

# AMYA Classic VM – Timeline

## 1981-1985

### 1981 Spring #43

John Davis – Class Secretary

6. Chuck Haling, Rockford, Mich. #1793  
(Magic Dragon) 64
7. Chris Jensen, Itasca, IL #1914 (Toad)  
67 1/2
8. Max Lewis, Sydney, Australia \*1040  
(Magic Dragon) 77 3/4
9. Gene Dunham, Waterloo, IA #1794 (Magic  
Dragon) 78
10. Dan Abma, Comstock Park, Mich. #1952  
(Magic Dragon II) 91
11. Bob Girdley, Mesa, AZ #1908 (Magic  
Dragon) 93
12. Norm Marklewitz, Wichita, KA #508 (L.J.)  
96

One last point about Divisionals and ACCRs: Now is the time for club members to discuss the possibility of hosting a Divisional or an ACCR for 1982. It is never too early to express your interest, and not that many months before I award the 1982 Regattas.

Several questions relating to clarification of our new class specs have come to my attention which need to be covered. First, just what were the main things our new specs affect? Mainly three: sail numbering, the bumper, and batten spacing.

On some older sails, battens on the leech were not evenly spaced as is now required. This spec will be enforced at Divisionals and the ACCR, but these older sails are probably losing their competitive shape by now and are hopefully due for replacement. Now is the time to check yours.

The way the new specs are worded, the bumper is considered as integral a part of the yacht as the hull, mast and sails, and is a mandatory requirement. Its purpose is to prevent damage in collision between models. Many ultra-light hulls now sailing will sustain serious damage with the impact of a bumperless boat. It is relatively easy to add a bumper to your hull. It can be made of any type of material such as cork, high density foam, RTV sealant, casting rubber, several layers of servo tape, etc. Bumpers must be above the waterline when the boat is in a static mode; they are not included in the overall length measurement of 50" +/- 1/4"; and are limited to 1/2" overhang.

Sail numbers: Putting the US in front of a number without ones in it just does not fit most sails, as illustrated by our new

specs. It is acceptable to put the US below the M and its underlining bar, and above the sail number:

|      |                  |
|------|------------------|
| M    | -----1" tall     |
| US   | -----2 1/2" tall |
| 2300 | -----2 1/2" tall |

The primary purpose of sail numbers is, of course, yacht identification while racing. Larger numbers are better for visibility. 2 1/2" tall is an odd size for ready made numbers. If you must use other than 2 1/2" tall numbers, then go to 3" numbers. Less than the spec is not acceptable.

I have received word that there are some minor changes to the "International" M specs. Last year we adopted the M specs as they then stood. Any changes to the specs will be submitted to our members for approval on the 1982 ballot (since this information was not received in time for this years ballot). As your class secretary I am obligated to let you know where I stand on important issues and this is one of those times. I agree with the AMYA principle of maintaining class autonomy and control. I also agree with the principle of making every reasonable effort to be in unison with "International" M specs. To some skippers that will seem conflicting, but let me explain: The origin of our Class was in Marblehead, Mass., developed by Roy Clough in the 1930's. Marblehead 50/800 is a truly international class and a very real part of our heritage. When I voted to re-adopt "International M" I voted to reclaim that heritage, not to accede to any particular group. There has been much concern about the pros and cons of international affiliation. I do not oppose IMYRU affiliation and am willing to give it fair evaluation. However, our AMYA Constitution provides for class autonomy and the democratic vote by class members to decide what we will accept as our rules. We control our class. I strongly believe in and will follow those principles in matters concerned with governing our class.

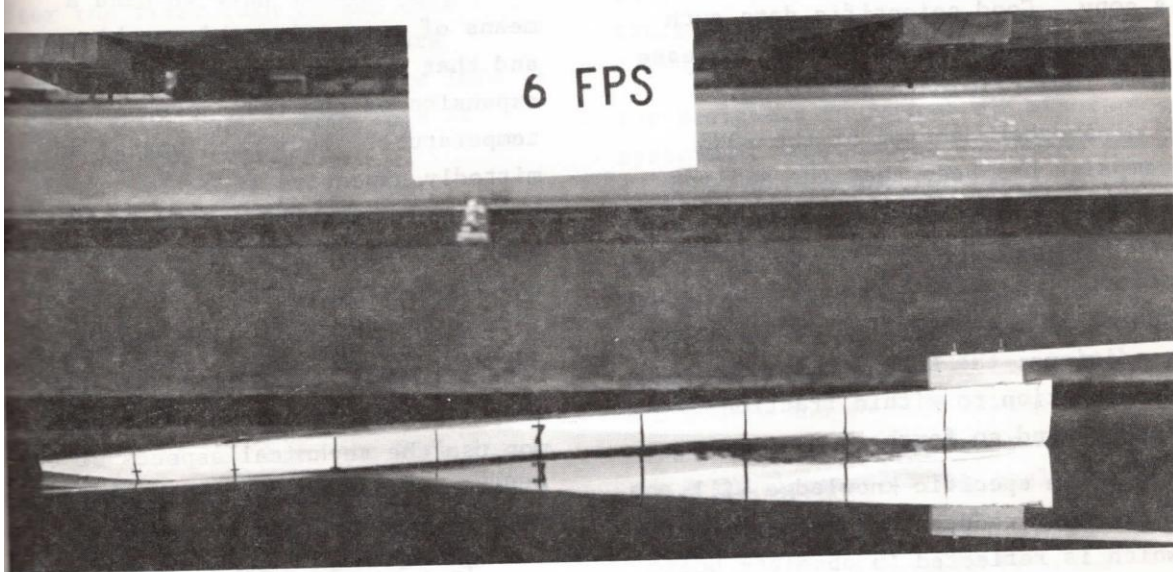
One last note: I hope you all find our new Yacht Registration cards acceptable. Aside from the "nautical" trimming, the real benefit is quicker delivery to you because of reduced paperwork. When you want a hull/sail number, you want it fast, and that is the way I want to get it to you! As ever, if you have any questions or comments, please write. I am at your service.

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Accepted IMYRU M rule but changes will still be voted on by AMYA members.

## DESIGN AND DEVELOPMENT IN THE 50/800 CLASS

by KARL L. KIRKMAN



### BONE MODEL UNDERGOING TESTS IN SHIP MODEL BASIN

With victory in the 1981 ACCR for the 50/800 Class, the BONE Syndicate achieved a goal set in winter 1978 and concluded what is probably the most extensive campaign ever waged in radio-controlled model sailboats.

The BONE Syndicate had brought to bear sophisticated computer design techniques, towing tank tests, custom-built electronics, the most exotic of construction, and an exhaustive program of sailing trials in order to develop the best possible all-around boat. Such an effort is beyond the reach of the average

hobbyist; in fact the campaign involved four naval architects and four former AMYA ACCR winners in the push for the best. However we believe that such an effort, carried out for absolutely no financial return in a class where development is the object and where the results are then made freely available to others as in this article strengthens the sport.

For example, our towing tank tests have shown that part of the "boat of the month" problem can probably be attributed to the fact that some good sailor gets a new



boat going by hard work when the hull does not actually represent any hydrodynamic improvement and then everyone feels compelled to jump to a copy. Good scientific data such as towing tank tests should decrease this indiscriminate switching.

Another benefit of the BONE campaign has been that the sailing experience has been thorough and systematic enough that we can probably select bulb weight to within a few tenths of a pound of optimum for any conditions; the keel length, chord and location to within fraction of inches, and so forth.

Such specific knowledge will ultimately reduce the uncertainty which is reflected in obsolete boats and wasted investment.

The BONE XI's raced in the 1981 ACCR represented new levels of weight reduction, 4.17 pounds all up including rig (excluding ballast) but this was done without extreme compromises in structure. The five BONE XI's raced hundreds of races in preparation for the ACCR in all kinds of conditions without a single failure except from collision damage, and none ever failed to complete a race even with severe collision damage such as a holed deck, a broken keel from collision with a full-size boat in heavy air, and a broken mast bulkhead from crossing mastheads in a good breeze in a port-starboard crossing. It is true

that the hulls required storage in a humidity-controlled atmosphere because of a distortion problem, but we believe we have in hand a means of correcting this problem and that of keel distortion due to expansion of the foam cores at high temperature. Thus such boats, admittedly expensive to build, should have good competitive life expectancy and high reliability despite the light weight.

The purpose of this article is not to recount the events but collect together and present for common use the technical aspects of the effort so that others can build upon them in the future.

In a broad sense, the design of a boat includes not only the plans but the construction and tune-up so that the boat reaches its peak performance just at the start of the chosen major competition in this case the 1981 ACCR, and some of these aspects will be included herein. Thus, more than naval architecture, radio control systems or sailmaking is required; the designer must put the whole package together in harmony.

The process of proper design is actually a convergent spiral as described in detail in Rod Carr's "Strictly Sail" Column in the June 1979 R/C Model Builder". Starting with dimensions, the designer checks weights, sketches a structure, lays

ut a hull shape, selects a rig, checks stability, estimates speeds in various points of sail and arranges machinery within the hull. After the first turn around this cycle (if his first choices are good) the design will converge into a competitive boat. From this it should be clear that:

- o an ill-conceived first-cut design cannot be "forced" to work and must be abandoned.

- o one cannot design only hulls, rigs or keels; a whole system must be assembled.

The designer must not work in a vacuum, he must exercise the skill to observe variations between yachts and to identify what features are good and why they are so. Thus, persons who drag interminable successions of lines plans down to the club or engage in willy-nilly copying of features of hull, rig or appendages are not designers who are likely to win a pre-selected competition.

Be aware that the planned-for competitive victory must be fixed in time so that the campaign can be focused and so that whatever edge a design enjoys will not squandered by premature exposure, and that if success is not achieved at the chosen regatta the boat will probably need further improvement to hold its chance of victory in the future.

The BONE family has included a number of extreme departures from conventional designs, each one tried in an attempt to a "breakthrough" boat and many of which were distinct failures.

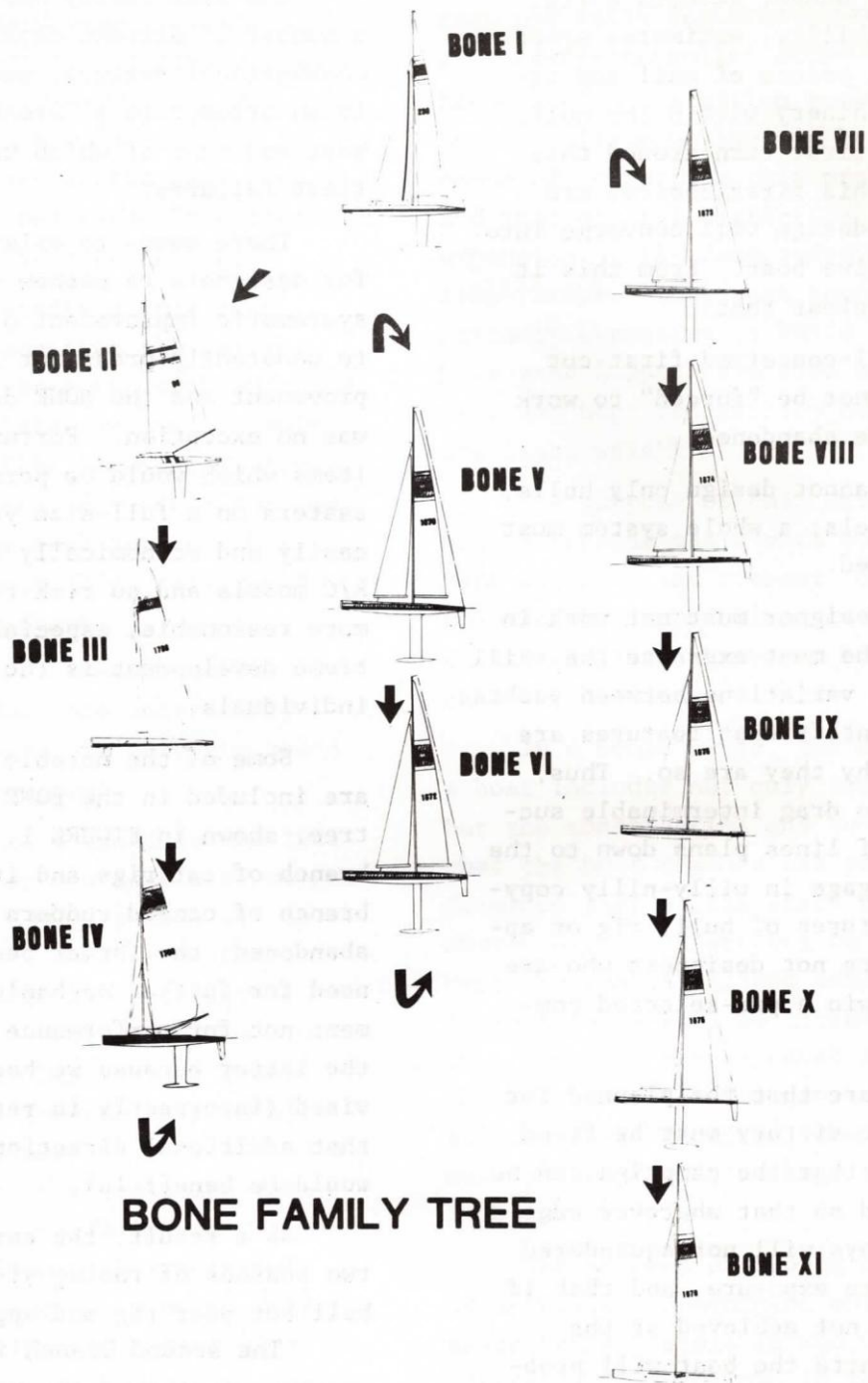
There seems to exist a tendency for designers to eschew the minor systematic improvement of yachts and to constantly press for large improvement and the BONE design team was no exception. Fortunately, items which would be permanent disasters on a full-size yacht are easily and economically remedied on R/C models and so risk-taking is more reasonable, especially when extreme development is the goal of the individuals.

Some of the notable failures are included in the BONE family tree, shown in FIGURE 1. The early branch of cat rigs and its sub-branch of canard rudders were both abandoned; the former because of the need for further mechanical development not for performance reasons and the latter because we had been advised (incorrectly in retrospect) that additional directional stability would be beneficial.

As a result, the entire first two seasons of racing yielded a good hull but poor rig and appendages.

The second branch involved a narrow version of the hull lines which was outstanding in heavy air but distinctly unimproved in light





## BONE FAMILY TREE

FIGURE 1- EVOLUTION OF BONE DESIGNS

air. This hull was developed by intuition from the original lines which had been tank tested but because of schedule considerations the new lines were not tested. This was a serious error in judgment as later tests were to confirm since we had succeeded in replacing the only part of the original boats which showed outstanding all-around potential with a one-condition configuration. Again, this thrust had to be abandoned at the cost of one winter season of racing in San Diego and an enlarged credibility gap. On the other hand this branch demonstrated the weight savings of KEVLAR fibre reinforcement which has been used in all subsequent boats.

All of this led us back to lines much like BONE I but with rather unconventional appendages; a deep high-aspect ratio keel blade and a slender laminar-flow body of revolution bulb. This combination showed some promise but because of the small cross-section of the keel a serious flutter problem showed-up; at high speeds-the boat would begin to oscillate rapidly in roll, shaking the rig violently.

While solving the keel stiffness problems, a larger keel section, BONE VIII, was built to evaluate the tacking performance, balance and speed of this arrangement and this boat was eventually replaced with BONE IX which reverted to the small keel-section after the flutter prob-

lem was solved.

The only remaining weakness of the boat was light-air performance which was solved by shortening the keel span at some sacrifice in stability to get reduced wetted surface and this boat, BONE X, was very competitive.

Based upon good results with the single BONE X, five copies of BONE XI (#1967-1971) were constructed in winter/spring 1981 which had additional weight reductions over BONE X by the utilization of a special KEVLAR/Carbon Fibre mat in the hull lamination, 1/64th inch plywood decks and simplification of the internal structure. These boats were built with 6.8-pound keel weights originally, but when this proved insufficient in medium air 7.5 and 8.2 pound bulbs (all interchangeable) were provided for differing conditions.

The 3.2-pound bulb was built first and air-freighted to San Diego for the Western Divisionals arriving the day before the regatta. With virtually no tuning, this BONE XI (#1970) finished third in the regatta and showed excellent speed.

The first regatta for the BONE XI with the final 7.5-pound bulb was the Canadian National Championship where boat #1970 finished with a score of 17 first places of 20 heats. This identical boat using a max height MYLAR rig won the U.S.



National Championship at Port Washington in August 1981.

As can be seen from this rather lengthy development the importance of top-notch competition to test boats and evaluate approaches is absolutely necessary. In this case boats were built in Maryland and then air-freighted to San Diego for test sailing and racing. An essential key to this rather circuitous process was willingness of the sailors to attempt to race some quite mediocre boats and to provide feedback to the design/construction team in the form of observed performance not suggested changes. Our team never broke faith that; on the one hand, the boats were well sailed and if they did poorly it must be because they needed changing, and on the other hand that the designers could be trusted to interpret reports of performance and decide on design changes.

With this general overview of the BONE development, we will now present technical details of various aspects of the design:

- o Hull Form
- o Appendages
- o Stability
- o Weights
- o Construction
- o Rigs
- o Stability & Control

Each will be discussed in detail with supporting data in the following sections:

## Hull Form

In developing a hull form for a model yacht, one must resist the temptation to simply incorporate features of full-size hull forms. This is true for two reasons:

1. Many full-size hulls have had the lines influenced by arbitrary measurement criteria which result in a hull that is best for its rating rather than a hull which is inherently low in resistance in an absolute sense, and
2. The interaction between wave flow and viscous flow is entirely different on a model than on a full-sized yacht. These differences sometimes called "scale-effects" have been the cause of a great deal of difficulty in interpreting the tests of small models for designing large yachts such as Americas Cup 12-Metres and must be understood in order to design a good model hull. A more complete description of the relevant hydrodynamics appeared in Rod Carr's "Strictly Sail" column in the August & September 1979 issue of R/C Model Builder Magazine.

The hull form development for the various BONES began by a survey of existing competitive hulls and the development of lines based upon hydrodynamic considerations. Of course, lines cannot be developed without a preliminary weight estimate and for this purpose an exist-

ing boat was disassembled, the parts weighed and estimates made of possible weight savings so that a target displacement could be established.

In philosophy, the decision was made to go for a low displacement-length ratio for good heavy air and off-wind performance but to break with tradition and keep a very narrow beam. Traditionally, light boats had gone to great beam to get adequate stability with the result that light-air performance was poor because of excessive wetted surface. By keeping the beam-draft ratio small, the resulting circular hull sections minimize wetted surface and stability is achieved by deepening of the keel fin and hence lowering of the VCG. As a result, the BONES weakest point was expected to be light-air and this was borne out in early racing.

In terms of longitudinal distribution of displacement, two precepts were followed; the hull was given a curve of areas much like a laminar-flow (low Reynolds Number) body of revolution, and the submerged transom used on the 12-Metre MARINER was adopted. This was done because the form was believed to have tank-tested well on a small model about the size of a 50/800 and despite disastrous performance on the full-size boat because of what we expect are scale effects in data expansion.

Using these considerations as inputs hull lines were developed and a plug and mould built from which BONE I was constructed.

These original lines were used, unchanged except for adjustments in freeboard/shear for BONE I, II, III, IV.

To confirm the superiority of the lines, towing tank tests of upright resistance were conducted in the HYDRONAUTICS Ship Model Basin at a displacement of 15 pounds for a number of then competitive hulls. The resistance curves for these, shown in Figure 1, were originally presented in Model Airplane News in the late Bob Harnis's column.

As development of the BONES proceeded, it became clear that a 12-pound boat was achievable and to exploit this, a new set of lines was drawn and hulls built incorporating approximately the same transom area as the earlier hull but smaller cross-sections and beam.

Such a hull was incorporated in BONE V without tank-testing and the boat was a poor performer in light air. When this became clear from a number of races, a towing-tank model of this hull, (MK5), was constructed and tested and not surprisingly showed poor resistance characteristics in light air conditions. Refinements to this hull to cut-down the transom area, MK6,



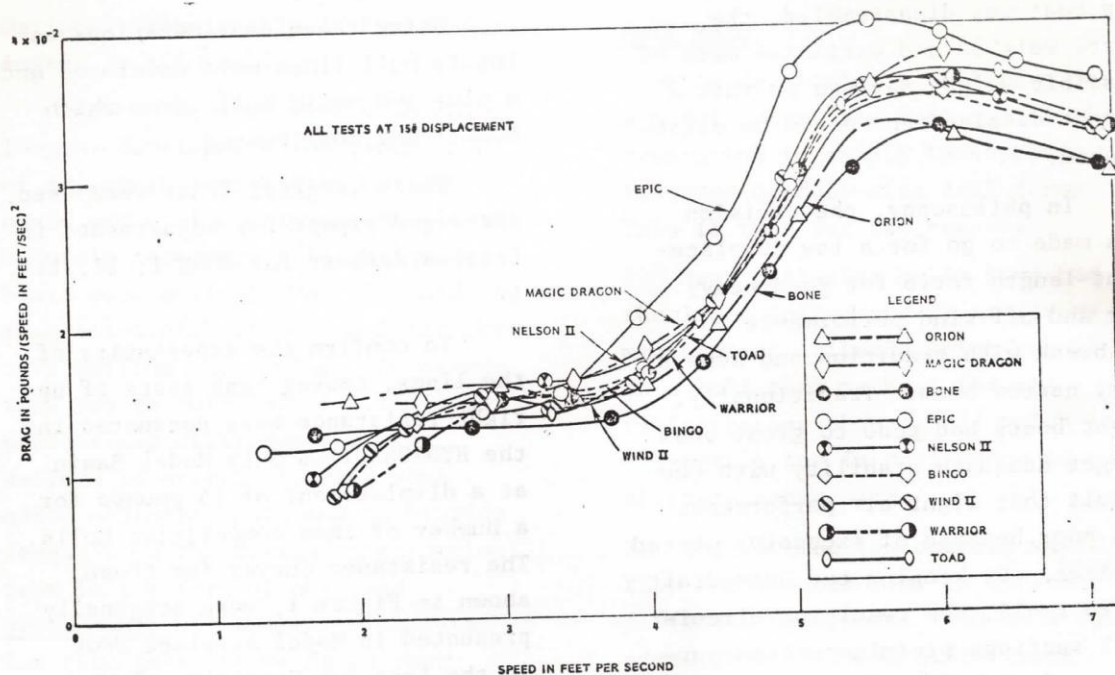


FIGURE 2 - UPRIGHT RESISTANCE FOR SELECTED 50/800 HULLS

and to fine-up the bow, (MK7), could not get performance to match the original lines floating with the transom out-of water, (MK4), as shown in the resistance data from towing-tank tests in Figure 2, and the narrow hull was abandoned.

This experience was a major setback to the BONE development in the sense that much effort in construction and testing was wasted and the boats were pretty well discredited. An unexpected advantage was that, with the hull performing so poorly even when extremely well-sailed there was no effort to copy the type and the large competitive advantage available only as long as

the boat was diverse was maintained right up to the 1981 Canadian and U. S. National Championships.

The final refinement to the hull form was to fine-up the forward waterlines above the normal flotation plane so that the hull could punch through the wakes of other boats in crowded situations such as in starts and at leeward marks without a speed loss.

The final lines as drawn by a computer lines fairing process are shown in Figure 4.

In addition to maintaining the displacement distribution and wetted surface as described above, an ef-

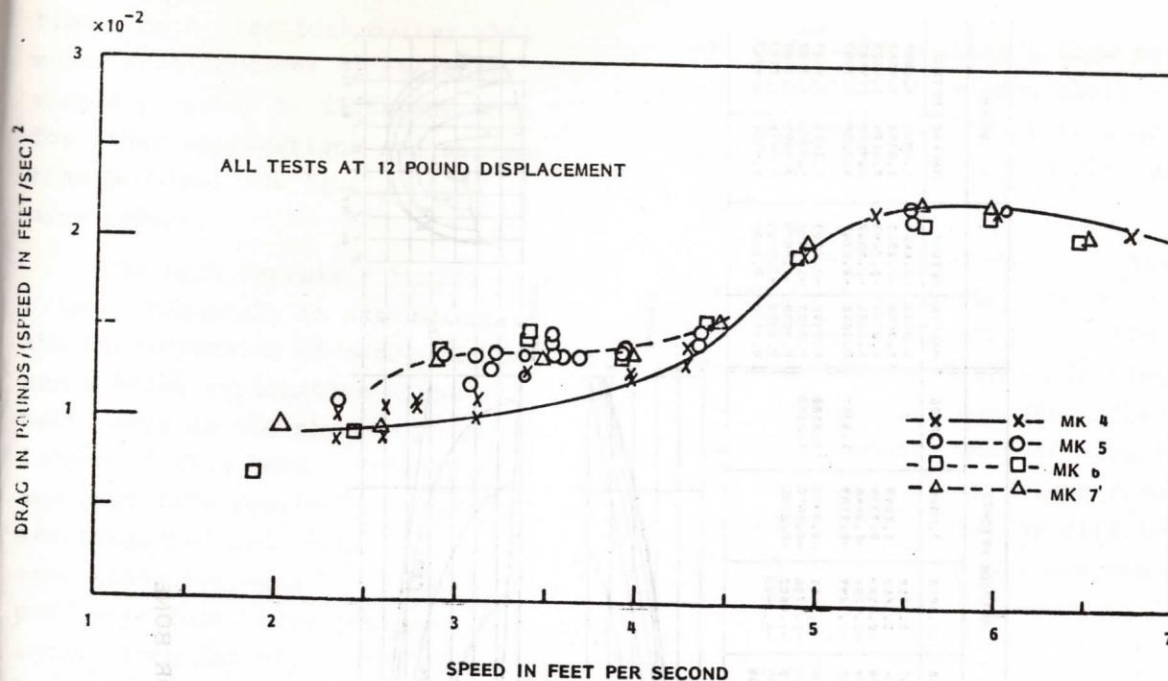


FIGURE 3 - UPRIGHT RESISTANCE OF BONE HULLS

fort was made to balance the ends of the hull so that the boat would control nicely in extreme conditions and particularly to depower the stern sections so that sailing length would be maintained at large heel angles. With a more powerful stern shape (i.e. beamer, flutter section) the longitudinal center of buoyancy would shift aft as the hull heels and it would bury its nose and shorten the effective sailing length of the hull. To check this, the model was ballasted at different heel angles in a tank of water and the length of the waterline checked at each. For the BONE hull this length is virtually unchanged whereas for some more powerfully

sectioned boats the length actually shortens as they heel. The narrow stern also makes for minimum generation of moments when the boat heels and has given a hull which can be sailed to weather in gusty air quite nicely.

#### Appendages

No where in a model yacht is the issue of scale effects more important than in the design of an appendage suite.

In particular, the Reynold's Number which characterizes the flow on the appendages in full-size yachts, aircraft, etc. and this must be taken into considera-



| SHIP - BONE |                  | WATERLINE HALF-BREADTHS |         |        |        |        |        |        |        |        |        | CL     |         | SHEER  |        |
|-------------|------------------|-------------------------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|
|             | DISTANCE FROM FP | -2.0000                 | -1.0000 | 0.0000 | 1.0000 | 2.0000 | 3.0000 | 4.0000 | 5.0000 | 6.0000 | 7.0000 | HALF-B | HEIGHT  | HALF-B | HEIGHT |
| STA005      | 5.0000           |                         |         | 0.9299 | 1.4037 | 1.7505 | 1.9619 |        |        |        |        | 0.0000 | -0.6465 | 2.0962 | 3.6907 |
| STA010      | 10.0000          |                         |         | 1.2622 | 2.3709 | 2.7867 | 2.9661 |        |        |        |        | 0.0000 | -1.2515 | 3.0352 | 3.4367 |
| STA015      | 15.0000          |                         |         | 1.8484 | 3.4537 | 3.4336 | 3.5965 |        |        |        |        | 0.0000 | -1.7203 | 3.0518 | 3.1927 |
| STA020      | 20.0000          | 0.3221                  | 1.2640  | 2.9307 | 3.5581 | 4.0943 |        |        |        |        |        | 0.0000 | -2.0062 | 3.0518 | 2.7067 |
| STA025      | 25.0000          |                         |         | 2.9307 | 3.5581 | 4.0943 |        |        |        |        |        | 0.0000 | -2.0767 | 4.1259 | 2.7067 |
| STA030      | 30.0000          | 0.9942                  | 2.9336  | 3.6668 | 4.0508 | 4.1612 |        |        |        |        |        | 0.0000 | -2.0103 | 4.1610 | 2.4607 |
| STA035      | 35.0000          |                         |         | 3.5884 | 3.9630 | 4.0390 |        |        |        |        |        | 0.0000 | -1.8600 | 4.0381 | 2.2167 |
| STA040      | 40.0000          | 2.1079                  | 2.8465  | 3.1450 | 3.5087 |        |        |        |        |        |        | 0.0000 | -1.5075 | 3.5899 | 1.9727 |
| STA045      | 45.0000          |                         |         | 2.1198 | 2.5733 |        |        |        |        |        |        | 0.0000 | -0.8465 | 2.6676 | 1.7267 |
| STA050      | 50.0000          |                         |         | 0.0100 | 1.3421 |        |        |        |        |        |        | 0.0000 | 0.0000  | 1.4534 | 1.4847 |

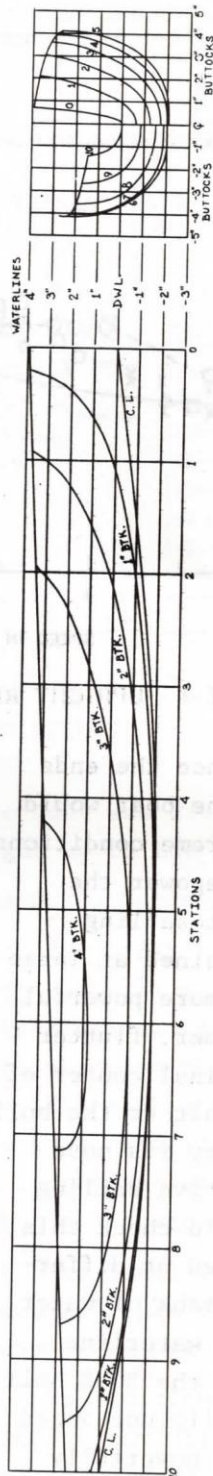
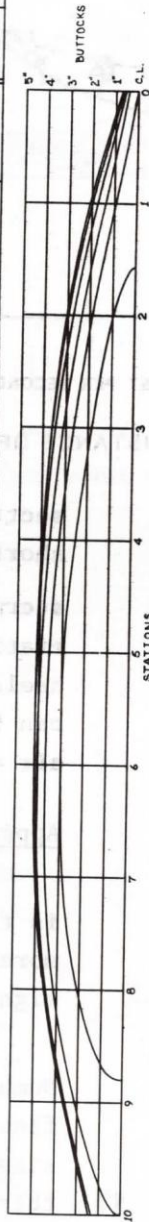


FIGURE 4- LINES PLAN FOR BONE

tion. As a practical matter this means that sections of the foils should probably be different than for other applications and separation problems are likely to be more severe.

The term Reynold's Number arises frequently in discussing the hydrodynamics of model yachts and a brief explanation might help focus on the physical significance of this term. Scientists and engineers routinely "non-dimensionalize" information for comparison purposes; weights per cubic foot, strength per square-inch (or per pound), etc. In the science of fluid mechanics a ratio which is repeated checked in a flow situation is the ratio of dynamic forces to viscous forces called the Reynolds Number. In a "low" Reynold's Number flow, the dynamic forces are small compared to the viscosity of the fluid; think of it as a small keel or rudder being moved through molasses. In situations where this ratio is the same, the flow patterns are similar. For example, the pattern about one keel in molasses might be exactly similar to a smaller keel in a less viscous (more runny) fluid.

Also, when the ratio (Reynold's Number) is different, the flow pattern will be different. Taken together this behavior is described

as "Reynold's scaling"; flow patterns are compared based upon their Reynold's Number not their size or speed of flow, or liquid viscosity alone.

A practical example of this important scaling problem is the extreme change in drag of foils at different foils as shown in Figure 5. This data non-dimensionalized per square unit of area to make comparisons more clear shows a huge change in drag as different Reynold's Number ranges are con-

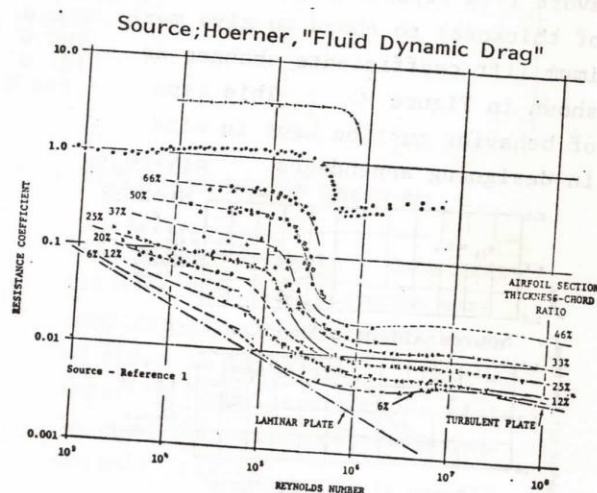


FIGURE 5- VARIATION IN RESISTANCE COEFFICIENT OF AIRFOIL SECTIONS AS A FUNCTION OF REYNOLDS NUMBER



sidered. For Reference, the Reynold's Numbers for a 50/800 in different conditions are approximately as follows.

|        | Light Air         | Heavy Air         |
|--------|-------------------|-------------------|
| hull   | $6.7 \times 10^5$ | $2.0 \times 10^6$ |
| keel   | $4.2 \times 10^4$ | $1.3 \times 10^5$ |
| bulb   | $1.6 \times 10^5$ | $4.8 \times 10^5$ |
| rudder | $2.8 \times 10^4$ | $8.4 \times 10^4$ |

Because of this change in behavior of the flow, the selection of the best, or optimum, shapes for appendages changes for different conditions. For example, in picking a thickness for a rudder to avoid flow separation, the ratio of thickness to chord to give maximum lift coefficients changes as shown in Figure 6. This type of behavior must be kept in mind in designing appendages.

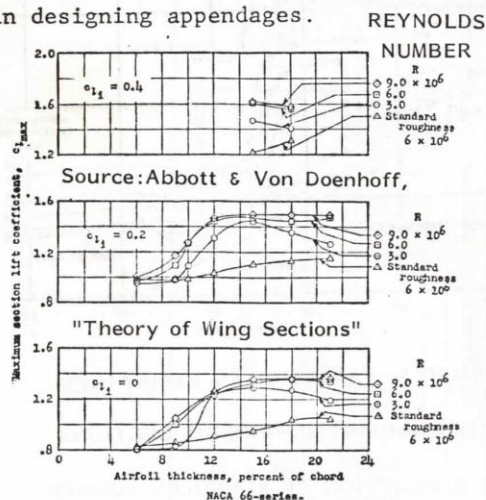


FIGURE 6- VARIATION OF MAXIMUM LIFT COEFFICIENT WITH REYNOLDS NUMBER

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The purposes of appendages are:

1. To generate side force to counteract that of the rig,
2. To extend a lump of ballast sufficiently far below the hull for adequate stability, and
3. To provide turning moments when steering is desired and resisting moments when directional stability is wanted.

Unfortunately many of these objectives are obtained at a penalty in drag and so trade-offs are necessary. In the end, one tries to fit appendages of absolute minimum size so as to lower drag and accepts marginal performance in some of the other areas to some extent.

In order to try to quantify the drag penalties of various appendage suites in performing the design trade-offs of alternate approaches a specialized computer program was written, a sample output of which is shown in Figure 7. This program used as input assumptions a bulb weight and keel geometry, and calculated the resistance components for the resulting hull, bulb and keel taking into account the Reynold's Number of each part and the appropriate drag characteristics. (The rudder was omitted) Because stability (to be discussed in detail later) plays an important part in the decisions, the program

RACING YACHTS  
17500 SKYLINE DRIVE  
SILVER SPRING, MD 20904

50/800-CLASS  
APPENDAGE SELECTION PROGRAM  
THE INPUT ASSUMPTIONS WERE-

|                                   |          |        |        |        |        |        |        |
|-----------------------------------|----------|--------|--------|--------|--------|--------|--------|
| BULB WEIGHT, POUNDS               | 8.00     |        |        |        |        |        |        |
| KEEL SPAN, INCHES                 | 14.00    |        |        |        |        |        |        |
| KEEL CHORD, INCHES                | 3.57     |        |        |        |        |        |        |
| KEEL THICKNESS, INCHES            | 0.36     |        |        |        |        |        |        |
| SPEED IN FPS                      | 1        | 2      | 3      | 4      | 5      | 6      | 7      |
| HULL FRICTION                     | 0.0152   | 0.0499 | 0.1017 | 0.1686 | 0.2515 | 0.3567 | 0.4593 |
| HULL FORM DRAG                    | 0.0020   | 0.0064 | 0.0131 | 0.0218 | 0.0325 | 0.0461 | 0.0594 |
| HULL WAVE DRAG                    | 0.0004   | 0.0086 | 0.0097 | 0.0550 | 0.2047 | 0.5776 | 0.8883 |
| HULL TOTAL                        | 0.0176   | 0.0650 | 0.1246 | 0.2454 | 0.5687 | 0.9805 | 1.4069 |
| BULB DRAG                         | 0.0016   | 0.0052 | 0.0103 | 0.0201 | 0.0314 | 0.0452 | 0.0615 |
| KEEL DRAG                         | 0.0142   | 0.0161 | 0.0319 | 0.0518 | 0.0755 | 0.1028 | 0.1334 |
| TOTAL DRAG                        | 0.0333   | 0.0863 | 0.1667 | 0.3173 | 0.6757 | 1.1285 | 1.6019 |
| R/V2                              | 0.0333   | 0.0216 | 0.0185 | 0.0198 | 0.0270 | 0.0313 | 0.0327 |
| METACENTRIC HEIGHT, INCHES        | = 10.87  |        |        |        |        |        |        |
| RIGHTING MOMENT, IN-POUNDS/DEGREE | = 2.47   |        |        |        |        |        |        |
| HEELING MOMENT, IN-POUNDS         | = 112.33 |        |        |        |        |        |        |
| HEEL ANGLE, STANDARD RIG          | = 45.55  |        |        |        |        |        |        |
| BULB VOLUME, CUBIC FEET           | = 0.009  |        |        |        |        |        |        |
| KEEL VOLUME, CUBIC FEET           | = 0.007  |        |        |        |        |        |        |
| HULL VOLUME, CUBIC FEET           | = 0.191  |        |        |        |        |        |        |
| TOTAL VOLUME, CUBIC FEET          | = 0.208  |        |        |        |        |        |        |

FIGURE 7- SAMPLE COMPUTER OUTPUT OF APPENDAGE DESIGN PROGRAM

also computed the usual stability characteristics and a keel angle for a "standard rig" to give a feel for the stability of different boats. The plot in Figure 3 shows a breakdown of the components of drag for a typical 50/800. Note how the drag of the keel becomes very large at the low speeds typical of drifting conditions. This shows the problem with a small deep keel (the example was for a 3.5" x 14.3" keel blade with 8-pound bulb).

In order to validate the equations in the computer program for

hull drag, towing-tank data measured for two displacements were compared to computer predictions as shown in Figure 9. Another important consideration for keels is the area and hence the hydrodynamic loading.

In the first BONES, a keel area of approximately 50 square inches was used. These boats lost speed badly when tacking for other reasons and, as a result we adopted a larger keel area (about 75 square inches) because stall and large sideship was evident after a tack.



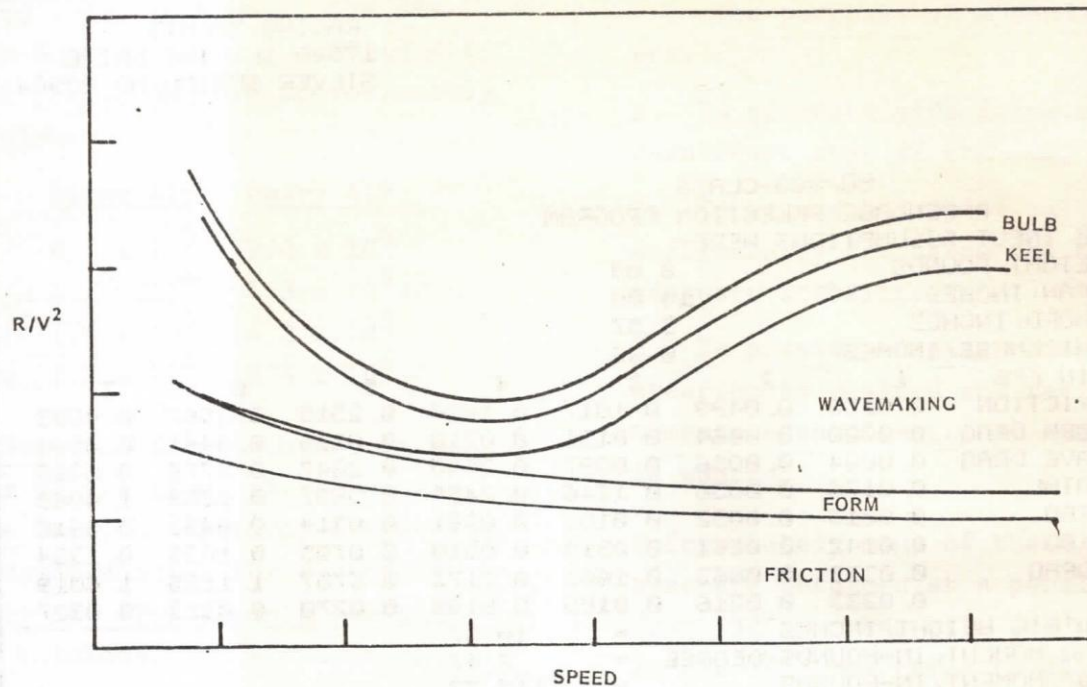


FIGURE 8- TYPICAL DRAG COMPONENTS

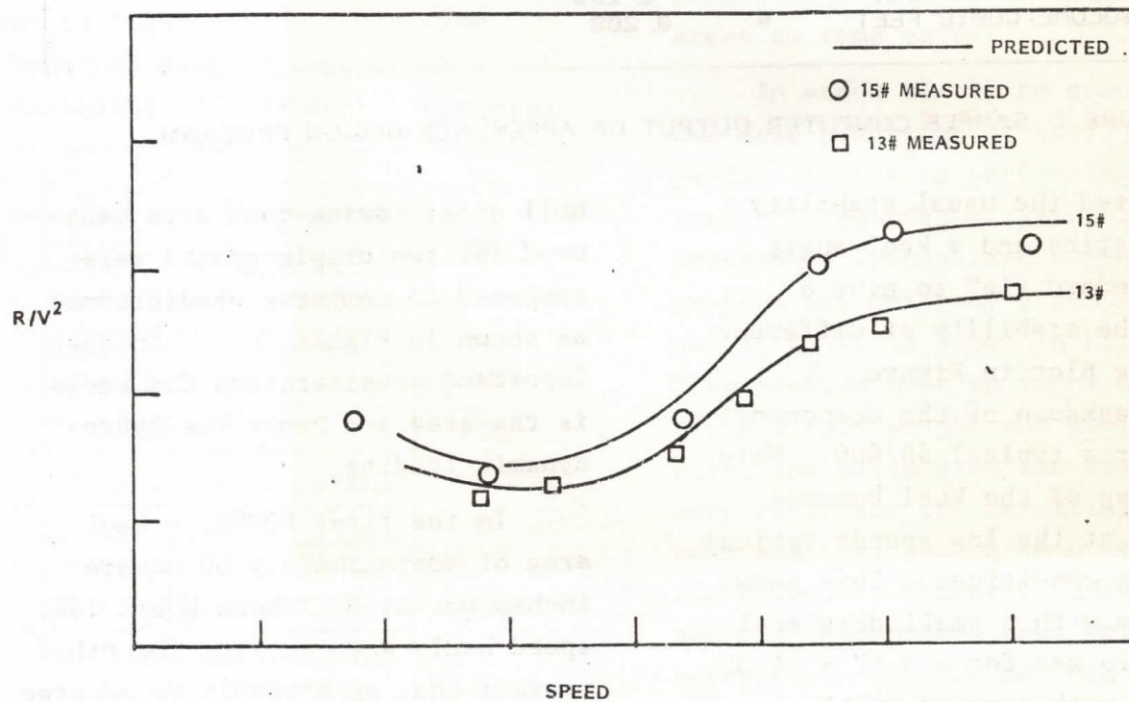


FIGURE 9 - COMPARISON OF PREDICTED AND MEASURED HULL DRAG FOR BONE AT  
52 TWO DISPLACEMENTS

Since the large keel is quite good at high speeds because it "hides" volume down low where there is little wavemaking, this area was carried over to BONE V where it absolutely destroyed the light-air performance when combined with the poor hull-form. Once this problem was documented we returned to the 50 square-inch keel and ultimately reduced this value to about 45 square inches on BONE XI. The final keels had a span of 15-inches, a chord of 3 inches and a 10% t/c ratio and used an NACA 66-0010 section.

Holding this small keel area with a long keel span and small chord means that the keel is of extremely high aspect-ratio and this created its own special problems in addition to the obvious structural and flutter problems described later. One benefit of a high aspect-ratio is a high efficiency because induced drag is reduced but the keel has a higher "lift-curve slope". That is, for a certain angle of attack, the keel generates more lift than a lower aspect-ratio keel and consequently, max lift coefficient and stall are reached more quickly; the keel is more "cranky" to sail. Thus the boat is harder to keep on edge in windward sailing and is more demanding to race. Another indirect effect is that, since the keel develops its maximum lift at a

smaller angle than is ordinary for model yachts, the point of best speed-made-good to windward also comes at a smaller angle. The result of this is that the yacht makes less leeway and the sails must be trimmed wider to compensate. All of this takes a great deal of learning in the sailing department.

The rudder for most BONES is also a high-aspect ratio foil and may suffer from flow breakdown (and apparent loss of control) if the helm is put over too quickly or too far. A heavy-air rudder was also designed which incorporates a lower aspect ratio and sweepback to help the loss of control, but this was not used because it would have an efficiency penalty.

### Stability

Because it is an unmeasured and untaxed parameter in the 50/800 rule and because it contributes so very much to performance of a boat in anything other than drifting conditions, stability is an important consideration for these boats.

One peculiarity of the rule measurement of sail area: failure to measure roach area, means as a practical matter that a boat carrying a tall rig gets more actual sail area than a boat with a short rig. This, coupled with the higher efficiency of a tall rig, area-for-area, which will show up as better



pointing angle has pushed competitive boats to the max rig height within the class rules. Whereas a competitive boat of five years ago might have carried a 78-80-inch rig, 85 is de rigueur in light and moderate air today. Because one cannot always switch rigs to suit weather conditions the boat must have adequate righting moment so that, if caught with a max height rig, it can at least hang-in, and this consideration kept us from creating a light-air machine with the BONES. Put differently, if we had wanted to take a chance on not having to race in some medium or or heavy air the boats could be made much faster in light air as will be discussed in detail later.

The righting moment of a hull is a product of two quantities: the displacement of the entire vessel and the distance known as its "righting arm" when heeled. As a practical matter the righting arm can be increased either by increasing beam or lowering the center of gravity of the boat, either of which adds resistance. Thus the designer must trade beam, displacement & center of gravity height to achieve a well balanced design. It is immediately obvious that, all things being equal, it pays high dividends to lighten the rig and hull of a boat and put this weight into the keel, and this was the reason for our relentless

push to eliminate weight from the boats. In this regard, the most impressive and important measure of a "light" boat is not the all-up weight, which can be reduced by cutting off lead, but the all-up weight minus ballast.

The next obvious question, then, is how much lead to put on a boat once you have gotten the hull as light as possible. This depends upon the hull form, and particularly the beam, and the length of keel.

A comparison of existing boats at the time that BONE V was being designed is shown in Figure 10. This graph shows the angle of heel for a group of 50/800's with a standard rig as a function of their keel spans and ballast weights as estimated from publications and literature, and solid lines representing constant weight of keel bulb values for a BONE hull.

Note that the most stiff boats (heel angle  $30^{\circ}$ ) have excessively heavy bulbs (12-14#), that a few light-air boats like EPIC (heel angle  $51^{\circ}$ ) had light bulbs, and that the then currently competitive boats MAGAIC DRAGON, NELSON II, BLACK MAGIC, etc. had angles of 40-45 degrees. Using this type of data, a bulb of about 8-pounds was indicated for BONE V with a 17-inch span keel. This stability was adequate, but the keel span was too long and was finally reduced in BONE XI to

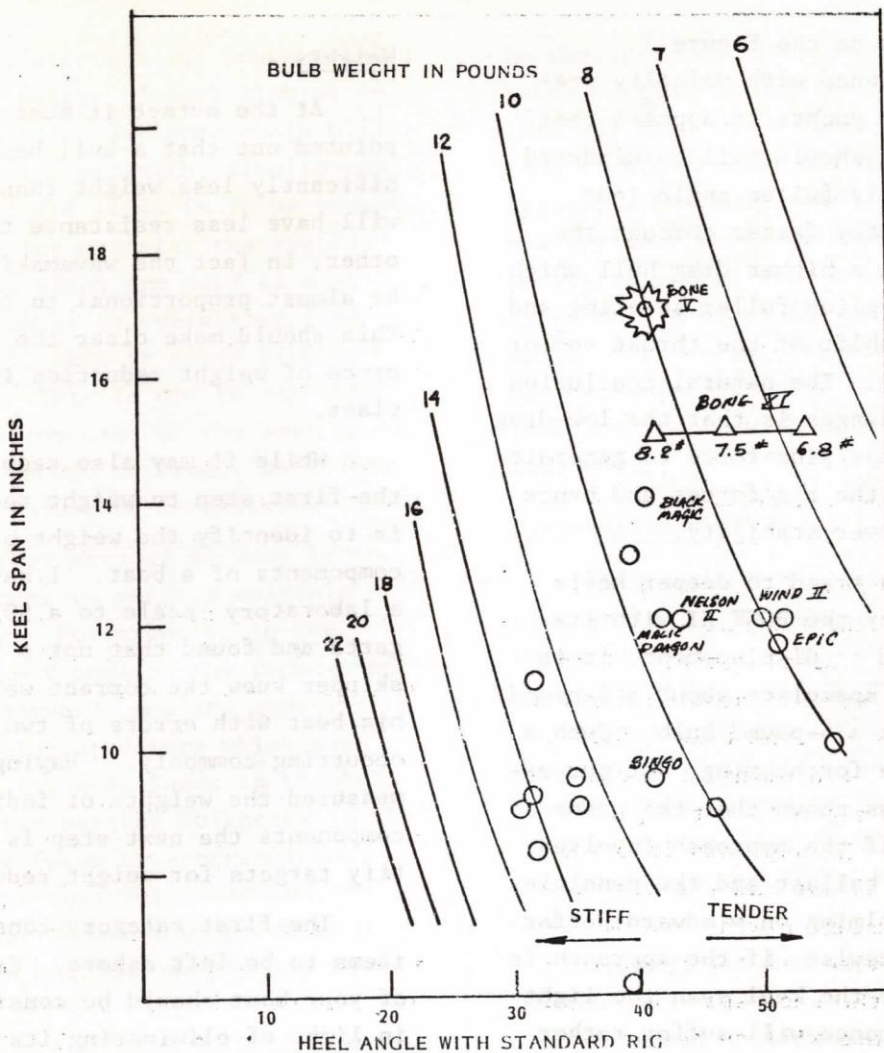


FIGURE 10- COMPARISON OF STABILITY OF VARIOUS BULB WEIGHTS  
AND KEEL SPANS

15 inches. In actual sailing trials, the BONE XI was equipped with three interchangeable keel weights: 6.8, 7.5 & 8.2 pounds and the 7.5 pound weight on a 15-inch span blade was the best all-around boat but the 8.2 was at only a slight disadvantage off-wind, whereas the 6.8 was non-competitive upwind.

When these three keel weights are plotted on the graph they show a heel angle larger than was typical of the most competitive boats and the reason for this deserves discussion.

The BONE hull form has significantly less resistance than the other



hulls shown on the Figure 2.

From experience with velocity prediction for yachts it appears that such a hull should sail to windward at a slightly fuller angle (and hence slightly faster through the water) than a higher drag hull which, in-turn, implies fuller sheeting and a forward shift of the thrust vector for the rig. The natural conclusion of these changes is that the low-drag hull has less side-force to generate to balance the rig forces and hence requires lower stability.

With a trend to deeper keels indicated by the BONE XI with its 11.67-pound displacement, it is natural to speculate about a 9-pound 50/800 with a 6-pound bulb. Such a boat may be forthcoming, but our experience has shown that the gains are small if the approach involves removal of ballast and the penalties are overwhelming on windward performance. Likewise, if the approach is to increase the keel span the light air performance will suffer rather markedly.

On the other hand it is never safe to expect a limit has been reached in a class where it was generally considered only a few years ago that eighteen pounds was the minimum weight for a competitive boat.

## Weights

At the outset it must be pointed out that a hull having significantly less weight than another will have less resistance than the other; in fact the wavemaking will be almost proportional to the weight. This should make clear the significance of weight reduction in the class.

While it may also seem obvious the first step to weight reduction is to identify the weight of various components of a boat. I have taken a laboratory scale to a 50/800 regatta and found that not a single skipper knew the correct weight of his boat with errors of two pounds occurring commonly. Having actually measured the weights of individual components the next step is to identify targets for weight reduction.

The first category consists of items to be left ashore. Each piece of your boat should be considered in light of eliminating its function and a decision should be made as whether to continue to carry it aboard. For example, in the BONES, we routinely leave the radio receiver switch harness out and plug the batteries directly into the receiver. This may seem simple and obvious, but how many persons take trouble to make this modification?

The next level of reduction comes in making all components con-

sistent in strength and hence weight. Since the weight of each link of an intelligently designed chain will depend on its strength, simultaneous failure of all links is to be sought. Consider, for example, the typical plexiglass winch arm used in most boats which is so overstrong (and overweight) that it could pick up the boat. This is not to say that one wants any part of the boat to be marginal enough to break, only that strength should be consistent.

Another area of economy is to design items to perform multiple functions. For example, in the BONES from V onward, the foundation for all servos and the sheet winch is a modular structure which also picks up the keel loads in the hull, acts as two partial bulkheads in the hull, and forms a waterproof box within the hull for isolating the radio gear from any water which may enter the hull and be free in the bilge.

It must be said that weight reduction must not be carried out to such an extent that breakdown occur. The boat must maintain structural integrity so that no advantage is lost in heavy winds, and so that no water enters the hull. In fact one should seek to go sailing in really dirty weather early in the career of any new boat so that confidence can be built in the boats ability to carry on, or that any weaknesses can

be repaired and strengthened. It takes special discipline to resolve that any item which fails to function or breaks will not merely be replaced, but supplanted by some new approach which eliminates the potential source of a breakdown. It takes only a brief survey of the results of any major regatta to see how many persons eliminate themselves from contention with a failure of some sort.

### Construction

This section will deal with our experience in building 50/800's where no serious consideration was given to either cost or practicality in order to achieve light weight. However, much of the final resulting construction can be performed in most home workshops if one is willing to experiment and throw away a few rejects.

In hull construction, I doubt that anything can seriously rival FRP for limited production. For BONE hulls, we have repeatedly prepared wood plugs to hull lines and then taken epoxy-glass molds from these. The progression has been two part molds with rolled shear and a centerline split, a three part mold which resulted on joint flanges along a bilge diagonal and finally a one-piece mold with removeable bow and stern transom plates and a removeable deck flange.



Hull construction has involved exclusively epoxy resin because of its superior characteristics. However the reinforcing has changed and evolved. The early hulls were of three layers of fiberglass cloth with triangular balsa stringers glassed into the bilges for stiffeners.

This was a fine construction, but excessively strong, and was replaced by a two-skin fiberglass reinforcing. At this point the change was made to KEVLAR which has remained the hull material since BONE V. The BONE V hulls were of two layers with carbon fibre/foam stringers in the bilges and gradually this was reduced until BONE XI which were made of one layer of a special experimental KEVLAR/Carbon Fibre mat. This evolution is shown in Figure 11.

One particularly troublesome item has been surface finish. Because we wanted to avoid the unnecessary weight of a gel coat the early boats were wax-released and painted. With the use of KEVLAR serious problems arose because any sanding which broke the thin epoxy outer shell raised a persistent fuzz of KEVLAR which was troublesome to smooth and raised the weight when sufficient paint was used to reseal it. We wished to use a light coat of pigmented epoxy paint sprayed into the mold as a gel coat substitute, but the wax caused this paint to bead-up and made it difficult to get a good paint bond to the out-

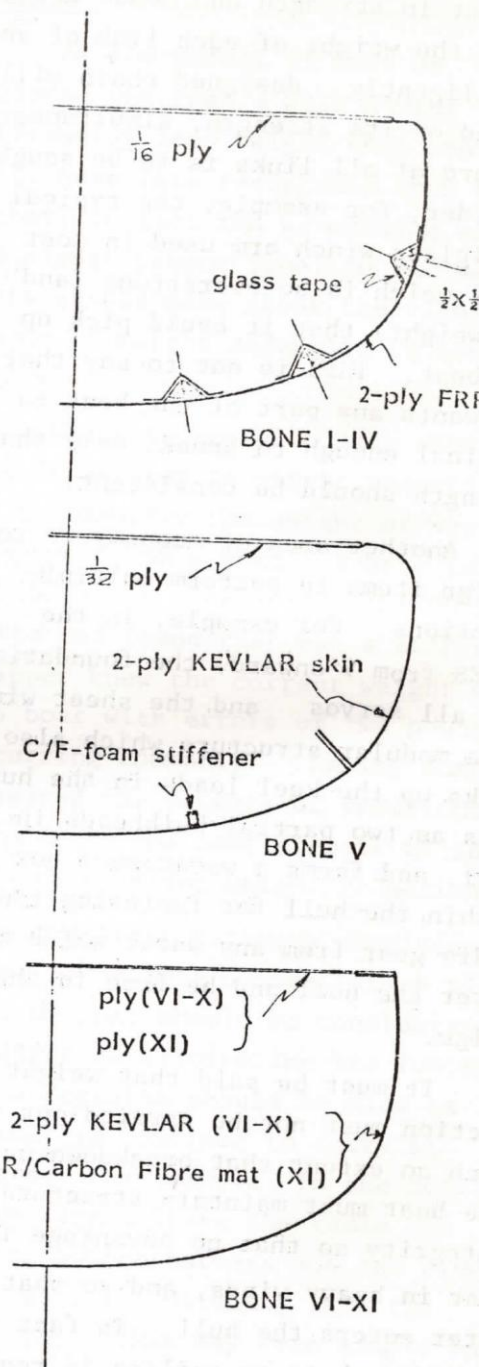


FIGURE 11 - CONSTRUCTION SECTIONS

side. The final solution was to wax the mold, spray PVA into the mold, spray epoxy primer, into the mold, and pigment the resin for the saturation of the skin.

Another useful construction step was to form the shear clamps by wetting a 3/4-inch wide tape of KEVLAR and placing this in the hull/deck corner of the mold while the hull laminate was wet. At the same time, pine blocks were clamped in place beneath this tape to take chain plates and the plywood bulkheads were set in place while the hull laminate was soft. The bulkheads were exclusively of 1/16-inch mahogany aircraft plywood.

Deck construction followed a lengthy evolution also. Following various fiberglass and KEVLAR laminates, we finally settled on 1/64-inch poplar aircraft plywood. Deck beams are triangular balsa epoxy bonded to the deck and highly stressed beams (such as at jib tack and sheet exits) are covered with KEVLAR cloth.

Two unusual items of construction probably merit mention. First, the main hatches were built using a special custom fibreglass molded part and plastic sheet which slides into place. These are the lightest and driest hatches we have observed in the class and they can survive (although we do not recommend this) without taping. Because of the low freeboard at the stern the rudder

stock and stuffing tube penetrate the deck and a aircraft push rod fitting is used on a tiller arm above deck. This arrangement has also led to extremely dry boats in bad weather.

One of the most difficult construction jobs has involved the keel blades. The BONE design has tended toward a maintenance of adequate stability by means of a long moment arm (and low center-of-gravity) for the ballast. Since the keels have a span much greater than conventional designs, the area was maintained by a relatively short chord and a corresponding reduction in thickness.

The smaller BONE section is quite nice hydrodynamically, but suffered structurally since its ability to resist bending (called section modulus) was less by thickness,  $t$ , to the third power. Hence the foil with half the thickness had  $(\frac{1}{2})^3$  or 1/8- the stiffness of the thicker foil. The problem is made more difficult because, with a significant inertia on the tip of the keel foil its natural frequency in both bending and twist has quite low and lay within the range where it could oscillate when excited by forces encountered in normal sailing. In fact, the early BONE thin keels suffered from just such flutter problems at high speed. On a reach or run the boats with these keels could be observed undergoing violent



oscillations as the keel structure whipped back-and-forth with a resulting large drag increase and speed loss.

Since this flutter problem put at risk the entire development of long keels, special effort was put into the manufacturing of the stiffest possible keels.

To obtain the most accurate shape, special matched-metal molds were machined from solid aluminum, cut to an exact foil section. These molds allow the lay-up of keels with the reinforcement close to the outer skin since virtually no allowance for sanding and fairing is needed. Getting material as far outboard as possible can make a great difference in stiffness; if the reinforcing is a mere 0.010" further outboard by virtue of no gel-coat being used and an accurate mold, the contribution to stiffness in a thin keel may be increased by almost forty-percent!

The original BONE keels were so flexible that a twist of seven degrees and a sideways deflection of five-inches would result if the boat were held horizontal and so a special test rig was built to evaluate more complex lay-ups needed to cut down these deflections.

The test setup consisted of a mounting to hold the keel sections horizontally and a special loading device to apply a combined bending and twisting force to simulate the

lead casting mass and center-of-gravity. Using this test stand, alternate laminate schemes were evaluated; loads were applied and the bend and twist plotted on a graph.

The loads experienced by a keel are of two distinct types and side-wise bending and "torsion" or twist. To counteract these, the reinforcing in a keel should be lined-up with the loads which means strands running spanwise for bending and strands running diagonally for torsion. Depending upon which load is more severe, the fibres to counteract it are placed farthest outboard (near the skin) to give them the best leverage.

In practice, layers may be alternated or doubled-up. Further, an outside skin of very light cloth may be employed to give a nice finish to the moulded part.

To show some of the variations in actual keel laminates, the data from tests are shown in Figure 12. The best lay-up actually cut the bending from 5 to about 2 inches, and the twist from 7 to 1 degree.

The final item to be mentioned is the keel bulbs. Because we selected a long slender shape, problems were encountered with bending. The first approach was to attempt to cast-in-place tungsten rods (which is almost twice as dense as lead) to stiffen the needle-like tail and fine nose. This was not

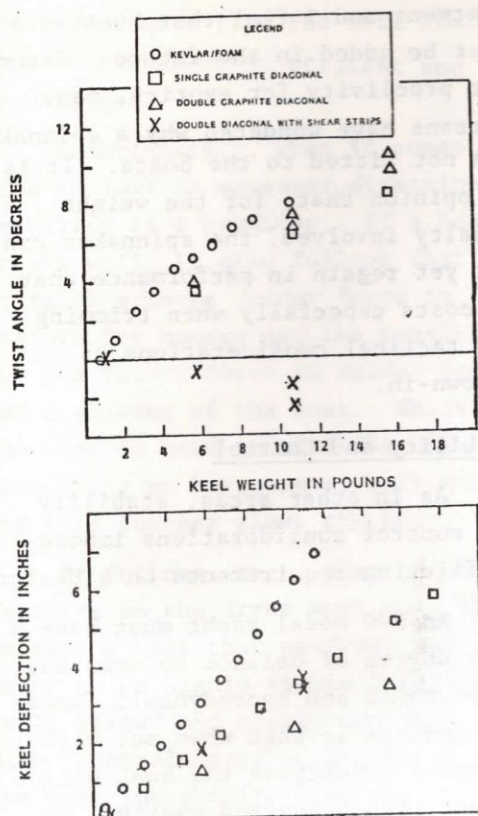


FIGURE 12 - MEASURED TORSIONAL AND LATERAL DEFLECTION OF ALTERNATE KEEL CONSTRUCTIONS

a terribly practical solution and the final BONE XI keels were cast with 6% antimony which greatly stiffened the final castings. In working with antimony, it must first be melted at high temperature for alloying with lead, about 11-1200 degrees is required. Then, the final alloy

melts at a temperature near leads melting point and can be accommodated by more reasonable equipment. The keel foils were made with a threaded brass insert and a cavity shaped to exactly fit the blade was made in the top of the lead. Thus, to change ballast, only a single bolt needed to be removed.

### Rig

The original plan for the BONES was to leap frog hull & rig development by holding rig dimensions while experimenting with hulls, and then fixing the hull and experimenting with rigs, etc. Thus, BONE I had a conventional sloop rig with absolutely no innovative details.

However, BONE II was a radical change since it incorporated a cat rig with rotating mast. The basis for this was a study of airplane wing leading-edge device data aimed at optimizing the relationship of job chord to mainsail chord. The conclusion from that study was that, if flow could be maintained on the lee -side of the sail by mast rotation, a zero jib was best since its ability to interact favorably with the mainsail is limited to the lower portion and only when close-hauled. In contrast the cat rig could maintain flow from beating to very broad reaching by means of rotating the rig.

One impediment to a una-rig is the inbalance and potential boom



tripping when the sail is let out and so a special rotating "turret" which housed the mast rotation mechanism and terminated the stays, shrouds, and backstay was designed and built. By moving the point of rotation for this turret aft of the mast, the sheeting forces were cut markedly and the rig balanced and ships when sheets are started.

Further, since mast rotation is adjusted relative to this pedestal, it was unnecessary to adjust the amount of rotation and a special linkage which unloaded the rotation servo between tacks saved battery life appreciably. BONES II, III & IV carried variants of this rig but it was ultimately abandoned temporarily from BONE V-XI because it still needed further refinement. In retrospect, I still believe that a una-rig has promise and will probably pursue development further.

The remainder of rig development was focused on conventional sloop rigs and they had no radical provisions. Masts were all carbon-fibre and booms carbon-fibre/foam material. PROBAR fittings and solid rigging was used almost throughout with the exception of special threaded out haul fittings. Sails were all made by BLACK Sails with a MYLAR and a DACRON 85-inch rig and a DACRON 78-inch rig as the heavy air selection for the ACCR regatta.

62 All rigs had jib trim and back

stay which are a minimum level of adjustment and I feel that boom vang must be added in the future. Given our proclivity for exotics, many persons have wondered why a spinnaker was not fitted to the boats. It is my opinion that, for the weight penalty involved, the spinnaker cannot yet regain in performance what it costs especially when trimming and tactical considerations as thrown-in.

### Stability and Control

As in other areas, stability and control considerations impose conflicting requirements on a design.

An R/C model yacht must have a high degree of balance between the aerodynamic and hydrodynamic forces and moments so that when met with changing conditions the boat will adjust its course and continue to sail "itself". To achieve this, the rig and underbody must be appropriately aligned so that the boat, balances well, and the appendages must be designed to help the boat regain its proper course if disturbed by a puff of wind or a wave. It is beyond the scope of this article to deal with the fundamentals of this exception to state that it is possible to perform calculations and experiments to scientifically select a boat configuration so that, when disturbing forces occur, the characteristics of the boat (principally of the keel and rudder) act to return

it to equilibrium. In this regard, the rudder acts like the tail feathers on an arrow assuring straight and true flight.

Unfortunately, when it comes time to tack or maneuver, directional stability is a handicap. If a boat tracks well, it also follows that it takes a large rudder force to disturb its course and the penalty for the rudder force is rudder drag and a slowing of the boat. While the boat is head to wind the rig is developing no horsepower, only drag, and this further slows the boat.

It follows, then, that the tail feathers on the arrow must come off; in fact a boat that performs well wants to be highly stable with "controls fixed" and highly unstable with "controls free". The price for too much instability when the rudder is moving is broaching and loss of control, particularly but not exclusively off the wind, in extreme conditions.

As was mentioned previously, the early BONES totally missed the mark in directional stability, the boats were adequately quick in straight sailing to be competitive but in our efforts to increase directional stability we created boats which completely stopped when tacking or maneuvering. To make matters worse, the canard rudder setup is such that if the boat is set-up with "weather helm" to help it work to windward in puffs, the bow rudder is

pulling the hull to leeward while holding the boat off from luffing which results in even more sideforce on the keel and more drag. For a conventional setup an aft rudder is lifting to windward when holding the boat off in a puff.

Another aspect of control is the flow across the rudder in marginal conditions. If an efficient high-aspect ratio rudder is used it may be prone to separation of flow and loss of steering; violent application of the tiller will have no result and only by reforming the rudder to centerline and re-establishing the flow will regain control. Reduced aspect ratio, foil thickening increased area and sweepback can all be used to help this problem but at a performance penalty in more manageable conditions. For the BONES we have actually designed normal and heavy-air rudders to help this problem but the prohibition on changing rudders renders the heavy air alternate virtually useless.

### Sailing Trials

All of the development outlined in this article would be useless without exhaustive (and methodical) sailing.

This actually involves a number of special approaches:

1. The boats must be raced in the best possible completion, however painful that may be. Racing in easily available local fleets may be



helpful but is more likely to obscure problems. For two years, BONES were built and air-freighted regularly across the United States because we believed that we could learn enough to justify the expense in the steady conditions and tough competition in San Diego. It should be noted that the BONES V-IX won few if any regattas, but improvement was steady and we felt sure that we learned valuable lessons from each disappointment.

2. Sailing must include planned non-racing. In competition conditions are not conducive to methodical tuning or experimentation. Thus much of the preparation was non-com-

petitive boat-for-boat match sailing to optimize tuning and evaluate performance in reproduceable experiment

3. Selected time must be devoted to sailing in non-optimum conditions. The boats must be consciously exercised in rain, heavy air, drifting conditions, etc. to probe for weaknesses in design or equipment.

4. The lessons of sailing experience must be capitilized on. It seems obvious enough, but it takes special determination to properly and consistently replace every failed item with an improved replacement.

Thus, a carefully planned and executed sailing program is essential to the development of a superior boat. 

## 1982 Spring #47

### A "BONE" OF CONTENTION

COMMENT BY: Larry Goodrich

Karl Kirkman's report on the Bone in the last issue gives the impression that the Bone Syndicate won the 1981 "M" ACCR and that the Bone is the best possible all around "M" boat, a breakthrough design.

Kirkman: "With victory in the 1981 ACCR for the 50/800 Class, the BONE Syndicate achieved a goal set in winter 1978 and concluded what is probably the most extensive campaign ever waged in radio controlled model sailboats. The BONE Syndicate had brought to bear sophisticated computer design techniques tow tank tests, custom built electronics the most exotic of construction, and an exhaustive program of sailing trails in order to develop the best possible all around boat. Such an effort is beyond the reach of the average hobbyist; in fact the campaign involved four naval architects and four former AMYA ACCR winners in the push for the best."

That's pretty heavy stuff. But let's look at Roy Langbord's very detailed report of the ACCR of who won with what and why.

ACCR Report: "In the closest ACCR in recent memory, Chuck Black, sailing the eleventh design in the Bone series, once again captured the 50/800 National Title. "...Chuck Black gave a classic demonstration of how to stay

in front in a major regatta. Not once winning a heat on the entire second day, Chuck always managed to start in the right place; stay up with the leaders; and finish with the top of the fleet. John Amen and Standley Goodwin seemed to take this strategy one better on the second day, they both sailed as consistently as Chuck, yet both managed to win two of their heats."

ACCR Report: "After two days and forty heats the final finish order was set. the results were remarkable. They were:

|     |                  |                  |
|-----|------------------|------------------|
| 1st | Chuck Black      | 36 $\frac{1}{4}$ |
| 2nd | John Amen        | 38               |
| 3rd | Standley Goodwin | 38 $\frac{1}{4}$ |
| 4th | Terry Allen      | 38 $\frac{3}{4}$ |
| 5th | John Elmaleh     | 44               |

So much for how close the competition was 2 $\frac{1}{2}$  points between first and fourth after two days'. Now let's look at a comparison of the designs selected by the top skippers

ACCR Report: "The 1981 ACCR . . . overwhelmingly proved that the "boat of the month" syndrome in the 50/800 class is at an end." "(The top five boats) were relatively equal in boat speed and performance. All of the top five boats also represented proven designs that will be around for some time to come."

In a comparison of the leading designs, it's worth noting that Ned Wagner, who placed



seventh sailing a N.Y. 50 suffered a rudder breakdown which cost him 10 points in one heat. (As far as I know, none of those who came in ahead of him suffered a comparable breakdown.) If you disregard that breakdown and allocate to Wagner his average score for the breakdown heat, the top five finishers and their boat designs would be as follows

| <u>Skipper</u> | <u>Design</u> | <u>Avg. Pts.</u> |
|----------------|---------------|------------------|
| Black          | Bone XI       | 1.8125           |
| Wagner         | N.Y. 50       | 1.895            |
| Amen           | Eclipse II    | 1.900            |
| Goodwin        | Toad          | 1.913            |
| Allen          | Toad          | 1.938            |

That gives you four very close designs, none of which could be considered a breakthrough on the basis of the ACCR. bear in mind that the wind was light and shifty, putting a premium on skipper ability and making it difficult to evaluate the all around performance of the designs.

Some keen observers at the pond site noticed that Chuck was struggling with the Bone up wind. It seemed to stall quickly when the wind dropped, although it accelerated well in the puffs. Many felt that the way Chuck was racing he would have won, perhaps by a larger margin, with any of the other top designs. In any event, the consensus seemed to be that the Bone was interesting for its design and technical differences but, all in all, not better than the other three designs as far as performance goes.

Why then could not the Bone Syndicate with computers, tank tests, custom electronics, exotic construction, exhaustive sailing trials, four naval architects and four former ACCR winners produce a more convincing design than the Eclipse II, the Toad or the N.Y. 50?

I do not know the complete answer, but I have some hunches. The three other designs are evolutionary improvements on earlier designs the Eclipse II is a successor to the Nellie. The N.Y. 50 is the Mill Pond Club's improvement on the very successful EPIC. The major clubs with good skippers and a variety of the to designs are in a sense testing facilities for an open design, although they lack the precise measurements available from tank testing equipment. (Niel once suspected that the bow wave thrown off his then current design could be improved with fuller entry lines so he built up one side of the

bow with microballoons and resin. While he stood in the water, I maneuvered the boat by him on alternate tacks so he could compare the waves thrown off by the different sides of the bow. The built up side was clearly better, and he incorporated those lines in his next design.) The successful designers know the technical literature, can draw the lines and predict the performance parameters and have a keen eye to spot minute changes in performance.

The Bone Syndicate adopted a radical form relying for stability on a deep keel, and I suspect that it was too much to hope that their form could be perfected in less than three years.

I hope the Bone Syndicate will keep on working to perfect the design. Here are some suggestions they may find helpful:

1. If the Bone is eventually to be made available for purchase, an attempt should be made to eliminate exotic materials and custom made electronics because the average hobbyist will not be able to afford them or maintain them.
2. A 12 lb. RM can be achieved without exotic materials, custom electronics and without omitting the switching harness. While the Bone Syndicate was still at 15 lbs. Forest Godby, and Niel Goodrich were experimenting with 12 lb. models. Niel's Renegade IV with an 8 lb. bulb is fractionally lighter than the Bone XI, and he uses standard Futaba equipment including the switching harness. The Renegade IV uses a monocoque technique without any beams, stringers, or bulkheads and it has a centerboard trunk which ties into the deck. Instead of fiberglass Niel uses the much stronger Xnol which is much easier to work with than Kevlar and is available locally.
3. The Bone Syndicate may have concentrated too much on San Diego for ideas whereas there are interesting ideas being worked on around the world. The skippers in Vancouver have an interesting way of setting up the job. Mill Pond has a very sophisticated radial jib fitting which might help. The British have an extraordinarily light winch and have developed a number of weight saving building techniques.
4. More specifically, the Bone was clearly the fastest design downwind, but its beating



performance was certainly not first rate. Chuck sailed upwind, almost upright, close to pinching, and the Bone pointed high but with low boat speed. As a result, most of the time Chuck made the windward mark behind several boats and had to rely on downwind speed to catch up. Several observers thought the Bone tended to stall too quickly when beating and that most good skippers would have trouble beating with it. In any event its upwind performance needs improvement. My impression from Kirkman's report is that the model was not tested at any heel angles and was not tested with the keel and rudder on. If possible, new tank tests should be conducted at several heel angles with the keel and rudder attached. Niel and I abandoned very deep keels several years ago because with the materials available to us, we were unable to keep the keels from flexing in the bottom half. If the keel goes slightly off center under the pressures involved in beating the lift may be destroyed and drag may be increased dramatically. I suspect the Bone keel still flexes too much, throwing the design into distortion. Also the high aspect ratio keel, which seems to work well off wind, may be too much of a high speed section for the slow speeds encountered in beating conditions.

Deep keels must  
be still and not flex

I wish the Bone Syndicate the best of luck  
We are all indebted to them for their efforts  
and sharing their experience with us.

Second: Bob De Bow #89

#### MOTION TO CHANGE MARBLEHEAD 50/800 CLASS SPECIFICATIONS

Please accept the following motion to change the Marblehead 50/800 Class Specifications.

Revise Item 16. DISTINGUISHING MARKS TO read:

- (a) Sizes: Class Mark "M" to be at least one (1) inch high and at least one-quarter ( $\frac{1}{4}$ ) inch thick. Registered Numbers and National Letter to be at least two and one-half ( $2\frac{1}{2}$ ) inches high, at least three-eighths ( $\frac{3}{8}$ ) inch thick, and spaced at least one half ( $\frac{1}{2}$ ) inch between figures. Bar dividing Class Mark and National Letters/Registered Numbers is to be one-eighth ( $\frac{1}{8}$ ) inch thick.
- (B) The Registered Numbers may be preceeded by the distinguishing National

Letters (US for United States) of identical dimensions, either above or to the left of the numbers. Skippers are encouraged to use the National Letters, however they are mandatory only for international events.

Examples:

$$\begin{array}{lcl} \frac{M}{US1911} & = & 1'' \\ & = & 2\frac{1}{2}'' \end{array} \quad \frac{M}{1911} = 1'' = 2\frac{1}{2}'' \quad \frac{M}{US} = 1'' \times \frac{1}{4} = 2\frac{1}{2}'' \times \frac{3}{8} = 2\frac{1}{2}'' \times \frac{3}{8}$$

*1/2" / FIGURES  
BAR 1/8 THK*

Motions do not  
affect performance

(c) Owners Racing Flag may be 2" by 1 1/2", approximately.

Signed: John A. Davis #1984  
Second: Chuck Black #78  
Standley Goodwin #334

Comment: The purpose of this motion is to allow reasonable flexibility in numbering sails and still maintain visual uniformity for ease in reading sail numbers while racing.

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#### MOTION TO CHANGE MARBLEHEAD 50/800 CLASS SPECIFICATIONS

Please accept the following motion to change the Marblehead 50/800 Class Specifications:

Revise Item 1.(3) to read:

Bow bumpers are mandatory and are limited to one-half inch (0.50") overhang. Bumpers are in no case to be included in the overall length measurement, whether built in, recessed, or otherwise attached to the hull. Bumpers must be made of resilient material and capable of minimizing damage to another yacht in the event of collision.

Signed: John A. Davis #1984  
Second: Chuck Black #78  
Standley Goodwin #334

---

to the rule and take it out



# DESIGN COMMENT

R.B. (Bob) Sterne  
AMYA #1701

I have been following with interest the article on the "BONE" and the letters to the editor since that article. I had some dealings with Karl Kirkman, during the development of the "BONE", and one of the boats he sent for evaluation was sent here to Vancouver. In return, I supplied him with three hull, one for a "KOKANEE", the double ender which started the trend towards minimum wetted surface, the "KISUTCH", with which we won the 1980 World Championships, and my last design the "PROGENY". I was rather disappointed not to see the results of the tank testing on these boats included in the article, but with the enormous amount of time Karl spent on developing the "Bone" I'm not surprised. Our evaluation of the "BONE" here in Vancouver, including sailing against Chuck in 1981 Canadian Championships, is that the "BONE" is a good competitive Marblehead, but cannot be considered a breakthrough. The winner of the 1981 Canadians was Chuck, not the "Bone".

More specifically, in the winds we had for the Championships, which ranged from 0 to 8 knots, the "BONE" was competitive on all legs of the course, but not a top boat on any. Chuck started extremely well, but in every race I sailed against him, I found that I could match, if not surpass him in boat speed, as could Blair Van Koughnett, with his "KISUTCH". Chuck's tactics, however leave you in the position I that once behind, your hopes of a victory are nearly nil. In light winds, to windward, I suspect that the "BONE" should have a fin with a larger chord, as leeway is considerable. The boat we experimented with was indeed very difficult to sail well in these conditions and I feel that the "groove" is indeed too narrow. In moderate airs, this is not so noticeable. In Vancouver, we have developed a fin of 48 sq. in. with a taper, and a span of 14" which we find to be excellent in all conditions. Like Karl, we tried a deeper fin and found that it was not as good in light airs, although most of this was due to mast position, which we have found changes more with the higher aspect fin, and is significantly further aft. The tapered fin has one additional benefit, in that event, with the same 10% section

that Karl uses the fin is wider and thicker at the hull where the bending strain is the largest. This, coupled with the fact that we locate the lead on the center of the fin, means that at 90 degrees of heel, the fin bends only one inch and doesn't twist at all, with 8 lbs. of lead on it. The fins are balsa core fiberglass, with two strips of carbon fibre incorporated into each side hardly very exotic.

Off the wind, it appears that everyone was most impressed with the "BONE". I suppose that in Vancouver, we must be a bit spoiled in this department, because we felt that it was a very average boat on this point of sail. At speeds below hull speed, the "BONE" is roughly as fast as the "KISUTCH", but as soon as it goes a bit faster, the boat squats rather badly, I think because it is too fine aft. Every time Chuck got into this mode, both Blair and I could catch up considerably.

I think that I have criticized the "BONE" enough. Now let's talk about its good points. The hull has low wetted area, which I believe has now been proven to be a decided advantage. In fact, I would go so far as to say that for the typical 12 lb. Marblehead we see today, it is a necessity. The hull has fine lines forward, which indeed help it punch through waves and wakes better. The boat is of light displacement, and high ballast ratio. It is designed around an 85" rig for light airs. All of these features are not exclusive to the "BONE", but it certainly combines them very successfully.

I would like to talk for a minute about materials. The "Bone" is built almost exclusively from Kevlar. Lacking this material in Canada until recently, we have done a lot of work on lightening hulls while still using fiberglass. Five years ago a hull weighed about 2 lbs. Our standard boats with Gel Coat, now come out at about 16 to 17 ounces, and without Gel Coat at 12 ounces. The best Kevlar hull, to date, weighs 10 ounces. On the other hand, it now is standard procedure here for a racing boat to have a fabric deck, and this together with all its beams, saves more than two ounces



over a plywood deck, and this together with all its beams, saves racing Marbleheads have weighted in right at 4 lbs. less lead, with 4 channel radio, and which I call "PROTEUS", is not even using the current fabric deck, and yet weighs only 10 lbs. complete with 6½ lbs. of lead, although I use only 2 channels. The typical British Marblehead, with Kevlar Hull, and two channel radio, weighs in at about 3½ lbs. less lead with only an aluminum mast. I project that when someone puts all the currently available technology together, that a 2 channel boat will come out at around 3 lbs.

I would now like to comment on some of the things that Karl said, and that others said in their letters. Karl said that the project was for "no financial return", and has proven this by donating the lines to the A.M.Y.A. More power to to him. I wish that I was in a position to do the same. The "bastardized" model yacht design syndrome referred to in Mr. Broman's letter is the result of a few people who love the sport of Model Yachting trying to make some money to either feed their own hobby, or in my case, as a significant part of my income. The reason that the English and Australians have the ability to continually improve designs is that they can get published plans for a large variety of hulls, which gives concrete information for the designer to work from. The people who submit these plans (and I have published the plans for the "KISUTCH" among others), however, are not expected to donate several months of hard work gratis. the publisher pays for the plans either outright or on a royalty basis. I have tried to get plans published in the USA under similar circumstances, and have been politely told that "the market is not big enough". even the "MYA" news, the equivalent of the AMYA Quarterly, has its own plans service, with a royalty payment scheme. I really think that it is a bit much to expect a designer, particularly one who does it for a living, to publish without payment. The small amount of the royalty would certainly not offset the possible sales profit, but you would be surprised how little differences that would make to the designer. I think that in a great many cases, just the fact that he did not have to "give his design away" and received a decent payment for it would be enough. I know it would be for me.

syndrome really doesn't exist, and I couldn't agree with him more. When I add up all the things that make a difference, hull shape is at the bottom of the list! I really believe that if two boats have the same rig, fin, rudder, lead, displacement, and wetted area, and are sailed equally well, that the actual shape makes little difference. I should clarify that by adding that the hull should be fair, and not change shape anywhere too suddenly, but beyond that, the differences become small. The large differences found by Karl in hull drag are (I feel) largely the effect of differing wetted surface. Certainly there will be remaining differences in drag, and hence boat speed, even if all the other parameters are held constant, and that is where the designer's job is important. However, the greatest differences we have seen in boat speed over the last few years have not resulted from a "breakthrough" boat, but from a steady improvement in materials, and hence ballast ratio, a reduction in displacement, an increase in rig height, and the quality of sails, the increase in draft, and increase in the efficiency of the appendages.

CONT ON PAGE 52

## B. D. HOBBY WAREHOUSE

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Karl states that the "Boat of the Month" 32



The statement that "a designer must not work in a vacuum" was really brought home to us in Vancouver, and to those in San Diego, after the 1978 Canadian Championships. We sail in predominately light airs, and had boats with 7 lb. keels, and a 16" draft. Those from San Diego had boats better suited to heavier conditions, with 9 lb. keels, on a similar draft. We both learned a lot from that regatta, and the result has been that boats from both areas have ended up with about 8 lbs of lead on an 18" draft but through better materials the total weight is much like what we had in Vancouver in 1978. This is typical of how top level racing improves boats.

Karl found that his narrow hull didn't work as well as his wider on light conditions and I suspect that the greatest part of this was due to dragging the transom. He also states that a great deal of care was taken to eliminate a poorly balanced hull due to excessively wide sections aft. In this I fully agree. This was one of the major considerations when our Club initially designed the "KOKANEE", a symmetrical double ender. Although this boat had trouble with diving, it was otherwise a joy to sail.

narrow fins, I can say with some authority that a great deal of the oscillation (flutter) can be eliminated with a shorter bulb. I would welcome some concrete data on the optimum bulb shape.

In his letter from ANL #46 Russel Potts (England) mentions the low wetted surface "BONE" and "KISUTCH" as having merit, but he considers that their heavy weather performance may be in doubt. This should be put to rest once and for all. You do not need a "dinghy" shape in order to have a boat which planes well. In fact, it may well be a detriment, particularly when you consider the imbalance it can cause when going to weather. A Model Yacht does not plane on the aft sections of the hull like a dinghy. It does not have the crew available to move far aft, and get the aft sections to the positive angle of attack like the aft sections of a model. A MODEL YACHT GETS ITS LIFT IN PLANING CONDITIONS FROM THE FORWARD SECTIONS OF THE HULL. So why

When a gust hit, the helm simply did not change. When we developed the "KISUTCH", we were after a boat which would not dive so much, and yet was well balanced, and therefore, easy to sail. This was done by using concentric circular sections aft, and this produces a well balanced boat, with much greater reserve buoyancy aft than the "BONE" which prevents squatting. Our Commodore, Brian Fitzsimons, has recently designed a Marblehead, which he calls "SPARK II", which is very much a combination of the lines of the "BONE", and "KISUTCH". In initial trials, it seems very good. The boat is well balanced, and shows no tendency to squat. I think this proves that it is possible to achieve both.

I would imagine that the shape Karl uses for the lead ballast on the "BONE" is one which has a low drag coefficient, but I would like to see data on a series of submerged leads of different thickness/chord ratios at different speeds. At low speeds, the bulb has (from Karl's data) about 1/10th of the total draft, and at these speeds I wonder if a shorter bulb with less wetted surface would be better. In addition, having tried long bulbs on

do we need a "dinghy" shape? Certainly, the "BONE" and "KISUTCH" both plane extremely well, and yet are hardly "dinghies." This is probably the biggest myth still left in model yachting!

In conclusion, I think we should all thank Karl Kirkman for the tremendous effort he put forth in testing boats, and in designing the successful Bone XI. And we should be grateful that he donated the plans to the AMYA. We shouldn't forget, however, that there is a lot of other talent out there, and if some magazine, or even the AMYA Quarterly, would consider paying for plans, that a great deal more might be forthcoming. We all enjoy having a competitive edge, but in the long run, every designer would benefit from publishing his plans. There is no questions that the wealth of information available would improve the boats. I just feel that the amount of work that goes into designing a successful yacht should not go unrewarded. ☐

## NEW CLASS TO BE CALLED "PHOENIX"

BY: Ray Agee

Looking for an easy to start class for beginners and a way to get older 50/800 class boats back in the water, members of the Copperstate Model Boat Club have created a new class within their membership with hopes of going AMYA wide.

Like the Bird of Phoenix, namesake of Arizona's capital, the new class boat rises from the ashes of our former 50/800 class. Copperstaters, after the onslaught of carbon fiber masts, Bones and other boats plus the switch to 'M' class rules, found themselves with a lot of older 50's that weren't competitive today.

So, in order to get these boats working again,

a set of interim rules were set up. Among these are a fourteen (14) pound minimum weight, dacron sails, wood or aluminum mast and a maximum of two servo controls limited to sail and rudder. If you have a fiber mast, backstay adjustment, weight under 14 pounds and mylar sails, then Phoenix isn't for you.

We initially have 13 boats set to compete but expect more from the other Phoenix area clubs. Soon, Copperstate will apply to AMYA for establishment of the Phoenix class. Other AMYA groups interested in our proposal are invited to contact us by writing to Copperstate MBC, P.O. Box 16434, Phoenix, AZ 85011. ☐

Phoenix Class of older 50/800 boats, the first vintage group!

Rules: 14# min, Dacron sails, wood or aluminum mast, 2 channel radio

MOTION TO CHANGE MARBLEHEAD 50/800 CLASS SPECIFICATIONS

Please accept the following motion to change the Marblehead 50/800 Class Specifications.

Revise Item 16. DISTINGUISHING MARKS TO read:

(a) Sizes: Class Mark "M" to be at least one (1) inch high and at least one-quarter ( $\frac{1}{4}$ ) inch thick. Registered Numbers and National Letter to be at least two and one-half ( $2\frac{1}{2}$ ) inches high, at least three-eighths ( $\frac{3}{8}$ ) inch thick, and spaced at least one half ( $\frac{1}{2}$ ) inch between figures. Bar dividing Class Mark and National Letters/Registered Numbers is to be one-eighth ( $\frac{1}{8}$ ) inch thick.

M-58-1

(B) The Registered Numbers may be preceeded by the distinguishing National Letters (US for United States) of identical dimensions, either above or to the left of the numbers. Skippers are encouraged to use the National Letters, however they are mandatory only for international events.

Examples:

|                    |                    |                  |                    |                |                    |
|--------------------|--------------------|------------------|--------------------|----------------|--------------------|
| $\frac{M}{US1911}$ | = 1"               | $\frac{M}{1911}$ | = 1"               | $\frac{M}{US}$ | = 1"               |
|                    | = $2\frac{1}{2}$ " |                  | = $2\frac{1}{2}$ " | 1911           | = $2\frac{1}{2}$ " |

(c) Owners Racing Flag may be 2" by 1  $1\frac{1}{2}$ ", approximately.

Signed: John A. Davis #1984  
Second: Chuck Black #78  
Standley Goodwin #334

Comment: The purpose of this motion is to allow reasonable flexibility in numbering sails and still maintain visual uniformity for ease in reading sail numbers while racing.

---

MOTION TO CHANGE MARBLEHEAD 50/800 CLASS SPECIFICATIONS

Please accept the following motion to change the Marblehead 50/800 Class Specifications:

Revise Item 1.C to read:

Bow bumpers are mandatory and are limited to one-half inch (0.50") overhang. Bumpers are in no case to be included in the overall length measurement, whether built in, recessed, or otherwise attached to the hull. Bumpers must be made of resilient material and capable of minimizing damage to another yacht in the event of collision.

M-58-2

38

Signed: John A. Davis #1984  
Second: Chuck Black #78  
Standley Goodwin #334

Comment: The purpose of this motion is to clarify the rule and take it out the realm of Class Secretary interpretation.

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**M (50/800) CLASS:  
DISTINGUISHING MARKS  
BOW BUMPERS**

M-58-1 PASSED 144 / 11  
M-58-2 PASSED 129 / 30

**M Class News**

by Standley Goodwin

After an absence of three years I again find myself M class secretary. In that period of time, the name of the class has been changed and the international version of the rule has been introduced. Throughout this period our class has maintained a healthy design effort. Our class is now healthy and it's my goal as class secretary to maintain the class in its present condition.

This year's ACCR in San Diego is well covered in other sections of the newsletter. Therefore, I will just congratulate Terry Allen for his well deserved win and let you read the other articles.

Two issues came up during measurement at this year's ACCR. The first is the issue of boats with centerboard trunks and the second the question of alternate rigs.

Several designers are installing centerboard trunks in their models. The keel fin fits snugly into the trunks and is typically held in place with a screw at the deck. With this type design it is possible to change the depth of the fin by adjusting the screw. The class rules clearly prohibit any movement of the fin. Therefore in any regatta sailed, models of this type shall have a mechanical stop preventing vertical movement of the fin. If you want to experiment with fin depth between regattas go ahead. However, at a regatta you must have a mechanical stop. Remember, changing fin depth during a regatta is cause for disqualification.

The second question is the issue of alternate rigs. Section 6 of our rules carefully defines rigs—you are allowed three rigs measuring 800 square inches. However, if you want a smaller additional rig or rigs you may have them, as long as every measured dimension is smaller than the same measurement on one 800 square inch rig. If you intend to build an additional rig, read section 6.0 carefully and make sure you understand it before you go ahead. It is permissible to mount additional rigs on separate masts.

A joint bid from the Detroit Model Yacht Club #88 and the West Michigan Model Yacht Association for the 1983 ACCR has been accepted. The race will be sailed at Bowling Green Ohio on July 30 and 31 1983.

I now have the class records and can issue boat numbers. When you are building a model remember it will need a number and send for it. Calling the class secretary the night before the regatta is not the proper way to get a number.

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Bow bumpers now required

Keels are not adjustable, during a regatta.

# PERFORMANCE OF THE LIGHT WEIGHT "M"

by Standley Goodwin

Last year's ACCR was won by the B one, a light weight "M," in a hard fought battle with normal "M's." This years ACCR was dominated by the light weights with the first six places taken by them. The average sailor will have some difficulty in obtaining an accurate opinion of the light weights because reports on them range from tales of super-boats to dogs that can only be handled by the most accomplished sailors. I have been sailing one of them, the Spot, for a season and thought it would be helpful to relate my observations of what they can and cannot do.

The light-weight "M" is a deep draft, narrow hull displacement model. Beam is in the range of 8 to 9 inches, with draft between 18 and 19 inches, and displacement between 10½ and 11½ pounds. Lead bulb weight varies between 6½ and 8 pounds. The hull lines are very smooth and easily driven. The entry at the bow is very fine.

These models have one outstanding feature—off the wind in steady breezes above 5 mph they are extremely fast. They do this without giving up any windward performance. In a race they will sail to windward with the normal "M's" and then pull ahead on the run. Properly sailed on a large pond in a steady breeze they are practically unbeatable.

At this point the average reader will think these boats are super boats. Unfortunately boat design is a compromise. When you emphasize one area of performance, you inevitably lose in another. Even under their best conditions, these models require a great amount of skipper skill and attention, especially to windward. Their extreme lightness means they will stop very rapidly when handled poorly. Make a bad tack and they go into irons easily. The high aspect ratio keel fins and rudders are extremely sensitive and stall easily. In general, light weight "M's" are extremely sensitive to sailing technique.

Make a mistake and the model will slow down significantly. The normal "M" will withstand errors in sailing techniques without serious performance loss. The light weights will not.

The light weights do best on large ponds with long courses in steady breezes above 5 mph. On these courses maneuvering, particularly tacking, is minimized. Due to their light weight they lose a little on every tack or maneuver. On a small course with lots of maneuvering they lose many of their advantages.

In light winds below 3 mph they lose their advantage. Apparently, the deep keels generate high drag at low speeds. In addition, light winds are usually quite shifty and therefore numerous tacks are required. Overall, these models are competitive in light airs but not superior. My experience on a light air pond for most of the season is that the skipper works hard to just stay even. The sensitive nature of the light-weight models remains, without the reward of superior performance.

Another condition where these designs experience difficulty is very puffy winds. The models have little bouyancy forward and a very low CG. As a result they put the bow down when a puff hits. At times they will put the deck under water. Until the bow comes up, they are slow and difficult to control.

Whether or not you should have a light-weight "M" depends upon skipper and sailing conditions. A skilled skipper sailing on a large pond in a steady breeze will need one of the light weights. A skipper with less skill will have difficulty in getting full performance from these sensitive models, and will do better with a normal design. Those sailing in light and shifty or very puffy conditions will find the normal design the best choice.





## THE RESURRECTION

by Bud Salika

I have a theory that I would present to you for consideration. I maintain that there are very few new 50/800 hulls being designed today. Why? Because they have already been designed.

Now you don't have to agree, and you can argue with me. I have a library of M plans that go back into the '30s that show hulls so similar to those being sailed today that I would scare you.

One very current example is a Sunkiss V just completed by a member near me. This hull dates back to prewar, which I believe does not detract from its sailing ability.

I maintain that the circle of hull designs is now on its third revolution. The first loop ended with the use of the braine and the vane steering mechanisms. Loop two started with R/C. When radio came along many skippers converted their older boats to R/C, and some, finding that the cutting away of those beautiful decks with fancy painting and those beautiful deck supports below was too painful. These hulls were then placed on the back of the shelf and new hulls were made to use with the sails that had been on the old boats. Where did the designs for the new hulls come from? Why from the plans that had been used before.

Radio control brought in a new breed of cat, some of them real mavericks who shook themselves loose from the stodgy thinking that "nothing new could be invented to make our boats go faster." With R/C they found that there was something new and they set out to find it. They looked at hulls and said we've got them. What we need is different keels, and those skegs have got to go because we need the maneuverability, and a skeg doesn't help. Oh sure, there were some so-called "new" hulls, but I would suspect their parentage in many cases as being taken from the old plans with the skeg chopped off and the keel made to look different. The age of change was upon us.

Loop three came with DACRON. We already had window shade cloth and varnished silk and other cloths that, when the sun warmed them up would fold and stick together, and the English had their version of the same materials.

But dacron is a story in itself. There was just plain dacron; then someone discovered that it came in soft and hard grades, also light and heavy. Some of the older pre-dacron sails were actually window shade material. It didn't make much difference

then because the boats were built like battleships anyway—heavy, solid construction.

Dacron led the way to sails made in panels. The noticeable stiffness of even the light dacron material made it possible to put flow into the sail by careful cutting and assembly of the panels. It was an era of great sail change of which Mylar is a part. And we can now sit back and say "we've gone about as far as we can go."

**Like heck we have.**

We may be even in loop four now. Consider that in the early days when there were a thousand skippers sailing—each with his own idea as to what was good with but a handful of real experts as we have today—how many different hulls were turned out each year, all 50" long. Let us say 350 new hulls each year, each minutely different from the other, some even being stolen from older plans and passed off as "my new design." Add to this 50 years of model sailing and what do we come up with?

Let's say it was possible to lay every hull ever built side by side, and you are given the task of drawing a design without duplicating what has already been done. Quite a task, relieved a bit when you are given permission to disregard the rules and to use the best features of any you like. Hey man, now we can really go at it, with 10,000 hulls from which to put together that super boat. Do you know that if you have one-tenth of a Stradivarius, and you make a complete instrument using that piece, your finished product can be certified as the real thing? I say to you, go and make your Strad. There is nothing wrong with the old designs that modern keels and R/C won't cure. Of course there are some real canal barges out there that wouldn't sail downhill. And there are some products that are the results of many hours of serious study. But don't tell me that the design you are presenting is absolutely new. It just ain't so.

I would suggest that you give serious consideration to the old designs. They too are the results of serious thinking, and possibly many hours sailing, which, to me, is more important. It's what's in the water that counts after all. The trend now is Mylar and a 12 pound boat. Now if we could only get rid of that damn keel I'm sure the boat would go faster.

Maybe I've just suggested loop number five.





## PHOENIX CLASS RULES ADOPTED

by Ray Agee

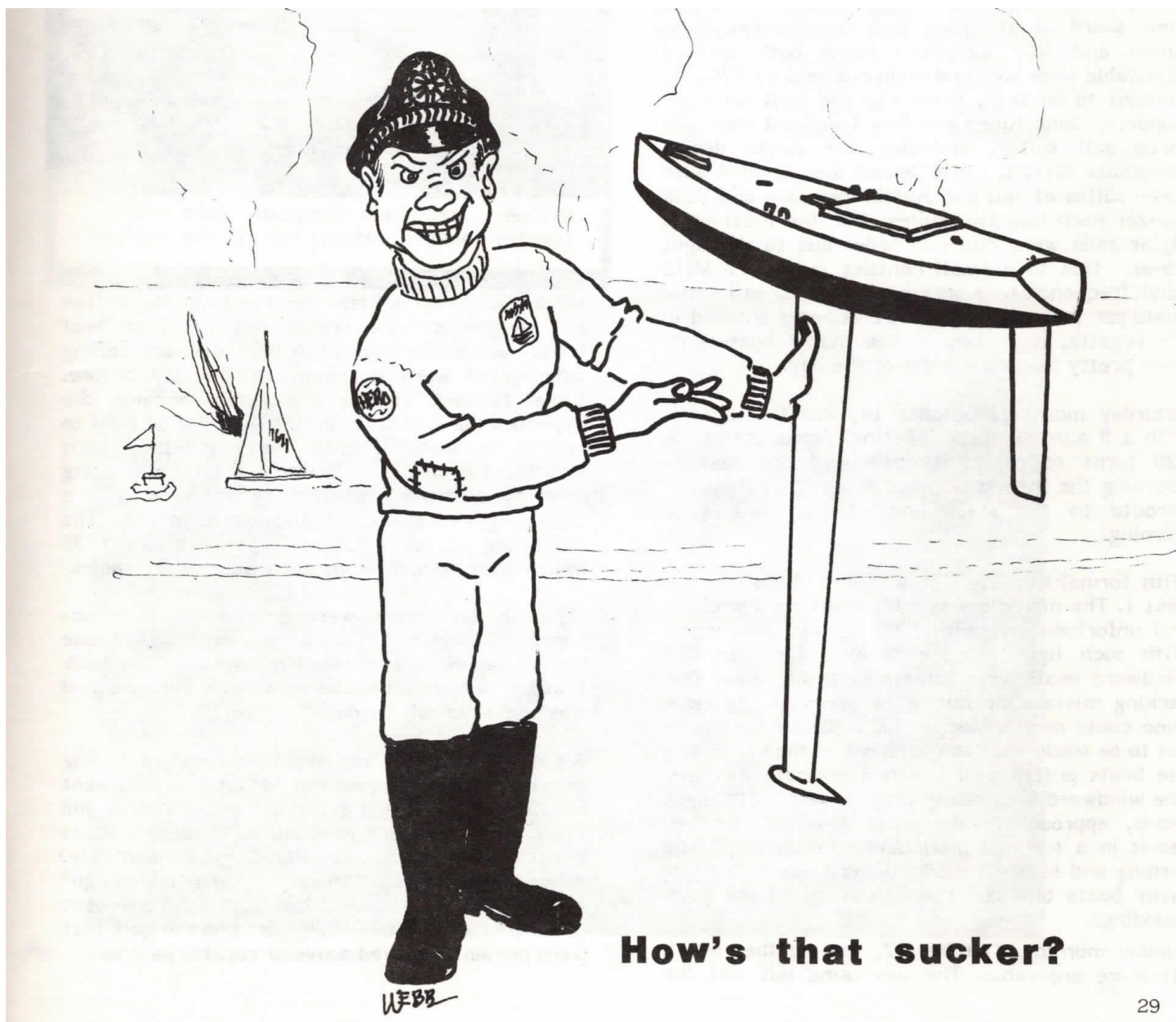
It's official—prospective class registrants voted during October to accept the proposed Phoenix Class rules, changing only one of the original propositions.

Any material will be allowed for masts in the class, which is based on the old 50/800 rules. This means that just about any 50/800 or Marblehead can compete in the class as long as it follows the basics of two-channel, no backstay, 14-pound minimum and dacron sails.

Some controversy had started earlier in the class'

discussion as many people had already added carbon fibre masts to their boats. Originally, only aluminum or wood masts would be allowed, but, after a lot of deliberation, it was proven that CF masts wouldn't cause an unfair advantage.

Also on the rules are an 85 inch mast height. While serving as interim class secretary, I have received comments from several clubs expressing interest in the class and now that we have decided on the mast issue, I believe that we'll have enough boats registered to make the class official. Persons desiring a complete list of class specifications should write me at 1719 Parkside Drive, Tempe, AZ 85281 or call me at (602) 966-0228.



**How's that sucker?**



The S/B yacht class is pretty well spread across this great country of ours. Further study of class records has produced the following:

- A. Where are the eligible S/B yachts?  
San Diego has 22, Chicago has 21, Los Angeles has 16, San Francisco has 14, Toronto, Ontario Canada has 11, Miami has 7 and Detroit has 5.
- B. By states we find:  
Calif. with 56, Ill. with 27, Fla. and Canada have 11 each, then N.Y. with 8, Mich. and Penn. with 6 each, Conn., Wisc. and Ohio with 4 each, Tex. and Virg., with 3 each, Wash., Hawaii, R.I., Del. and Minn. have 2 each and one each in Oreg., N.J., Ariz., Ky., Vt., Colo., N.C. and Ind.

Till the next Quarterly for fair winds and good sailing-----

Bill, good luck with your business, sure hate to see you leave. We hope that it won't take you away from sailing.

---

#### 'M' CLASS

BY: Stanley Goodwin

Sitting down to write the spring newsletter article at the end of January, I have some difficulty convincing myself that this is the last chance to communicate to class members before the ACCR in July. There are a couple of new items that will be required for participation in this years ACCR. All participants will show the committee that they have a valid registration card for the hull they are sailing. If the skipper chooses to use a sail number different than the hull number, he shall also show his registration card for the sail number (AMYA Regulations 5.2). In addition each entrant shall show a valid FCC license for the radio he is using. These proofs can be copies submitted with your entry or shown to the regatta committee pondside.

On the international scene there is a new version of the 'M' class rule up for approval by member countries. Although your class secretary was theoretically involved in the process, I have received no communications from those who actually did the rewrite. Last summer I managed to obtain a version of the proposed rewrite. The version I

reviewed was a complete rewrite of the present rule. Most of the obvious features remained the same. There was one significant change in the mainsail roach measurement which effectively allows an increase in roach.

Being an engineer who deals with technical specifications on a more or less daily basis, I have found that rewrites of specifications for editorial purposes seldom turn out as advertised. Apparently innocuous changes in wording can result in some rather surprising interpretations by users. Most rewritten documents require one or two revisions to bring them back to their original intent.

Present 'M' class rule, with modifications, has been in use since the late 1930's. It has been tested in almost every area and rulings generated to interpret it. It has produced the most successful model boat class in the world. As your class secretary, I have to question the wisdom of a sweeping change of a highly successful rule. If IMYRU does vote to accept the rule change, I will recommend that AMYA stay with the present rule for several years. If time proves the rewritten rules to be successful we can then change over. If instead the new rule has defects, we will have avoided the controversies that will be associated with straightening them out.

In the last quarterly I discussed model measurements each builder has control over. This quarterly we will look at the measurements your sailmaker has control over. If your sailmaker inadvertently makes an error, or pushes the rule a bit too far, you the sailor will suffer the consequences. You have the choice of measuring your sails now, and if any problems are found, returning them to your sailmaker for correction. Or you can wait until measurement time at a major regatta. If a fault is found then you are either going to fix it on the spot or not use the sails.

The area measurement of your sail is straight forward and requires no comment. The problem area has consistently been mainsail roach. Place your sail on a flat surface with a straight mast. Stretch a string from the after edge of the headboard or eye to the clew. Gently pull on the roach to flatten the sail and measure the roach extending beyond the string. Many sailmakers use

large luff curves which will appear in the roach measurement. You can expect wrinkles in the sail when you pull on the roach.

In early December I had the opportunity to attend SCRS #4 in San Diego, the last major sailing event of the season. Historically new designs first appear at the regatta. This year's regatta was sailed in light airs similar to those faced by most coast sailors. The top boats were with one exception the same designs that dominated the ACCR. The first three were a Bone, a Spot, and a Bone. The skippers and sails were more critical than the hull. John Amen's new Eclipse 3 was the new design in the top group. It was definitely competitive with the Spot and Bone.

This winter your class secretary has been building several rigs using carbon fiber masts. I have found that many mast blanks have a slight natural curve. If the rig is built with the curve toward the stern, it can easily be removed using the jumpers and stays. If the curve is oriented atwartships you can expect sail performance problems. My advice to builders is to check mast blanks before rigging.

## 1983 Summer #52

~~~~~  
"M" Class

By Standley Goodwin

I have received several requests from skippers who want to use their old sails on a new hull. Since sail numbers cannot be removed, the old sail number must be used. Luckily a motion to modify section 5.2 passed last years elections allowing this. The applicable section states: "The sail numbers of a boat need not be the same as the hull number, so long as the skipper or owner possesses the current hull registration for the sail being used." If you have both registrations, you are in business.

On the international scene, the M Class rule situation is even worse than reported in the last Newsletter. A large number of amendments have been proposed. There are changes, including some important ones, proposed for almost every section of the rule. For instance, one proposal would outlaw mylar sails while another would obsolete most hulls in existence. One option is to continue to study the rule change and use the present rule in the interim. Hopefully the IMYRU members will select this option and leave the rule alone. I will not recommend major changes to our M Class Specifications.

Many changed proposed in IMYRU M rule, AMYA taking a wait and see approach, not an early adoption approach



## 1983 Fall/Winter #53 & #54

### M Class

by Standley Goodwin

#### FALL:

The 1983 ACCR at Bowling Green is now history. After eleven races your Class Secretary and Jon Elmaleh were tied for first. The tie breaker went in your Class Secretary's favor and as a result I am this years champion.

The top designs in this years ACCR were the same ones that have done well in the past. The top three were Spot, Toad, and Eclipse III. The speed of these three was extremely close, with the differences depending upon the preferences of the skippers. We have gone through two seasons without a breakthrough. Possibly M Class design is stabilizing.

#### WINTER:

On the international scene, the final version of the proposed M Class rule is issued and being voted on by IMYRU. By the time you receive this newsletter, the vote on it should have been completed. The final version turned out to be a clarified version of our present rule. It describes the features of the rule and how to measure them quite clearly. None of the reported objectionable features were present.

New IMYRU M rule revision mostly clarification and how to measure, not radical changes as feared

"Class News", Continued from page 25.

The major change in the proposed rule restricts sails to be basically triangular in shape, i.e.; the type now used by most sailors. It deletes the little used option of having sails of any shape, permitted by our present rule.

After careful review, I found the new international M Class rule to be an improvement over our present one. I have requested that the AMYA president vote for this rule.

Acceptance of the new rule by IMYRU does not affect the U.S. We will continue to use our present rule until the class votes for a change. The present AMYA M Class rule will be in effect for the 1984 sailing season.

Of greatest interest to your class secretary is the proposed method of mainsail roach measurement. They are using a method very similar to our present method, measuring from a line connecting the after edge of the headboard and the clew. An additional mid girth measurement has been added to control excess luff curve.

With the exception of the mid girth measurement the roach measurement used by the new rule can be achieved through interpretation of our present rule. I have sent a letter to IMYRU requesting a clarification of a few points. As soon as I have received a reply and been informed the rule has passed, I will generate instructions for sail measurement for the 1984 ACCR at Port Washington. These should be in the hands of sailmakers Black and Amen before you receive this newsletter. I will inform class members of the roach measurement instructions in the next newsletter.

(Editor's Note: IMYRU did not approve the new change in their M Class rule.)

Is this the  
beginning of a  
continuous roach  
shape?



M CLASS

By Standley Goodwin

The M Class rule has two major constraints, hull length and sail area. Since two 1977 ACCR, our class has constantly had problems with mainsail roach measurement. The cause of the problem is the extra sailcloth that is added to the luff curve of the mainsail when the sail is panneled. The question is whether or not this is to be included in the roach measurement. One attempt to solve this problem, the IMYRU "M" class rule change, has failed to pass. Therefore, we must fall back to our past history.

In 1981 an AMYA amendment was passed which required measurement of the sail on a flat surface. For the 1982 ACCR this was interpreted to mean that the flat area of the sail was to be measured and the luff curve included in the roach measurement. This was done by laying the mainsail on a flat surface with the mast straight. Next, a string was stretched between the after edge of the headboard or center of the eye and the clew. Tension was applied perpendicular to the luff at the leech pulling the sail flat at the measurement point and the roach measured. This method controls extra sail area obtained through luff curve.

This method, though theoretically accurate, presents some difficulties. First,

the mast must remain straight. Second, the measurer must be sure the cloth lies flat at the point of measurement. Third, adequate tension must be applied to the string to ensure it is straight. However, done properly, it is accurate and will control total sail area. This is one of the two methods that will be allowed at the 1984 ACCR.

One of the drawbacks of this measurement technique is that the sailmaker cannot check the sail before delivery. He can deliver a sail which he believes legal and yet have it fail at measurement. The solution to our sail measurement problem lies with the sailmaker. He needs an accurate way to measure sails before delivery.

In order to solve this problem, I have developed an alternate measurement method based on triangular constructions which yields the same results. Using this technique, sailmakers can check sails prior to delivery and know they will pass measurement. In addition, all sailors will know that similar sails will have the same area. This technique accurately achieves the same results as the 1982 ACCR measurement technique. This technique will be an acceptable alternate measurement technique for the 1984 ACCR. An amendment to the "M" class rule incorporating this measurement technique is presented in the motions section of this newsletter.

I would like to point out that there



is a group in our class that would like to control projected sail area. They view the roach measurement as separate from the rest of the sail. Unfortunately, they lose control of sail area in the luff of the sail. Extra luff curve beyond that required for panneling can be added to a sail and the mast bent while sailing to make it effective. Naturally, the mast will be straight during measurement. Determining the amount of excess luff curve during measurement is virtually impossible.

Mast bending is a technique that has been highly developed in full size racing classes. However, they have avoided the problems in excess area through girth measurements. In our case, effective sail area gained through mast bending is free. Any attempt to control it will require check-

ing of mast bend while models are racing and adding the extra area to the measured sail area. Unfortunately, mast bend is a normal sail adjustment used today. When you adjust the backstay you bend the mast. Punishing the offenders without also penalizing the innocent will be extremely difficult.

I believe that sail area control is the most important issue facing the "M" class today and believe it is necessary to take a strong stand on the subject. There are a significant number of mainsails that will require modification to meet either technique for roach measurement to be used at the 1984 ACCR. However, there also are a significant number that will pass the requirement. One of these two groups will be unhappy. The problem should be faced now and corrected.

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Motion to review M class rule to clearly define the mainsail roach measurement, standardize head of sail definition, and clarify overall length measurement.

Add 1.4 The overall length of the yacht shall be measured approximately parallel to the waterline. Where the bumper is integral with the hull, the length measured may include the bumper and measured length to give the overall length of the yacht.

Delete 6.4

Add 6.4 The maximum height of any rig, measured from the deck at the mast to the head of the mainsail, shall be 85 inches.

Delete 6.5

Add 6.5 The height above deck of the jib-stay of any suit of each alternative rig shall not exceed 80% of the height above deck of the head of the largest mainsail of that rig. The height of the jib-stay is defined as the point where the line of the jib luff intersects the front of the mast.

Delete 8.1

Add 8.1 Luff - A. Measured from bottom edge of the sail to the head of the sail.

Add 8.4 Foot - C. Measured from the after corner of the sail (clew) to the forward corner of the sail (tack).

Add 8.5 Leech - D. Measured from the head of the sail at the luff to the lower after corner of the sail (clew).

Delete 9.1

Add 9.1 Luff - Q. Measured from bottom edge of the sail to the head of the sail.

Delete 11 in its entirety

Add 11. - ROACH OF SAILS

11.1 Measurements in this section shall be performed with the measurement tape and sail material in contact to provide an accurate measurement along the sail material. The only exception allowed is for the pocketed or double luffed main where the tape may leave the sail material between the maximum mast diameter and the projection of the luff mark located on the sail in front of the mast.



11.2 Localized distortion of the luff curve at a measurement point will be bridged and measurement performed from the estimated true location of the point.

### 11.3 Mainsail Roach

a) Measure a distance  $A/4$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/4$  centered at the head of the sail at the luff and an arc of radius  $C/4$  centered at the  $A/4$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .56 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.

b) Measure a distance  $A/2$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/2$  centered at the head of the sail at the luff and an arc of radius  $C/2$  centered at the  $A/2$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .38 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.

c) Measure a distance  $3A/4$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $3D/4$  centered at the head of the sail at the luff and an arc of radius  $3C/4$  centered at the  $3A/4$  luff point. Mark the intersection with a cross(+). Extend a line connecting the luff point and the intersection of the arcs .19 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.

d) The maximum roach measured from a line connecting any two adjacent roach measurement points or the after edge of the head and the upper roach measurement point or the lower roach measurement point shall not exceed two (2) inches.

e) Pocketed or double luff mainsail: Perform measurements of a) through d) except center the D arcs at the intersection of the after side of the mast and the head of the sail and locate the luff points on the sail in front of the mast. Measure the mast diameter (K) at the head of the sail. The respective arcs from the luff points are  $C/4 + 3K/4$ ,  $C/2 + K/2$ , and  $3C/4 + K/4$ .

### 11.4 Jib Roach

a) The width of the roach of the jib shall not exceed two (2) inches measured from the after edge of the sail to a line joining the after side of the head and the after lower corner of the sail (clew). Jib roach measurement shall be performed with the jib laying on a flat surface.

### 11.5 Foot Roach

a) Rounded foot of loose footed sail is not measured, but shall not exceed one inch (1").

Delete 13

### Add 13 Head of Sail Definition and Headboards

13.1 Whether or not a headboard is fitted, the head of the sail shall be defined as the line along which the width of the sail, measured at a right angle to the luff, is  $3/4$  inch. Mark the head of sail line on the sail.

For a pocketed or double luffed mainsail: The head of the sail shall be defined as the line along which the width of the sail, measured from the after side of the mast to the leech at a right angle to the after side of the mast is  $3/4$  inch. Mark the head of sail line on the sail.

13.2 Headboards shall not exceed  $3/4$  inch (0.75") across the lower edge. This shall be measured between the edge of the sail it supports along the line of the lower edge of the headboard. This includes headsails, mainsails and spinnakers.

13.3 Only sail material may be used for tablings in the head, tack, or clew of any sail.



## New sail measurement proposed for consistency

Add 14.3 Additional sail area obtained from excess roach shall be measured and added to the measured area of that sail.

Delete - Figure entitled: SAIL AREA MEASUREMENT

Delete - Figure entitled: DOUBLE LUFF MAINSAIL

Motion by: Standley Goodwin, AMYA 334

Seconded by: Eugene Thober, AMYA 4328

### Comment

Since the 1977 ACCR, the M class has constantly had a problem with mainsail roach measurement. We have required recutting of some mainsail roaches at nearly every ACCR. This amendment presents a method to accurately measure roach. In addition, it clarifies an inconsistency in definition of the head of a sail and states the measurement technique now used for hull measurement.

The roach measurement technique allows the sailcloth area that a flat triangular sail with a 3/4 inch headboard and two inch roach would have. It delivers the same results as the measurement procedure tried out at the 1981 ACCR and used at the 1982 ACCR.

The other two changes are minor in nature. One defines the head of the sail so that all sails are measured in the same way. It then incorporates the change in every area where a measurement to the head of the sail is involved. The second states the hull length measurement techniques now in use.

As an aid in evaluating this proposal, Sections 1.4, 8.4, 8.5, 11.1, 11.2, 11.3, 13.1, and 14.3 are new. All other items are either modified or renumbered statements from the present rule.

A more complete description of measurement techniques and rationale behind them appears in other articles in this newsletter

Adoption of this amendment will close several loopholes and ensure that all sails

are measured consistently and contain only the area the rule allows.

### EXPLANATION OF THE RATIONALE FOR THE ALTERNATE MAINSAIL MEASUREMENT

By Standley Goodwin

In an eighty inch (80") mainsail with a triangular measure of 475 square inches, the legal roach typically contains 120 square inches. Due to rule interpretation problems, some of our sailmakers have stretched this to 160 square inches. Without a clear interpretation of the rule, this unmeasured area could be stretched even further.

The problem results from the introduction of the paneled sail. When a sail is paneled, extra sail cloth must be added to the luff curve. It is this extra sail that is causing the problem. In a full sail this extra luff curve can be in excess of one-half inch.

Our class rule has been traditionally interpreted to control the area of sail cloth in a sail. To do this with a paneled sail, an exact method of determining the location of the line from which the roach is measured must be made. The line to be used is based upon the one that a flat triangular sail with a three-quarter inch headboard would have. Three equally spaced points on this line are being located. The roach at these points is being measured. If necessary, these points and the clew or after edge of the headboard can be connected to allow roach measurement in other places.

The technique to be used involves construction of three triangles on the sail, with a slight extension of the base of each to account for the effect of the headboard. From these three points the roach can be accurately measured. The technique is accurate and repeatable.

I have measured several sails and have found that it takes about ten minutes to do the constructions. I would like to encourage all clubs to set up a program to measure existing mainsails. It is especially important that measurement marks



be left on the sails. In order to save time at regattas, sails that have the marks will be spot checked. Others will require full measurement.

One other area of sail measurement has presented a problem. Some sailmakers have used headboard constructions that are not handled by the rule. For consistency, all sails will be measured as if they had a headboard. Since any sail can easily be modified to incorporate a headboard, it seems hardly worth requiring it when a simple measurement will have the same effect.

# INSTRUCTIONS FOR ALTERNATE MEASUREMENT OF SAILS AT 1984 M ACCR

By Standley Goodwin

The first part to be considered is the head of the sail. For consistency, the head of the sail will be defined as the top of the sail at a point where the sail is three-quarters of an inch wide measured

perpendicular to the luff (see Figure 1). The intersection of the X-Y line and the luff is defined as point X. The outer edge of the line is defined as Y. All sails will be measured as if the X-Y line were the bottom of a headboard three-quarters of an inch wide. This applies to both jib and main.

Measurements to determine sail area will be similar to those used in the past. The one significant difference will be the method used to determine the line connecting the outer edge of the headboard, Y, and the clew for the purpose of mainsail roach measurement. Three points on this line will be located using triangular construction methods and the roach at these points determined. If necessary, these points can be connected and the roach measured in other places.

The procedure to be used is necessary only for the mainsail. Jibs have a concave luff curve which in combination with the short battens makes it quite difficult to have excess roach. Therefore, the simple string rule will be used for determining jib roach.

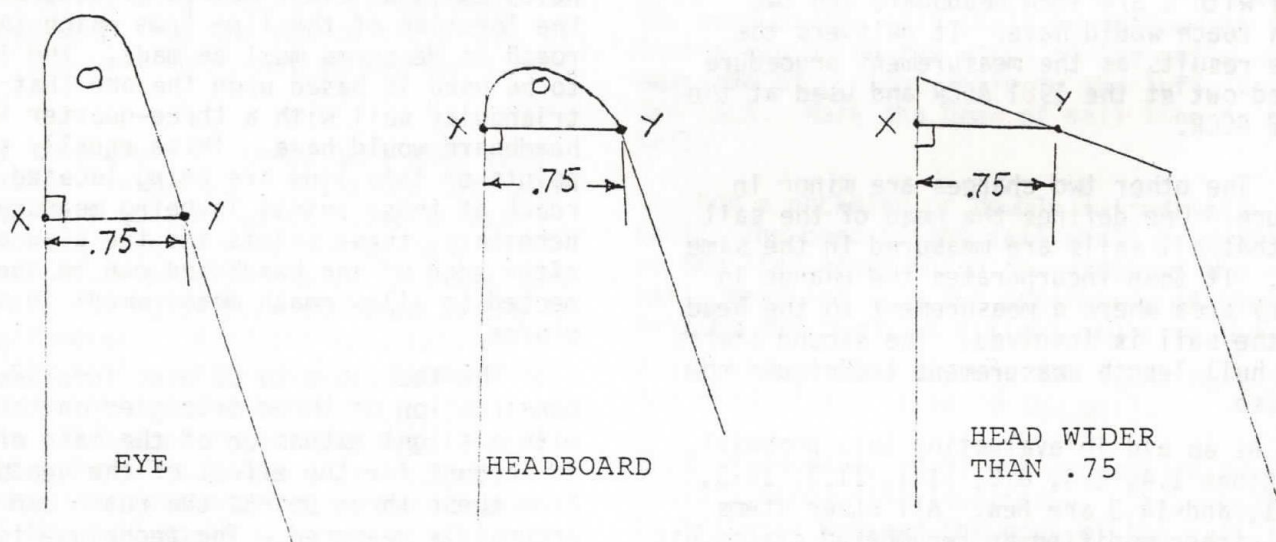


FIGURE 1

### General Instructions for Measurement

1. For all measurements, gentle tension shall be applied to the cloth in the direction of measurement to remove wrinkles.

2. To insure a true measurement, the tape measure and the cloth should be in contact.

3. Reasonable luff tension shall be applied and the foot shall be extended along the boom.

4. Jib measurements shall be performed with the sail on a flat surface.

5. Mainsail measurements shall be performed with as much of the sail as possible on a flat surface. The mast and various fittings restrict the mainsail from full contact with the surface.

### Instructions for Mainsail Measurement (Figures 1, 2, and 3 may be helpful in determining the method of measurement)

1. Locate the X-Y line by determining the point at the head of the sail where it is  $.75$  ( $3/4$ ) inch wide perpendicular to the luff. Draw the line on the sail. Be sure that point X and Y are clearly marked. See Figure 1.

2. Measure A from X at the head to the bottom edge of the sail (tack) along the luff.

3. Mark luff at  $1/4$  A,  $1/2$  A, and  $3/4$  A.

4. Measure D from X to after lower edge of sail (clew).

5. Lightly mark sail at  $1/4$  D,  $1/2$  D, and  $3/4$  D. It is best to mark in small arcs extending toward the luff.

6. Measure B from after edge of sail (clew) to nearest point on luff. This is the mainsail perpendicular.

7. Measure C from after corner of sail (clew) to the forward corner of sail (tack). This is the mainsail foot.

8. Measure from the  $1/4$  A luff mark

a distance  $1/4$  C. Determine the point where the  $1/4$  C measurement intersects the  $1/4$  D arc. Mark this point with a small cross (+).

9. With the rule on the  $1/4$  A luff mark and the cross, extend the line an additional  $.56$  ( $9/16$ ) inch. Mark this point with a dot (·). This is point  $Y_1$  on the line between Y at the after edge of the headboard and the lower corner of the sail (clew).

10. Measure from  $Y_1$  to the leech, perpendicular to the leech. This is the roach at  $Y_1$ .

11. Repeat steps 8, 9, and 10 starting at the  $1/2$  A mark using measurements  $1/2$  D and  $1/2$  C. In step 9, extend the line  $.38$  ( $3/8$ ) inch from the  $1/2$  C,  $1/2$  D, intersection. This locates  $Y_2$ . Perform the roach measurement as in Step 10 at  $Y_2$ .

12. Repeat Steps 8, 9, and 10 starting at  $3/4$  A using measurements  $3/4$  D and  $3/4$  C. In Step 9, extend the line  $.19$  ( $3/16$ ) inch from the  $3/4$  C,  $3/4$  D intersection. This locates  $Y_3$ . Perform the roach measurement as in Step 10 at  $Y_3$ .

13. Check that the cross is marked at the  $1/4$  C and  $1/4$  D intersection. Check that the dot at  $Y_1$  is marked. Check that the cross is marked at the  $1/2$  C and  $1/2$  D intersection. Check that the dot at  $Y_2$  is marked. Check that the cross is marked at the  $3/4$  C and  $3/4$  D intersection. Check that the dot at  $Y_3$  is marked.

14. Determine mainsail area by multiplying A times B and dividing by two.

15. Measure foot roach by stretching a string from the forward lower corner (tack) to after lower corner (clew). Determine maximum dimension from the string to lower edge of the foot of the sail. This is the foot roach.

16. Check batten lengths.

### Instructions for Jib Measurement (Figure 4 may be helpful in determining measurements)

1. Lay the jib on flat surface.





2. Locate the X-Y line at the head of the jib as in Step 1 of mainsail measurements. Draw the line on the sail. Be sure that X and Y are clearly marked. (See Figure 1).

3. Measure Z from X at the head to the bottom edge of the sail (tack) along the luff.

4. Measure the diagonal R from the lower after edge of the sail (clew) to the nearest point on the luff.

5. Determine jib area by multiplying Z times R and dividing by two.

6. Stretch a string between the lower after corner of the sail (clew) and Y. Determine the maximum dimension from the string to the after edge of the sail. This is the jib roach.

7. Stretch a string from the forward lower corner (tack) to the after lower corner (clew). Determine maximum dimension from the string to the lower edge of the foot of the sail. This is the jib foot roach.

8. Check batten lengths.

# M CLASS MEASUREMENTS

## HULL

LENGTH OVERALL PARALLEL TO LWL (-BUMPER) \_\_\_\_\_  
BUMPER LENGTH \_\_\_\_\_

## RIG MEASUREMENTS:

MAIN HOIST TO X \_\_\_\_\_; JIB STAY INTERSECT \_\_\_\_\_, is \_\_\_\_\_ %  
MAINSAIL: LUFF A \_\_\_\_\_, LEECH D \_\_\_\_\_  
PERPENDICULAR B \_\_\_\_\_, FOOT C \_\_\_\_\_

$\frac{A \times B}{2} =$  \_\_\_\_\_ in<sup>2</sup>, FOOT ROACH \_\_\_\_\_, MAX. BATTEN \_\_\_\_\_

TO LOCATE Y<sub>1</sub>  $\frac{1}{4}$  A \_\_\_\_\_,  $\frac{1}{4}$  D \_\_\_\_\_,  $\frac{1}{4}$  C \_\_\_\_\_  
 $\frac{1}{4}$  C + .56 \_\_\_\_\_, ROACH AT Y<sub>1</sub> \_\_\_\_\_

TO LOCATE Y<sub>2</sub>  $\frac{1}{2}$  A \_\_\_\_\_,  $\frac{1}{2}$  D \_\_\_\_\_,  $\frac{1}{2}$  C \_\_\_\_\_  
 $\frac{1}{2}$  C + .38 \_\_\_\_\_, ROACH AT Y<sub>2</sub> \_\_\_\_\_

TO LOCATE Y<sub>3</sub>  $\frac{3}{4}$  A \_\_\_\_\_,  $\frac{3}{4}$  D \_\_\_\_\_,  $\frac{3}{4}$  C \_\_\_\_\_  
 $\frac{3}{4}$  C + .19 \_\_\_\_\_, ROACH AT Y<sub>3</sub> \_\_\_\_\_

JIB: LUFF Q \_\_\_\_\_, PERPENDICULAR R \_\_\_\_\_

$\frac{Q \times R}{2} =$  \_\_\_\_\_ in<sup>2</sup>, MAX. ROACH \_\_\_\_\_

MAX. FOOT ROACH \_\_\_\_\_, MAX. BATTEN \_\_\_\_\_

## OTHER RIG MEASUREMENTS

TOTAL SAIL AREA \_\_\_\_\_ IN.<sup>2</sup>  
MAST DIAMETER \_\_\_\_\_, MAIN BOOM DIAMETER \_\_\_\_\_  
JIB BOOM DIAMETER \_\_\_\_\_



MOTION TO REVISE M CLASS SPECIFICATIONS

Motion to revise M class rule to clearly define the mainsail roach measurement, standardize head of sail definition, and clarify overall length measurement.

Add 1.4 - The overall length of the yacht shall be measured approximately parallel to the waterline. Where the bumper is integral with the hull, the length measured may include the bumper and measured thickness of the bumper subtracted from this measured length to give the overall length of the yacht.

Delete 6.4

Add 6.4 - The maximum height of any rig, measured from the deck at the mast to the head of the mainsail shall be eighty-five inches.

Delete 6.5

Add 6.5 - The height above deck of the jib-stay of any suit of each alternative rig shall not exceed eighty per cent (80%) of the height above the deck of the head of the largest mainsail of that rig. The height of the jib-stay is defined as the point where the line of jib luff intersects the front of the mast.

Delete 8.1

Add 8.1 - Luff - A. Measured from bottom edge of the sail to the head of the sail.

Add 8.4 - Foot - C. Measured from the after corner of the sail (clew) to the forward corner of the sail (tack).

Add 8.5 - Leech - D. Measured from the head of the sail at the luff to the lower after corner of the sail (clew).

Delete 9.1

Add 9.1 - Luff - Q. Measured from bottom edge of the sail to the head of the sail.

Delete 11 in its entirety.

Add 11. - ROACH OF SAILS

11.1 - Measurements in this section shall be performed with the measurement tape and sail material in contact to provide an accurate measurement along the sail material. The only exception allowed is for the pocketed or double luffed main where the tape may leave the sail material between the maximum mast diameter and the projection of the luff mark located on the sail in front of the mast.

11.2 - Localized distortion of the luff curve at a measurement point will be bridged and measurement performed from the estimated true location of the point.



### 11.3 -Mainsail Roach

- a) Measure a distance  $A/4$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/4$  centered at the head of the sail at the luff and an arc of radius  $C/4$  centered at the  $A/4$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .56 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.
- b) Measure a distance  $A/2$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/2$  centered at the head of the sail at the luff and an arc of radius  $C/2$  centered at the  $A/2$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .38 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.
- c) Measure a distance  $3A/4$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $3D/4$  centered at the head of the sail at the luff and arc of radius  $3C/4$  centered at the  $3A/4$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .19 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.
- d) The maximum roach measured from a line connecting any two adjacent roach measurement points or the after edge of the head and the upper roach measurement point or the lower after edge of the sail (clew) and the lower roach measurement point shall not exceed two (2) inches.
- e) Pocketed or double luff mainsail: Perform measurements of a) through d) except center the D arcs at the intersection of the after side of the mast and the head of the sail and locate the luff points on the sail in front of the mast. Measure the mast diameter (K) at the head of the sail. The respective arcs from the luff points are  $C/4 + 3K/4$ ,  $C/2 + K/2$ , and  $3C/4 + K/4$ .

### 11.4 - JIB ROACH

- a) The width of the roach of the jib shall not exceed two (2) inches measured from the after edge of the sail to a line joining the after side of the head and the after lower corner of the sail (clew). Jib roach measurement shall be performed with the jib laying on a flat surface.

### 11.5 - FOOT ROACH

- a) Rounded foot of loose footed sail is not measured, but shall not exceed one inch (1").



Delete 13

Add 13 - Head of Sail Definition and Headboards

13.1 -Whether or not a headboard is fitted, the head of the sail shall be defined as the line along which the width of the sail, measured at a right angle to the luff, is three-quarter inch. Mark the head of sail line on the sail.

For a pocketed or double luffed mainsail: The head of a sail shall be defined as the line along which the width of the sail, measured from the after side of the mast to the leech at a right angle to the after side of the mast is three-quarter inch. Mark the head of sail line on the sail.

13.2 -Headboards shall not exceed three-quarters of an inch (0.75") across the lower edge. This shall be measured between the edge of the sail it supports along the line of the lower edge of the headboard. This includes headsails, mainsails and spinnakers.

13.3 -Only sail material may be used for tablings in the head, tack, or clew of any sail.

Add 14.3 -Additional sail area obtained from excess roach shall be measured and added to the measured area of that sail.

Delete - Figure entitled: SAIL AREA MEASUREMENT

Delete - Figure entitled: DOUBLE LUFF MAINSAIL

Signed: Standley Goodwin, AMYA # 334

Seconded: Eugene Thober, AMYA # 4328

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#### MOTION - TO REVISE "M" CLASS RULES

Marblehead sails (both main and jib) shall be measured pursuant to the general \*AMYA method for Sail Measurement as proposed in 1984. (\* M-RR1)

Signed: Ned Wagner, AMYA # 2004

Seconded: Bob De Bow, AMYA # 89

Comment: We believe that the proposed AMYA method for Sail Measurement procedures should be applied to the Marblehead Class. We believe these procedures accurately reflect past measurement practices in the class. We also believe that these procedures (contrary to other proposed measurement systems) will not cause any presently legal Marblehead sails to become obsolete or illegal.



Dear Editor:

My goodness! What a fuss and dither on how to measure 50/800 sails, or any sails.

It seems to me that if the Goodwin motion were to become AMYA or any class rules, not many skippers would understand them anyway.

The problem seems to start with the idea (and rule 3.1, etc.) that a sail should be measured on the mast, which I say is difficult to the point of being impossible. Sails on a mast or spars just do not lie flat on a measuring surface.

Let's back up 50 years and say that "sails should be measured off of their spars, stretched under reasonable tension from head, tack and clew until there is a 'lie' of cloth from head to clew that does lie flat. A line stretched between the head and the clew will give sufficient evidence as to how much roach exists.

And someone will say that you have to stroke the sail so that all of the cloth between the luff and the leech lies flat. Shy? No knowledgeable skipper in his right mind will attempt to "load" this area with cloth. It makes for just plain lousy sails to do so.

And someone will say, "How about that curved luff?" And again I say that if you want to load this sail edge for'd of the luff, then go ahead and do so. You do so to your own detriment.

The head of a sail is the upper-most height corner, or a line perpendicular to the luff where the cloth joins the headboard. If you don't use a headboard, then the head is the upper-most point of cloth, not the center of the head "eye," but the cloth.

"Intentionally bent masts?" Any mast using a backstay, where the forestay intersects the mast at the 80% mark, is going to be intentionally, or maybe accidentally bent. So what! Are you going to gain any appreciable amount of usable sail area by bending? How much, twenty square inches? I doubt it. If the mast is intentionally

bent, then that area has to be considered. Excess roach cannot exist. It cannot be added to the sail area because it cannot exist within the rules.

It seems to me that someone is going a long way in attempting to satisfy so very few by writing an elaborate set of rules without which I can have just as much fun from my hobby. I would vote against the motion.

E. Salika #308



Dear Editor:

My congratulations on your first edition, a very fine job indeed! Having put together a few myself, I can appreciate the hard work. Keep up the good work and accept all the credit that comes your way.

Bill Webb, Director



Dear Editor:

Gene, congratulations on a Super Job of producing the AMYA Quarterly Newsletter. May you always have wind in your sails.

Bob Girdley, Vice President

p.s. I was born in Bedford, Indiana



Gene & Susan:

Just received my #55 QNL. Super Issue.

Barbara Maire





## M CLASS NEWS

by: Standley Goodwin

Pre ACCR measurements have uncovered a large number of mainsail roaches that fail measurement requirements. Again, for the Nth time, we will be recutting mainsails at an ACCR.

The various versions of mainsail roach measurement using the string rule have one thing in common. They have a horrible repeatability problem. Only an expert measurer who carefully checks for the many sources of error can get repeatable results. I would hate to count the number of times I have heard a poor soul who has just been told to cut an eighth inch off his roach say, "But it measured in last year".

The string rule detects but does not control the mainsail roach problem. It must be performed on a rigged sail and therefore cannot be checked by the sailmaker before sail delivery. The sailmaker can deliver a sail he thinks is okay and yet have it fail.

In case you haven't figured it out, the argument is over sail area. A square inch of roach pushes a boat just as effectively as a square inch of measured area. With all other things equal, the boat with the most sail area will win every time. The next time you lose a race by a foot, ask yourself, did I lose because I sailed poorly, or did my competitor have twenty square inches more roach. You will never know.

Your class secretary has proposed an M class rule change which precisely controls mainsail roach.

This was done to benefit the average sailor who purchases his sails. No matter which sailmaker he goes to, he will know that he will get the same total area. The sailmaker can perform the roach measurements on an unrigged sail before delivery. Measurement marks placed on the sail by the sailmaker can easily be checked and the roach of the sail will be obvious. Passage of this amendment will also close a few loopholes open to the few that make their own sails, thus preventing them from getting an unfair advantage.

I expect that you will read a number of negative comments on this proposal that will range from the well thought out to hysterical emotionalism. I will admit that control offered by this amendment does not come free. It will probably result in a small increase in the cost of a suit of sails. All I ask is that you carefully weight the benefits and costs of this amendment. In the end I believe that you will find the benefits considerably outweigh the costs. Remember, the alternative is to continue the chaos of the last seven years.

Since proposing this amendment, I have received several complaints that it is too complicated. Our present string rule can only be performed on rigged mainsails. Since our sailmakers make maximum roach mainsails and cannot measure them, they produce a fair number of overs. These sails are detected at major regattas and require recutting on the spot.

This winter I spent considerable time looking at measurement techniques for mainsail roach that can be used for both rigged and unrigged sails. In looking at the various candidates, I had to bear in mind that our rule allows a wide range of sail shapes. If we could restrict ourselves to triangular mainsails attached to a mast by a jackline, the measurements could be simplified. Given the constraints of our rule, the proposal in the amendment was the simplest one I could find.

Class members must either accept this amendment or one very similar to it, or continue the re-cutting of mainsails at regattas. I wish there was an easier answer but I can't find it.

The entire rule with the amendment incorporated is presented elsewhere in this newsletter. You will find the major change in Section 11 on roach measurement. The rest is a slightly modified version of our present rule. Our present rule is in the 1980 spring newsletter Number 39 starting on Page 20. Two rule amendments are presented in the 1982 spring newsletter on Pages 22 and 23. In reviewing the proposed amendment, you will note that it is numbered differently than the original 1980 rule. My predecessor took the liberty of replacing the letters with numbers. Thus Section 1a becomes 1.1. Since I have been sending out rule copies with registrations that use the new number system, I felt it best to stick to it. I suggest that class members compare the present and proposed rules before voting, and hope you will decide on a path that maintains the long term health of our class.



**M..M..S..1      MOTION TO REVISE M CLASS SPECIFICATIONS**

**Note:** This NEW version completely replaces the M Class Specs as printed in # 55 QNL. (Specs rewritten by Standley Goodwin)

INTERNATIONAL "M" CLASS (MARBLEHEAD 50/800 CLASS)

(Proposed 1984 Motion and Amendments Incorporated)

**1. OVERALL LENGTH**

- 1.1 Overall length of the hull fifty inches (50").
- 1.2 One-quarter of an inch (0.25") in excess of, or less than, 50 inch overall measurement allowed.
- 1.3 Bow bumpers are mandatory and are limited to one-half inch (0.50") overhang. Bumpers are in no case to be included in the overall length measurement, whether built in, recessed, or otherwise attached to the hull. Bumpers must be made of resilient material and capable of minimizing damage to another yacht in the event of collision.
- 1.4 The overall length of the yacht shall be measured approximately parallel to the waterline. Where the bumper is integral with the hull, the length measured may include the bumper and measured thickness of the bumper subtracted from this measured length to give the overall length of the yacht.

**2. SAIL AREA**

- 2.1 Sail area (excepting spinnaker) not to exceed eight hundred square inches (800 sq. in.).



3. UNITS OF MEASUREMENT

All measurements shall be taken and recorded as follows:

- 3.1 Linear: Inches and decimal fractions of an inch.  
3.2 Areas: Square inches and decimal fractions of a square inch calculated to 3 places and corrected to 2 places of decimals.

Conversion Figures

1 cm = 0.394 inch

1 cm<sup>2</sup> = 0.155 sq. in.

1 cm<sup>3</sup> = 0.061 cub. in.

1 kg = 2.205 lb.

1 inch = 2.54 cm

1 sq. in. = 6.45 cm<sup>2</sup>

1 cub. in. = 16.387 cm<sup>3</sup>

1 lb. = 0.454 kg

4. PROHIBITED

- 4.1 Movable keels, Centre-boards, Lee-boards, Bilge-boards.  
4.2 Bowsprits, Overhanging rudders.  
4.3 Movable or shifting ballast.  
4.4 Outriggers, Pontoons, Twin Hulls, "Tunnel" Hulls.  
4.5 To change rudders during a race or series of races, except in bona fide cases of damage to the original rudder.  
4.6 Weight of lead ballast SHALL NOT be changed during a race or series of races.

5. UNRESTRICTED

- 5.1 ~~There are no restrictions of Beam, Tumble-home, Freeboard, Draft, Load water line length, Displacement, Scantlings, Materials (except where provided elsewhere in these rules).~~  
5.2 An alteration in displacement, other than by a change of internal ballast, does not, OF ITSELF, render a certificate invalid.

6. RIGS

- 6.1 Bermudan, Marconi or jib-headed mainsail, Gaff, Gunter, Wishbone, etc. may be used.  
6.2 Not more than 3 alternative rigs are allowed, provided the total sail area of each does not exceed 800 sq. inches. The sails of each rig must be clearly marked, A, B, or C.  
6.3 A rig is defined as any number of suits of sails, the largest of which shall not exceed 800 sq. inches. The dimensions of this suit shall be recorded on the Measurement Certificate. If any dimension of any remaining suits is greater than that of the largest suit, then these suits shall be recorded as alternative rigs.  
6.4 The maximum height of any rig, measured from the deck at the mast to the head of the mainsail shall be eighty-five inches.  
6.5 The height above deck of the jib-stay of any suit of each alternative rig shall not exceed eighty per cent (80%) of the height above deck of the head of the largest mainsail of that rig. The height of the jib-stay is defined as the point where the line of the jib luff intersects the front of the mast.



7. MASTS AND SPARS

- 7.1 There shall be no limit to height of mast.
- 7.2 The greatest diameter of masts and spars is limited to three-quarters of an inch (0.75").
- 7.3 There are no restrictions on material, weight, or section, and no extra measurements are entailed where not round.
- 7.4 Hollow masts and spars are allowed.
- 7.5 Permanently bent masts and spars, Rotating and Bipod masts are allowed.
- 7.6 Masts and spars not to be included in sail area measurement.

8. TRIANGULAR MAINSAIL MEASUREMENT

- 8.1 Luff - A. Measured from bottom edge of the sail to the head of the sail.
- 8.2 Diagonal - B. Measured from the after edge of the sail (clew) to the nearest point at the Luff.
- 8.3 (Pocketed or double luffed) Diagonal - B. Measured from the after edge of the sail (clew) to the forward side of the mast when the clew is fully extended along the boom.
- 8.4 Foot - C. Measured from the after corner of the sail (clew) to the forward corner of the sail (tack).
- 8.5 Leech - D. Measured from the head of the sail at the luff to the lower after corner of the sail (clew).

9. JIB OR HEADSAIL MEASUREMENT

- 9.1 Luff - Q. Measured from bottom edge of the sail to the head of the sail.
- 9.2 Diagonal - R. Measured from after edge of sail (clew) to the nearest point at the Luff.

10. CALCULATION OF SAIL AREA

- 10.1 Triangular Mainsail (or Sliding Gunter with head in same straight line as the mast). Multiply A by B and divide in two (2).
- 10.2 Jib or Headsail. Multiply Q by R and divide by two (2).

11. ROACH OF SAILS

- 11.1 Measurements in this section shall be performed with the measurement tape and sail material in contact to provide an accurate measurement along the sail material. The only exception allowed is for the pocketed or double luffed main where the tape may leave the sail material between the maximum mast diameter and the projection of the luff mark located on the sail in front of the mast.

- 11.2 Localized distortion of the luff curve at a measurement point will be bridged and measurement performed from the estimated true location of the point.



### 11.3 Mainsail Roach

- a) Measure a distance  $A/4$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/4$  centered at the head of the sail at the luff and an arc of radius  $C/4$  centered at the  $A/4$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .56 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.
- b) Measure a distance  $A/2$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/2$  centered at the head of the sail at the luff and an arc of radius  $C/2$  centered at the  $A/2$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .56 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.
- c) Measure a distance  $3A/4$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $3D/4$  centered at the head of the sail at the luff and an arc of radius  $3C/4$  centered at the  $3A/4$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .19 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.
- d) The maximum roach measured from a line connecting any two adjacent roach measurement points or the after edge of the head and the upper roach measurement point or the lower after edge of the sail (clew) and the lower roach measurement point shall not exceed two (2) inches.
- e) Pocketed or double luff mainsail: Perform measurements of a) through d) except center the  $D$  arcs at the intersection of the after side of the mast and the head of the sail and locate the luff points on the sail in front of the mast. Measure the mast diameter ( $K$ ) at the head of the sail. The respective arcs from the luff points are  $C/4 + 3K/4$ ,  $C/2 + K/2$ , and  $3C/4 + K/4$ .

### 11.4 Jib Roach

- a) The width of the roach of the jib shall not exceed two (2) inches measured from the after edge of the sail to a line joining the after side of the head and the after lower corner of the sail (clew). Jib roach measurement shall be performed with the jib laying on a flat surface.



11.5 Foot Roach

- a) Rounded foot of loose footed sail is not measured, but shall not exceed one inch (1").

12. BATTEN LIMITS

- 12.1 Battens in mainsail shall not exceed four in number and shall divide the leech into approximately equal parts. Battens not to exceed four (4) inches in length.
- 12.2 Battens in headsail shall not exceed three in number and shall divide the leech into approximately equal parts. Battens not to exceed two (2) inches in length.

13. HEAD OF SAIL DEFINITION AND HEADBOARDS

- 13.1 Whether or not a headboard is fitted, the head of the sail shall be defined as the line along which the width of the sail, measured at a right angle to the luff, is three-quarter inch. Mark the head of sail line on the sail.

For a pocketed or double luffed mainsail: The head of the sail shall be defined as the line along which the width of the sail, measured from the after side of the mast to the leech at a right angle to the after side of the mast is three-quarter inch. Mark the head of sail line on the sail.

- 13.2 Headboards shall not exceed three-quarters of an inch (0.75") across the lower edge. This shall be measured between the edges of the sail it supports along the line of the lower edge of the headboard. This includes headsails, mainsails and spinnakers.

- 13.3 Only sail material may be used for tablings in the head, tack, or clew of any sail.

14. SAILS BOUNDED BY CURVED EDGES

- 14.1 If, when the sail is set, the mast, spar, or jibstay is intentionally bent, or curved by any means, any additional area obtained in this manner shall be measured as a bow and added to the area of the sail.

- 14.2 The Base - O shall be multiplied by two-thirds (0.66) of the Perpendicular - P.

- 14.3 Additional sail area obtained from excess roach shall be measured and added to the measured area of that sail.

15. SPINNAKER AND SPINNAKER BOOM

- 15.1 The maximum spinnaker hoist for any rig shall be 68 inches.
- 15.2 Spinnaker boom not to exceed fifteen (15) inches in length, measured from centre of mast to outer end of boom.



## 16. DISTINGUISHING MARKS

- 16.1 Sizes: Class Mark "M" to be at least one (1) inch high and at least one-quarter (1/4) inch thick. Registered Numbers and National Letters to be at least two and one-half (2 1/2) inches high, at least three-eighths (3/8) inch thick, and spaced at least one-half (1/2) inch between figures. Bar dividing Class Mark and National Letters/Registered Numbers is to be one-eighth (1/8) inch thick.
- 16.2 The Registered Numbers may be preceded by the distinguishing National Letters (US for United States) of identical dimensions, either above or to the left of the numbers. Skippers are encouraged to use the National Letters; however, they are mandatory only for international events.

Exampless:

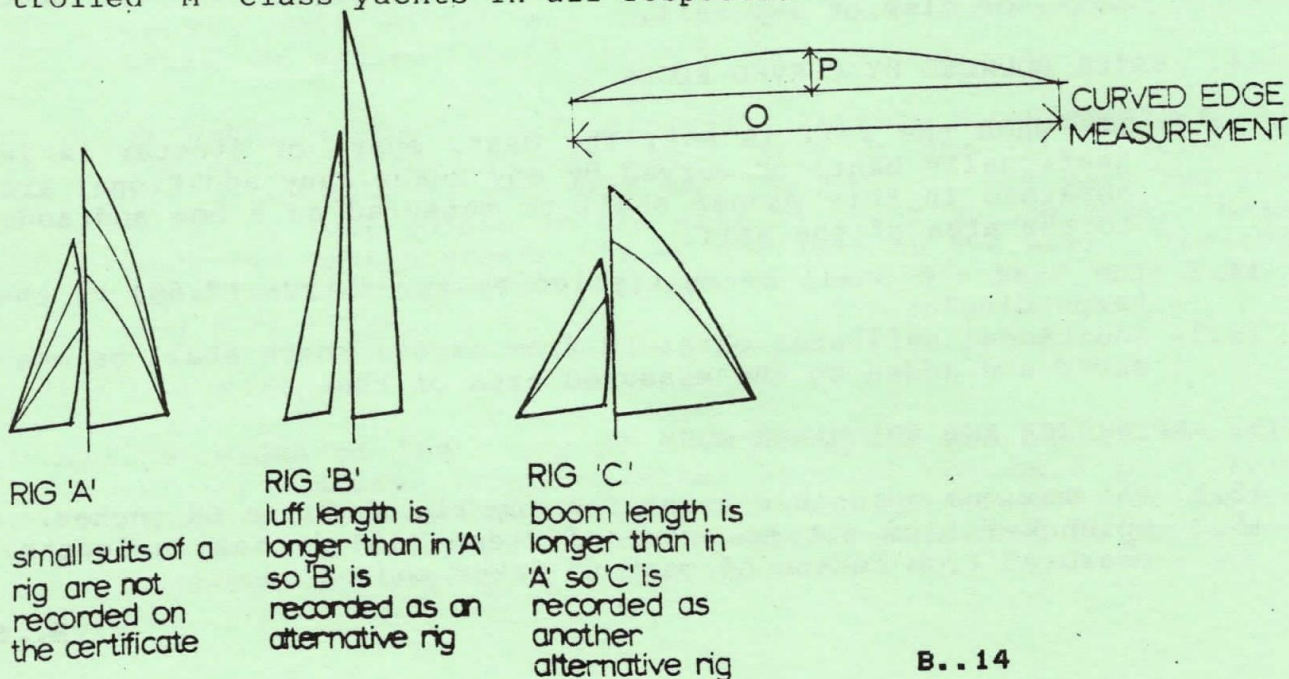
$$\begin{array}{rcl} \frac{M}{US1911} & = & 1" \\ & = & 2 \frac{1}{2}" \end{array} \quad \begin{array}{rcl} \frac{M}{1911} & = & 1" \\ & = & 2 \frac{1}{2}" \end{array} \quad \begin{array}{rcl} \frac{M}{US} & = & 1" \\ \frac{US}{1911} & = & 2 \frac{1}{2}" \\ 1911 & = & 2 \frac{1}{2}" \end{array}$$

- 16.3 Owners Racing Flag may be 2" by 1 1/2", approximately.

## 17. 1984 SAIL MEASUREMENT EFFECTIVITY

- 17.1 All sails built after January 1, 1985 shall conform to the requirements of the 1984 Motion to clearly define mainsail roach measurement, standardize head of sail definition, and clarify overall length measurement. Sails built before that date may be measured until January 1, 1986 using M class and AMYA regulations in effect on January 1, 1984. Section 17 shall be deleted from the rule on January 1, 1986.

The forgoing Rating Rules/Class Specifications apply to Radio Controlled "M" Class yachts in all respects.





Amendments to Motion to revise M class rule to clearly define the mainsail roach measurement, standardize head of sail definition, and clarify overall length measurement.

Amendment 1 - Replace 11.3b with the following:

11.3 Mainsail Roach

- b) Measure a distance  $A/2$  down from the head of the mainsail along the luff and mark the luff at this point. Locate the intersection of an arc of radius  $D/2$  centered at the head of the sail at the luff and an arc of radius  $C/2$  centered at the  $A/2$  luff point. Mark the intersection with a cross (+). Extend a line connecting the luff point and the intersection of the arcs .56 inches toward the leech and mark the point with a dot. The maximum roach measured from the dot to the after edge of the sail shall not exceed two (2) inches.

Comment: This amendment moves the middle roach measurement point out 3/16 of an inch. By doing this, the unsightly concave roach seen on full sails is straightened. The price to make the sail look right is less than five square inches.

Amendment 2 - Add section 17 to the motion:

17. 1984 SAIL MEASUREMENT EFFECTIVITY

- 17.1 All sails built after January 1, 1985 shall conform to the requirements of the 1984 Motion to clearly define mainsail roach measurement, standardize head of sail definition, and clarify overall length measurement. Sails built before that date may be measured until January 1, 1986 using M class and AMYA regulations in effect on January 1, 1984. Section 17 shall be deleted from the rule on January 1, 1986.

Comment: This amendment allows sails purchased for the 1984 season to be used in the 1985 season without remeasurement. Since few sails remain competitive for more than two years, the remeasurement problem should solve itself.

Signed: Standley Goodwin, AMYA # 334  
Seconded: Eugene Thober, AMYA # 4328

Comment: I have been a measurer for the VMYC # 49 for many years, and I would like to point out that most if not all of the sails I have measured, and seen measured, over these many years would be made illegal if this motion passes. Mr. Goodwin has made an excellent job of defining how to measure the area of the cloth in the mainsail, but has overlooked the devastating effect that this would have on virtually



**M..M..S..1 continued (page 8)**

everyone in the class. The IMYRU proposal for a half girth measurement of the length of the mainsail foot plus three inches is a lot more realistic, and virtually all sails I have measured would comply with this. This rule did not pass this time around, but this is because it was included with other changes which were untenable. The situation will be resolved internationally in the near future, and I would suggest that we wait and see, rather than adopt this regulation now, and require virtually everyone to cut down their sails. I urge you to vote against this motion. Bob Sterne AMYA 1701

**M..M..S..2 MOTION - TO REVISE "M" CLASS RULES**

Marblehead sails (both main and jib) shall be measured pursuant to the general \*AMYA method for Sail Measurement as proposed in 1984. ( \* M-RR-1 )

Signed: Ned Wagner, AMYA # 2004  
Seconded: Bob De Bow, AMYA # 89

Comment: We believe that the proposed AMYA method for Sail Measurement procedures should be applied to the Marblehead Class. We believe these procedures accurately reflect past measurement practices in the class. We also believe that these procedures (contrary to other proposed measurement systems) will not cause any presently legal Marblehead sails to become obsolete or illegal. Wagner & De Bow

Comment: I would agree that the method of measurement detailed in motion M-RR-1 would not obsolete the vast majority of sails in the M class, and although we may be wise to adopt any future IMYRU change, I feel that this is an excellent interim step. Please vote for motion M-M-S-2. Bob Sterne, AMYA # 1701

**1984 Autumn #57**

Motions "PASSED" take effect January 1, 1985 & must be approved by two thirds majority of the votes submitted.

**MOTIONS:**

|                               |          |        |         |       |
|-------------------------------|----------|--------|---------|-------|
| AMYA REGULATIONS sail meas-   | M..RR..1 | PASSED | 123 Yes | 34 No |
| AMYA REGULATIONS amend above- | M..RR..2 | PASSED | 99 Yes  | 52 No |

**STAR 45 CLASS:**

|                 |           |        |        |      |
|-----------------|-----------|--------|--------|------|
| New Class Specs | M..45.S.1 | PASSED | 25 Yes | 6 No |
|-----------------|-----------|--------|--------|------|

**3 UR CLASS:**

|                          |            |        |        |       |
|--------------------------|------------|--------|--------|-------|
| No maximum sail area etc | M..3UR.S.1 | PASSED | 24 Yes | 3 No  |
| 36" maximum w/bumper     | M..3UR.S.2 | FAILED | 1 Yes  | 23 No |

**M (50/800) CLASS:**

|                                                   |            |        |        |       |
|---------------------------------------------------|------------|--------|--------|-------|
| New Class Specs                                   | M..M..S..1 | FAILED | 15 Yes | 85 No |
| M sails measured pursuant to M.RR.1 passed above, | M..M..S..2 | PASSED | 75 Yes | 30 No |

Barbara Maire, Executive Secretary

Motion to use new IMYRU M class rule for measurement failed, but motion to go back to usign standard AMYA measurement methods passed. So what is the rules as of this issue?



M CLASS NEWS

Standley Goodwin,  
Marblehead "M" Class Secretary

I would like to first congratulate our class champion, John Amen, for his win at the 1984 ACCR at Port Washington. Racing was very tight with the winner literally being determined ten feet from the finish of the last race.

From a sailing point of view, this regatta had a wide range of conditions. In some races conditions varied from planing to calm within a few minutes. A wide range of hull designs did well. The first four places were four different designs. The designs were the Eclipse III by John Amen, the Donna by Jon Elmaleh, the Toad by Terry Allen, and the Spot by Terry Allen. All of these designs are presently in production and available to class members. Worth noting is the fact that three of the four designs are not new. The boat-of-the-month syndrome didn't work at the '84 ACCR.

17. Sail Measurement

- 17.1 Marblehead sails (both main and jib) shall be measured pursuant to the general AMYA Regulations, Part II Section 3, as passed in 1984.

Since the results of the vote were known before the ACCR, your class secretary felt the new measurement instructions should be used. At this point, it became clear that there were two very different interpretations of the instructions for measurement of sail roach. The literal interpretation of the instructions differs considerably from what composers of the instructions intended. The author of this rule has been informed and has indicated that he will correct the problem.

At the 1984 ACCR the most liberal interpretation of the instructions were used. There were few problems with roach measurement. It is hoped this experience will continue and the more drastic remedies will not be necessary.

Class members should understand that M class rules take precedence when measuring

sails. The preamble of Section 3 states, "These procedures DO NOT supercede any class specifications." In particular, the roach measurement is still performed to the outer edge of the headboard or to the center of the eye. Section 3 does not change the M class rule; it tells us how to perform the necessary measurements.

Our 1985 ACCR will be held in San Diego in early August as part of a race week. You will find more information on it elsewhere in the newsletter. At this moment, there are four M class divisional races this year, a considerable improvement over past years.



10-R CLASS NEWS

Frank Soto, Class Secretary

Ten Rater racing in 1984 is almost history. Our attention will probably now focus on new race schedules, boat repairs, and building for 1985. With the ACCR scheduled for August 7 and 8 at San Diego "RACE WEEK '85" and the 1985 Eastern Division (Region 2) Championship Race for 10 Raters to be held at Central Park, NYC, on June 15, we are off to a good start. Now let's hear from 5 other regions to complete the schedule of Regional Championship Races for 1985.



OPEN CLASS SECRETARY'S REPORT

Bud Salika

The open class has always seemed to be a Limbo for those boats that didn't fit into any other class. It's not a good feeling to have a boat registered in a class that has no activity. I had occasion to talk with Wally Gitchel who was the class secretary many years (6 or 7) ago. Wally at that time came up with the idea of the course which is published in the AMYA Handbook. I didn't like the course then and really am not enthused by it today. Wally did point out to me some of the ideas and



## INTERNATIONAL "M" CLASS (Marblehead)

### 1. OVERALL LENGTH

- 1.1 Overall length of the hull to be fifty inches (50").
- 1.2 One quarter of an inch (0.25") in excess of, or less than, 50 inch overall measurement allowed.
- 1.3 Bow bumpers are mandatory and are limited to one half inch (0.50") overhang. Bumpers are in no case to be included in the overall length measurement, whether built in, recessed, or otherwise attached to the hull. Bumpers must be made of resilient material and capable of minimizing damage to another yacht in the event of collision.

### 2. SAIL AREA

- 2.1 Sail area (excepting spinnaker) not to exceed eight hundred square inches (800 sq. in.).

### 3. UNITS OF MEASUREMENT

All measurements shall be taken and recorded as follows:

- 3.1 Linear: Inches and decimal fractions of an inch.  
Areas: Square inches and decimal fractions of a square inch calculated to 3 places and corrected to 2 places of decimals.

### 4. PROHIBITED

- 4.1 Movable keels, Centre-boards, Lee-boards, Bilge-boards.
- 4.2 Bowsprits, Overhanging rudders.
- 4.3 Movable or shifting ballast.
- 4.4 Outriggers, Pontoons, Twin Hulls, "Tunnel" Hulls
- 4.5 To change rudders during a race or series of races, except in bona fide cases of damage to the original rudder.
- 4.6 Weight of lead ballast shall not be changed during a race or series of races.

### 5. UNRESTRICTED

- 5.1 There are no restrictions on Beam, Tumble-home, Freeboard, Draft, Load water line length, Displacement, Scantlings, Materials (except where provided elsewhere in these rules).
- 5.2 An alteration in displacement, other than by a change of internal ballast, does not, OF ITSELF, render a certificate invalid.

### 6. RIGS

- 6.1 Bermudan, Marconi or jib-headed mainsail, Gaff, Gunter, Wish-bone, etc. may be used.
- 6.2 Not more than 3 alternative rigs are allowed, provided the total sail area of each does not exceed 800 square inches. The sails of each rig must be clearly marked, A, B, or C.
- 6.3 A rig is defined as any number suits of sails, the largest of which shall not exceed 800 square inches. The dimensions of this suit shall be recorded on the Measurement Certificate. If any dimension of any remaining suits is greater than that of the largest suit, then these suits shall be recorded as alternative rigs.



- 6.4 The maximum height of rig, measured from the deck to the lower edge of the headboard or eye, shall be 85 inches (Main Hoist).
- 6.5 The height above deck of the jib-stay of any suit of each alternative rig shall not exceed eighty per cent (80%) of the height above deck of the lower edge of the headboard or eye of the largest mainsail of that rig. The height of the jibstay is defined as the point where the line of the jib luff intersects the front of the mast.

## 7. MASTS AND SPARS

- 7.1 There shall be no limit to height of mast.
- 7.2 The greatest diameter of masts and spars is limited to three-quarters of an inch (0.75").
- 7.3 There are no restrictions on material, weight, or section and no extra measurements are entailed where not round.
- 7.4 Hollow masts and spars are allowed.
- 7.5 Permanently bent masts and spars, Rotating and Bipod masts are allowed.
- 7.6 Masts and spars not to be included in sail area measurement.

## 8. TRIANGULAR MAINSAIL MEASUREMENT

- 8.1 Luff - A. Measured from bottom edge of the sail to the lower edge of the headboard or eye.
- 8.2 Diagonal - B. Measured from the after edge of the sail (clew) to the nearest point at the Luff.
- 8.3 (Pocketed or double luffed) Diagonal - B. Measured from the after edge of the sail (clew) to the forward side of the mast when the clew is fully extended along the boom.

## 9. JIB OR HEADSAIL MEASUREMENT

- 9.1 Luff - Q. Measured from bottom edge of the sail to lower edge of headboard or eye.
- 9.2 Diagonal - R. Measured from after edge of sail (clew) to the nearest point at the Luff.

## 10. CALCULATION OF SAIL AREA

- 10.1 Triangular Mainsail (or Sliding Gunter with head in same straight line as the mast) Multiply A by B and divide by two (2)
- Jib or Headsail Multiply Q by R and divide by two (2)

## 11. ROACH OF SAILS

- 11.1 The width of the roach shall not exceed two (2) inches, measured from the after edge of the sail to a line from the lower corner of the sail (clew) to either the outer edge of the headboard or to the centre of eye at the head of the sail where there is no headboard.
- 11.2 Rounded foot of loose footed sail is not measured, but shall not exceed one inch (1").

## 12. BATTEN LIMITS

- 12.1 Battens in mainsail shall not exceed four in number and shall divide the leech into approximately equal parts. Battens not to exceed four (4) inches in length.

- 12.2 Battens in headsail shall not exceed three in number and shall divide the leech into approximately equal parts. Battens not to exceed two (2) inches in length.

### 13. HEADBOARDS

- 13.1 Headboards shall not exceed three quarters of an inch (0.75") across the lower edge. This shall be measured between the edge of the sail it supports along the line of the lower edge of the headboard. This includes headsails, mainsails and spinnakers.
- 13.2 Only sail material may be used for tablings in the head, tack, or clew of any sail.

### 14. SAILS BOUNDED BY CURVED EDGES

- 14.1 If, when the sail is set, the mast, spar, or jibstay is intentionally bent, or curved by any means, any additional area obtained in this manner shall be measured as a bow and added to the area of the sail.
- 14.2 The Base - O shall be multiplied by two-thirds (0.66) of the Perpendicular - P.

### 15. SPINNAKER AND SPINNAKER BOOM

- 15.1 The maximum spinnaker hoist for any rig shall be 68 inches.
- 15.2 Spinnaker boom not to exceed fifteen (15) inches in length, measured from centre of mast to outer end of boom.

### 16. DISTINGUISHING MARKS

- 16.1 Sizes: Class Mark "M" to be at least one (1) inch high and at least one-quarter (1/4) inch thick. Registered Numbers and National Letters to be at least two and one-half (2 1/2) inches high, at least three-eighths (3/8) inch thick, and spaced at least one-half (1/2) inch between figures. Bar dividing Class Mark and National Letters/Registered Numbers is to be one-eighth (1/8) inch thick.
- 16.2 The Registered Numbers may be preceded by the distinguishing National Letters (US for United States) of identical dimensions, either above or to the left of the numbers. Skippers are encouraged to use the National Letters, however they are mandatory only for international events.

Examples:

|        |          |      |          |      |          |
|--------|----------|------|----------|------|----------|
| M      | = 1"     | M    | = 1"     | M    | = 1"     |
| US     | = 2 1/2" | US   | = 2 1/2" | US   | = 2 1/2" |
| US1911 | = 2 1/2" | 1911 | = 2 1/2" | 1911 | = 2 1/2" |

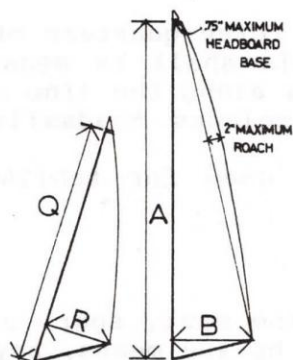
- 16.3 Owners Racing Flag may be 2" by 1 1/2", approximately.

### 17. SAIL MEASUREMENT

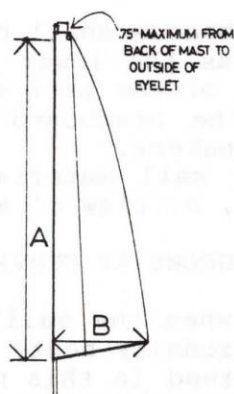
- 17.1 Marblehead sails (both main and jib) shall be measured pursuant to the general AMYA Association Regulations, Part II Section 3, as passed in 1984.



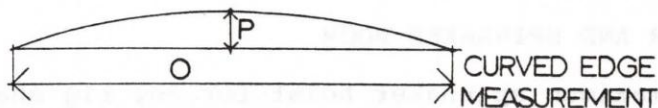
The forgoing Rating Rules/Class Specifications apply to Radio Controlled "M" Class yachts in all respects.



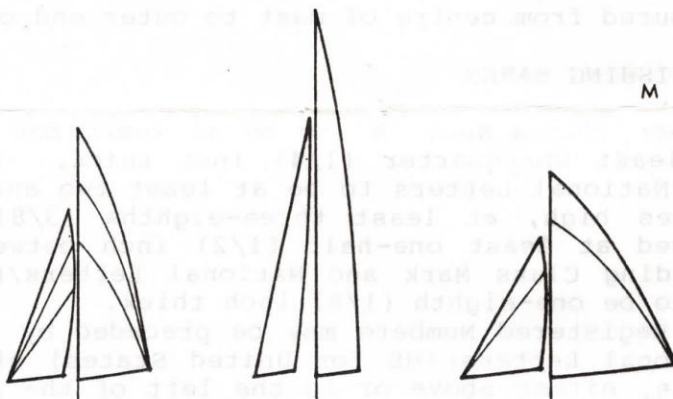
SAIL AREA MEASUREMENT



DOUBLE LUFF  
MAINSAIL



CURVED EDGE  
MEASUREMENT



RIG 'A'

small suits of a  
rig are not  
recorded on  
the certificate

RIG 'B'

luff length is  
longer than in 'A'  
so 'B' is  
recorded as an  
alternative rig

RIG 'C'

boom length is  
longer than in  
'A' so 'C' is  
recorded as  
another  
alternative rig

## M CLASS NEWS

By Standley H. Goodwin

On the first weekend of December, I had the opportunity to attend SCRS 4. This regatta turned out to be the most competitive regatta I have attended. Virtually every name sailor in the M Class and quite a few from others attended. Of the forty entrants, ten were past ACCR winners.

Results of regattas of this type help the average sailor gauge the equipment he should sail with. The most important news is that no new boats or equipment breakthroughs appeared. The first four places were taken by Terry Allen's Spot, Jon Elmaleh's Donna, John Amen's Eclipse III, and Louis Porro sailing a Bone. These designs were fairly representative of the rest of the fleet. Conditions were light and steady with wind shifts seldom more than ten degrees.

There are a couple of rule interpretations that I believe I should bring to the attention of class members. I have noticed a few sails with reinforcement patches that are highly questionable. Section 13.2 of our rule clearly states that patches may be only of sail material. My definition of



sail material is material that a producer of full size sails would use in the body of the sail. This material is generally woven but need not necessarily be. Use of clear plastic, fiberglass sheet, etc. is prohibited. If the material used is in a marginal category, showing that it is intended for use in the body of a sail and was obtained from a commercial sail cloth supplier, it will help your case.

The second area of concern is use of very high density materials for keel bulbs. The M class has no limitation on materials; however, AMYA does. Part II of the AMYA Handbook, Section 5.1 states:

- 5.1 The use of exotic materials such as mercury and uranium is prohibited in the construction of all AMYA registered yachts.

It is my opinion that tungsten also falls in the category of an exotic material. A keel bulb produced from it will certainly be very expensive. If you intend to experiment with keel bulb materials of higher density than lead, do considerable checking before you invest the time and money. It is highly likely that the material will be classed as an exotic material, and the model using it declared illegal.

This year's regatta schedule shows that we are again going to have a very active season in the M class. With over forty regattas open to M class members, I encourage every class member to attend at least on away from his home club. Let's keep our class active and growing.

#### EFFECT OF 1984 MOTIONS ON THE "M" CLASS

Editors note: The following is in response to an error on our part. We somehow seem to have dropped an entire paragraph out of memory in the word processor, last quarter, and created something of a problem for Mr. Goodwin. Our apologies to him and you.

In my previous newsletter I tried to explain the effect of the 1984 motions on the "M" class. Unfortunately, a paragraph was inadvertently left out of my article resulting in some confusion. This article is intended to clear up that confusion.

Three motions affecting the "M" class were passed:

Motion M..RR..1 - Delete and rewrite Section 3 of AMYA regulations passed and M..RR..2 amendment to M..RR..1 passed. In addition, M..M..S..2 motion to revise "M" class rules passed. As a result of the last motion, Section 17 has been added to our rule.

#### 17. Sail Measurement

- 17.1 Marblehead sails (both main and jib) shall be measured pursuant to general AMYA Regulations, Part II, Section 3, as passed in 1984.

Add to rule above

The overall effect of these motions is to redefine the measurement technique for the roach and leave the rest of sail measurements as is. These techniques were used at the 1984 ACCR, and very few problems were experienced. No measurement changes are proposed for 1985. Sails that measured in at the 1984 ACCR should have no difficulty at the 1985 ACCR.

The reason for this result is that most of Section 3 agrees with the "M" class rule requirements. In the few cases where the two disagree, the preamble of Section 3 states, "These procedures DO NOT supercede any Class Specification." This means that "M" class rule statements take precedence. Section 3 is intended to fill in gaps the class rule does not cover. If the class rule covers the subject, use the class rule. If it does not, try Section 3 for guidance.

As your "M" class secretary, it is my intent to have a quiet period in rule development. We have a good set of rules understood by all. Section 3 answers the question of how to measure the sail roach. Overall our rules are solid and almost all hardware built to date will pass them. Let's go out and have a good time sailing.





M CLASS NEWS

By Standley Goodwin

In my previous newsletter, I informed class members of a problem with reinforcement patches in sails and, in the process, caused some class members a bit of inconvenience. In this newsletter I am giving fuller coverage to the subject to clear up any confusion that may exist.

At the moment, the sail patch problem is a minor one. It is restricted to a few sails with clear plastic head and clew patches. Unfortunately, clear plastic is not a sail material and, therefore, these patches must be changed before these sails are legal. Although the problem is minor, it does bring up the question of what is legal for use in M Class sails.

Section 5.1 of the M Class rule states:

"There are no restrictions on beam, tumble-home, freeboard, draft, load waterline length, displacement, scantlings, MATERIALS (except where provided elsewhere)".

A careful review of the rule shows that there is only one restriction on the material used in sails.

13.2 Only sail material may be used for tablings in the head, tack, or clew of any sail.

Tablings are more commonly known as reinforcement patches. There is no restriction on the material used in the body of the sail. The body of the sail is the majority of the sail exclusive of the tablings or patches. You may use material from any source for the body of the sail. The material you use in the body of the sail is by definition sail material and is acceptable for use as tablings or patches. Normally most materials come from sailcloth suppliers; however, materials from other sources such as Coverite Micafilm are perfectly acceptable. Material for the body of the sail is unrestricted.

Materials used in the body of the sail are generally quite flexible and do not make good tablings or patches. A much stiffer material is desirable. This is the area where our problem lies. The material for tabling or patches is required to be sail material.

Sail material is the material used in a substantial portion of the body of a sail, either full-sized or model. There are two obvious sources of sail material for tablings or patches. If the tabling or patch material is material that a producer of full-sized sails would use for the body of a sail and was obtained from a commercial sailcloth supplier, it is acceptable. Alternately, if the tablings or patches are of the same material as the body of the model sail in question, it is acceptable. Otherwise, be prepared to show that the patches are indeed sail material.

Clear plastic, solid plastic and sheet fiberglass are not used for the construction of the body of full-sized or model sails. They, therefore, do not rate as sail material and are not acceptable for tablings or patches.



The vast majority of sails from commercial suppliers are legal and meet these requirements. I realize that the preceding discussion may be confusing to some class members; however, if you feel that your sail may be questionable and would like a ruling on it, send a letter to me describing the sail and materials involved. A sample of the materials involved would also be helpful. I will be glad to give you a ruling. Alternately, check with your sailmaker.

Enough of rules for a while. IMRYU is hosting a world championship at Fleetwood in early July 1986. The pond is salt water and strong winds are normally expected. Any class members interested in attending should contact me and I will provide him with more information.

Now that the sailing season is in full swing, keep your M class active. Try to attend at least one regatta away from your home club. Doing this helps increase class activity and keeps the class healthy.