt in the transom for strop painter. A handle for the mechanician is fastened on the starboard side on top of covering board, which is reinforced on under side to take strain.

**Shaft Log**—Self-aligning with stuffing box. Bronz

**Rudder Post**—Brass pipe of size to allow 1 inch rudder post to work easily inside. Thru hole from keel and fitted with lock-nut above and below rudder bearer and flush lock-nut on outside and inside of keel.

**Tiller**—12 in. long of bronze with sliding collar. Keyed to top of rudder post or fitted over a square and screwed.

**Rudder**—Located 4 feet 8 inches forward of stem. Shaped as per detailed drawing. 1 in. diameter bronze stock 12 in. long. Blade 3/32 in. thick.

**Strut**—Special bronze casting as per details with babbitted bearing. The fastening bolts are to be passe through oak reinforcing blocks on the inside.

**Steering Gear**—1¼ in. diameter wheel with wood drum and controls in center of wheel. Tiller line is ¾ in. bronze cable passing over 3 in. diameter sheaves.

**Gasoline Tank**—Set in after deck. Galvanized iron 11 in. diameter. 20 in. long. Strapped down.

**Engine**—Three cylinder 4 in. by 4 in. Pierce-Bud two cycle high speed model directly connected to shaft without reverse gear. Shaft angle must be taken from boat so that fore end of engine base is 34 in. from the step measured on the inside and at the same point 9¾ ft from top of keel to center line of shaft.

**Propeller**—Two blade, right hand, 15 in. diameter, 2 in. pitch.

**Propeller Shaft**—Steel for fresh water, bronze for salt. 1 in. in diameter.

**Paint and Varnish**—From the water line down the boat should be coated with the best racing composition or pot-leaded. Above the water line and inside it can be treated with either three coats of paint or four coats of varnish. It is of the utmost importance that all outside surfaces be finished glass-smooth. Rough planking will cut miles off the speed.