San Diego Ship Modelers Guild

Volume 5 Number 3 March 15, 1981

Notes on the February Meeting

The change of command from Doug McFarland to John Woodard topped off an effentful evening. John opened the meeting with a general question and answer period on what the membership would like to happen over the next year. Among the proposal made were, moving the meeting night*, more "How to" articals in the news letter, establishment of a steam library*, and a vote by the membership on smoking during the meetings. The vote was that there will be NO SMOKING during the meeting and if you do smoke before or after that you polic your leavings.

Following the open forum, we had introductions and show and tell. Not to many models present which it was agreed, must be worked on. In the future please bring your models in the various stages of compleation so that we may all benifit from your work. One of the most interesting aspects of the club is to learn from one another some of the many techniques used in any given task and sometime that isn't possible from the finished model. So remember the club moto - "Bring a model" and share the wealth of information.

Ted Pugh capped of the evening with a graphic and well exicuted discription of the techniques used on his plank-on-frame "oliver Cromwell". Ted has submitted many useful tips and sources to the newsletter and one can see from his exallant craftsmanship that he has a lot to share. Many thanks Ted. Bill Kelly Flemming presented a slide show and poem by his wife on the Barkentine California. * items to be covered again at this meeting

Models Present:

Ted Pugh.	Oliver Cromwell	Scratch built plank on frame Privateer
George Oliver	De Nada	Scratch built plank on frame 1962 28 ft. Ownens for R/C operations 1/10 scale
Nodske Love	Doug McFarland	18th Century ship of the line from a Billings kit with lots of scratch work.
California Plans	Bill Kelly-Flemming	Drawings taken from Photos for a future model in 1:96 scale

Notes on the March Meeting

The meeting place this month will be the engine room of the Berkeley for a presentation by John Woodard. John will begin his steam lecture at 7;30 but will extend it by approx. 30 min. followed by a demonstration by Al L'heureux on technique used to build large hull vessels. For those able to get to the museum early, chanel 10 will have a live telecast between 5:00 and 6:00 pm covering the Display contest aboard the Berkeley. Prerestration for that event will be held following the meeting. Bring a Model!

Static Display contest

Our Second annual static display model contest will be held aboard the Ferry Berkeley March 21-22. Entry fees have been set at $2.50 per entry or collection. The contest will be divided into four categories with five awrds. The categories are sail, power (merchant, civil or pleasure) power (naval), and plastic, with an award to each and one for the Best overall. Registration will be at the March Meeting and from 10:00-1:00 pm on Saturday March 21. Judging will begin at 1:00. Let's try to have a good turn-out.

Catolog Catolog

Most of the 3X5 cards have been typed but reproduction and distribution may be a problem. More on this at the meeting.

March Modeler of the Month
Val Peterson
By Bill Kelly-Flemming

With the upcoming static display compitition and show, it is fitting that our modeler of the month be one of last years winners. Characteristic of the diversity of our guild, the winning entry last year was the R/C model of the ocean going tug "Arapaho" built by Val Peterson.

For the second month in a row, we salute a native of Seattle,Washington. As a kid Val spent much of his time at the Seattle waterfront admiring the halibut schooners, salmon seiners, and tugs in their comings and goings. The father of one of his childhood buddies built halibut schooners, while the father of onother kid on the block owned "Eagle" and "Liberty". As a result, at the age of 12-13, he had the priveledge knowing "Eagle" under way on a couple of summer vacations. As Bal puts it, "I was hooked for life and never did really get away from the sea."

Typhoid fever took a year out of Val's life and during his recovery he built a working model of "Eagle" as near as he could remember. Eventually, it sailed, under power, in and around the Seattle lakes and sound. This was in 1931, when R/C was unheard of and when the only available batteries were short lived and un-rechargable door-bell batteries. Since "Eagle" never came back to shore, a row boat, a long string and/or a swim suit were a necessity. The young Val had to swim for her on numerous occassions.

"Eagle was literally shelved and forgotten in the following times of high school, dental college, three private practices between three wars, and 31 years in the navy. After 40 years in a Seattle attic, she was re-discovered by his youngest son. She was brought to San Diego, and rebuilt with all the modern technology that is available to the ship modeler. The results have been admired by many ship lovers at the pond.

Since then Val has built several models, including the winner of several awards, the tug "Arapaho", including being overall winner of the Fall 1979 R/C Regatta and the award "Best Civilian / commercial Vessal" in last year's Static contest. The "Arapaho" is a 1:32 scale.

Val says that "these events led me to the finest buch of guys one could imagine, and for me one of the nicest times in my life. Retirement would have been a "drag" without these wonderful people and this model ship building hobby." Likewise many of us are enriched by Bal Peterson"s "being aboard".

A well used jack knife is his faforite tool. It's being constantly ground and filed and resharpened to meet the particular need of the moment. He also uses a dental belt drive lab engine, which gives him all the versatility he needs for cutting and chaping. While the dental burrs and cutters are cheaper than the dremal types, they will not engage the chucks. (Ed. note: Chucks can be purchased for the dremal) He feels his belt and disc sander, jig saw, and small metal turning lathe are nice, but not an absolute must.

Val passes along the following tips to the rest of us:

"Of all the techniques, materials and tools that stand your ships out the most is the use of automobile body plastic used in conjunction with a good art air brush backed up by priority applied taping and masking.

On cutting masking tape, I use a thin fine grade laid out in required lenths on a long sheet of glass. Using a surgical blade #11 in a handle and a good art straight edge cone can strip down the 1/64" with no effort. The use of "plastiglas" is a mirror s surface and also preserves the cutting edge of the blade.

Add to these your own patience and inventiveness and your rewards seem to be endless"

Being an R/C modeler often means giving up details for ease of maintenance and durability under the adverse conditions of sat and fresh water conditions. The hours of clean up required after a run is part of the fun for Val. Such compromises for finess of detail leave him with awe and admiration for the static modeler. However as competition, and general admiration of his boats shows, Val is a excellent modeler in his own right, and a well deserving modeler of the month of March.

REQUIEM FOR THE CALIFORNIA

Our grandmother the sea
ancient and enigmatic,
our mother the shore
treacherous and weary,
our daughter the ship
majestic and proud
all and each
have entwined
in a brief saga of sorrow
and tragic loss.

The ship is gone--
claimed by an owning
deeper and more demanding
than our transient ties
and recent affections.

The ship is gone--
grounded by the linking
of sea and shore
in a timeless conspiracy
of what we can only
call the cruelest of fates.

The sea and the shore
kin of our creation,
the ship
kin of our creating
have struggled over
long, long reaches
of telling and tale,
defiant of each other's dangers,
circling and encircling
each the planet with us--
sea and shore,
ship and sailor.

We who remain
the crafted and crafters
are the bridge
which spans the unknown
spirits of each,
indwelling in us
remain the echoing
of hidden shoals
and guardian ridges
and sailing bows.

Gallant ladies all three
to we who can command
their wills only as far
as they allow us--
for we will never
rule the sea,
the shore, the ships--
we have the power
to destroy them
and they us,
but never
to command them
beyond their fickle
and seductive wills.

It comes crashing
onto us as the waves
pound the shuddering
remains of this ship,
that we are
as vulnerable as she
to miscalculated judgement
and capricious destruction--
that as with each of us
never will there be another
with the same story,
the identical grace,
the unique impact upon
other's lives and selves.

The sea remains.
The shore remains.
The ship is gone.

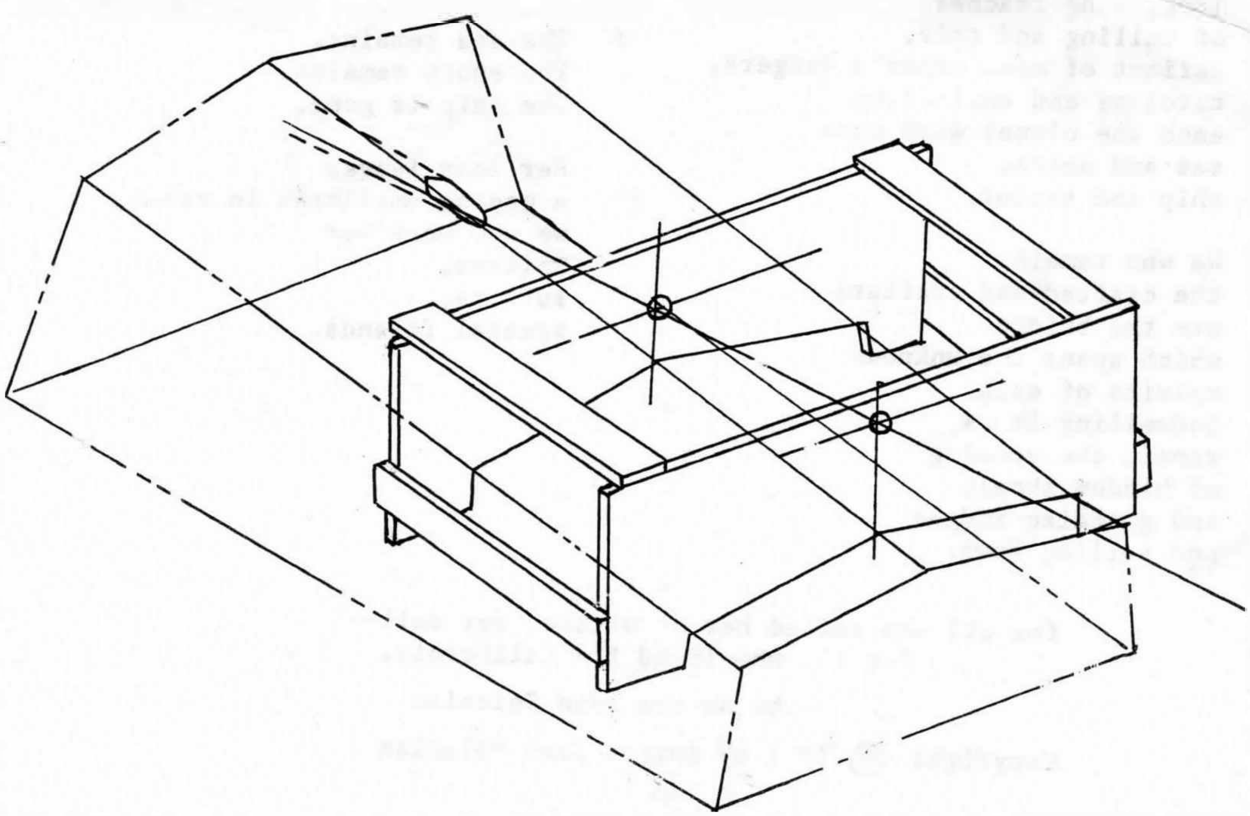
Her loss leaves
a gaping emptiness in us--
we who were her
sailors,
suitors,
special friends.

for all who sailed her or watched her sail--
for all who loved the California.

by Aurora Joan Selenian

Nessecity is the mother of invention:
George Oliver

A Problem encountered by many scale model boat builders is the task of locating and drilling for the prop shaft and log. one very common bu not very craftsmanlike manner is to cut a large oversize openning, install the shaft log, filling the remaining open area with epoxy and grinding the outside to the proper finished contour. For a more workmanlike, structural and true scale installation a simple jig can be made from scrap ¼" plywood with demensions taken directly from the plans, offsets or lines. Maintaining the exact scale angle and location of the prop shaft. Select two stations approxamatly 6 inches apart with the forward station about 1" to 1½" aft of the shaft outside penetration point of the bottom planking. Cut the two female type jig bulkheads allowing sufficient width to extend bejond the chine or up the side of a round bottom hull, to provide locking for side toside movement. On the side view of the drawings, extend the prop shaft centerline so that exact dimensions can be taken and locate the penetration point of the shaft on each jig bulkhead. Using strips of plywood approx. 2" wide, make an open box using the two jig prames as the ends. With an entension drill (12" long, available at most good hardware stores) drill each jig bulkhead so that the drill shank represents the extended prop shaft. Locate the entire jig at the proper stations and attach to the hull bottom with masking tape to secure it in position while drilling. It is recommended that two drill sizes be used, for the first operation a drill no larger in diameter that the actual shaft diameter be used for the pilot and then a drill large enough to allow the log tube to fit snuggly for the final size. Another recomendation is that the first pilot drilling be done by hand (finger twisting only) until the entire drill diameter is into solid wood. This will prevent the drill from wandering due to the very flat angle the drill is entering the hull bottom surface. The same procedure should be used when increasing the hole diameter from pilot size to full size. After the full diameter of the drill has entered the hull surface, then a low speed drill motor can be used to extend the hole lenght until it penetrates the inboard surface of the keelson. The above tried and proven method with the jig bulkheads holding the drill at the proper angle and an the enterline will result in the accurate and tight prop shaft installation in your boat.



Bill Benson
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Vic Crosby
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Richard Ekenberg
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John L. Harmeling
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Carl Johnson
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George Kelsch
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Lawrence Malopy
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Anne Merrill
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Arnold Otchin

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R.V. Pererson
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Royce Privett /
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Bob Brady
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Richard E. Dias /
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Fred Frass

DON HUBBAR ACE

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CORONADO CA
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Tom Hildebrand /
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Gordon Jones
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Al L'heureux
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John McDermott
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Roy Nilson
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Dennis Ouleza
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John W. Pieper
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Ted Pugh
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Bob Crawford
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Wm. F. Eads
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Ernest Jimenez
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Bill Kelly-Flemming
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Dick Little
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Doug McFarland
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George Oliver
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Gerald Pearce
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Bob Pranka
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Bob Ross
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David Schmieser
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Russell Scott
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Doug Smay
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Herb Strandt
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Earl Swhwizer
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Ed White /
redacted/

John Woodard
/redacted/

Shipcraft Guild
Abraham Taubmen, Sec'y /
redacted/

Bob Wright
/redacted/

Art Yeend
/redacted/

Ship Modelers Association
Tom Palin- Logkeeper
/redacted/

LA Sunday Boating
Club /redacted/

Calculating Scale Speeds

Most of us who build scale model ships will sooner or later want to know if our model operates at the correct scale speed. In fact, for the serious modeler who builds with care to a precise scale, this will become a necessity, particularly in light of the fact that accurate scale operation is generally one criteria for judging at regattas. However, it may not be readily apparent to everyone how scale speeds are calculated. It could be argued, and not without a certain logic, that if a model is built to 1/32 scale, then it should cover a distance which is 1/32 as great as the distance covered by the prototype in the same amount of time. This calculation would suggest that if a Fletcher Class Destroyer could cover 35 nautical miles in one hour, then a 1/32 scale model of the same ship should traverse 1.09375 nautical miles (35 divided by 32) in one hour. Despite the seeming logic of this solution, it would be found in practice that a model driven at this speed would behave in a most "un-scale-like" manner. In fact as we shall see, its scale speed under these circumstances would be a sluggish 6.19 knots. Not exactly the dashing image we would like to project!

To derive an accurate scale speed involves an application of Froude's Law of Comparitive Speeds. William Froude (1810-1879) was an English engineer and naval architect who founded the modern science by which the forces acting on a ship are predicted from experiments with geometrically similar models. In the late 1800's it was widely held that tests with models could not be relied upon for predicting the performance of ships. Froude however advocated a more thorough investigation of the laws governing the extrapolation from models to full size ships, and was invited by the Admiralty to explain his proposals. This led, in 1870 to a grant for the construction of a ship model testing tank which was the forerunner of the testing tanks now found in all maritime countries. Froude found that the chief components of resistance to motion were skin friction and wave formation, and he showed how the total resistance of a ship could be extrapolated from the results of model experiments. His methods in all probability inspired pioneers in aerodynamics to adopt model testing and thus contributed also to the rapid development of aircraft design.

Froude's many published papers were reprinted in one volume by the Institute of Naval Architects in 1955. We shall draw on one of these papers to investigate his Law of Comparitive Speeds. The formula developed by Froude for the calculation of the scale speed of a model based on a known prototype can be stated as

$$\frac{V}{v} = \sqrt{\frac{L}{l}}$$

where V is the speed of the prototype in knots, L is its length in feet, l is the length of the model in feet and v is the actual speed of the model in knots which represents the scale speed corresponding to V. As is readily seen, the ratio of L to l is nothing more than the scale of the model. In other words, if we build a 1/8 inch equals 1 foot scale (or 1/96 scale) model of a 750 foot long cruiser, the model will be 7.8125 feet in length. Therefore L=750 feet and l=7.8125 feet, and the ratio of L/l is 750/7.8125 or 96. We shall call 96 the Scale Factor, S. Now if we rearrange the terms of Froude's formula we will find that by dividing the speed of the prototype by the square root of the scale factor of the model we can determine the appropriate scale speed. This more useful form of Froude's equation is

$$v = \frac{V}{\sqrt{S}}$$

where S is the scale factor, i.e. L/l. In the case of our example, if our cruiser has a top speed of 32 knots, then the actual speed of our model, in order to be "in scale" should be

$$v = \frac{32}{\sqrt{96}} \quad \text{or } 3.27 \text{ knots}$$

Although this is an accurate figure for the models top scale speed, the equation is still not expressed in the most useful form for our purposes. I suspect very few of us determine in advance exactly what the scale speed of our model will be and then engineer it in such a way that it actually moves through the water at exactly that speed. The more common practice is to build the model and then see how fast it will go! Once we have determined how fast the model will go we can make modifications to either speed it up or slow it down as appropriate to attain the desired scale speed. Thus we need a method of measuring the actual speed of a model and determining from that the scale speed. All that is required to use Froude's equation in this case is the introduction of some new units of measurement and the rearrangement of the equation to solve it for a different variable. First let us assume that we establish a straight course which is exactly 100 feet in length. We will want to make two runs over this course, one in each direction, averaging the times in order to eliminate the extraneous effects of wind and current. Since our course is only 100 feet long we will want to work initially in units of feet per second rather than nautical miles per hour, converting later to knots to solve the equation. One nautical mile is defined as 1/60 of a degree, which is approximately equal to 6076 feet. Since there are 3600 seconds in one hour, one knot is equivilent to 6076/3600 or 1.687778 feet per second. Let us say that we run our cruiser model from the previous example over our 100 foot course and we find that the average time for the two runs is 30.00 seconds. What is our scale speed? Since we covered the 100 feet in 30.00 seconds our velocity is 100/30.00 or 3.33333 feet per second. We know that a knot is equal to 1.687778 feet per second, so our actual speed through the water is 3.33333/1.68778 or 1.97498 knots. We now have v=1.97498 and S=96 (because our cruiser is 1/96 scale) so all we have to do is solve the equation for V. First we rearrange the equation from

$$v = \frac{V}{\sqrt{S}}$$

to $$V = (v)(\sqrt{S})$$

or $$V = (1.97498)(\sqrt{96})$$

and $$V = (1.97498)(9.97979) = 19.35 \text{ knots}$$

Our scale speed for this first run is 19.35 knots.

Not happy with that performance, we go to work on our model to increase its speed, and our second trial yields a time less than half of the original clocking - 14.00 seconds! This is 100/14.00 or 7.14 feet per second, or 7.14/1.69 = 4.22 actual knots. The new scale speed therefore is

$$V = (4.22)(9.98) = 42.1 \text{ knots}$$

This provides us with the tools we need to determine the scale speed of any model. However making the calculations can be a bit cumbersome, even with a calculater having a square root function. This is particularly true if we are officiating at a model regatta where there are a large number of different scales involved. It would be nice if there were an easier and faster method, and in fact there is! Taking advantage of a computers speed in doing this type of calculation I wrote a program which produced the following easy reference chart. It lists scale speeds from 0.5 to 45.0 knots in increments of half a knot, for ten of the most popular scales. The chart is based on average times over a 100 foot course. To use the chart simply locate the scale of your model across the top, then move down that column until you find the time which is closest to your actual time. Now move across the page to either the right or left hand margin to determine your scale speed.

Lets return now to the example sited at the beginning of this discussion. We said that if we assumed our 1/32 scale Fletcher Class Destroyer from that example would cover 1/32 as much distance as its full size prototype in the same amount of time, it would have to travel at an actual speed of 1.09375 knots. We can put these figures into our equation to show that

$$V = (v)(\sqrt{S})$$

$$V = (1.09375)(\sqrt{32})$$

$$V = (1.09375)(5.65685) = 6.187 \text{ knots}$$

thereby verifying that this is not an accurate method of determining scale speeds.

We can also verify this fact using our chart. If our actual speed is 1.09375 knots and we know that one knot is equal to 1.68778 feet per second, we can find our velocity, which is (1.09375)(1.68778) = 1.84601 feet per second. To find how long it would take to cover our 100 foot course at this velocity we simply divide 100 feet by 1.84601 feet per second to get 54.17 seconds. On our chart we find under 1/32 scale that the time closest to our actual time is 55.86 seconds, corresponding to a scale speed of 6.0 knots. This is as close as we can get using the chart, but the error is only 0.19 knots. In fact, using the chart will result in a maximum error of ± 1/4 knot for all speeds up to 45.0 knots.

It is hoped that the information provided here will be useful to the serious modeler in establishing realistic speeds for his operating models. Too often the otherwise impressive appearance of a well constructed model is diminished by its failure to operate at scale speeds. It detracts greatly from a model of a 20 knot prototype to see it charging across the pond at a scale 90 knots!

Doug Smay

Doug Smay
March 10, 1981

Doug Smay 3/11/81

Bob,
I'm submitting the inclosed article on how to calculate scale speeds for inclosure in the news letter. I hope it's not too late for this months issue, but if it is perhaps you can use it in some future issue.
I've taken care to research the issue completel and I've double checked all of the figures for accuracy, including the computer program that generated the chart, so I'm confident that it is error-free. Hope you can use it.

Doug S

SCALE SPEED CONVERSION TABLE
(CALIBRATED OVER A 100 FOOT COURSE)

SCALE	1/200		1/16 1/192		1/100		1/8 1/96		1/4 1/48		3/8 1/32		1/2 1/24		3/4 1/16		1 1/12		2 1/6		(INCHES/FOOT) (FRACTIONAL)
KNOTS	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	MIN	SEC	KNOTS
0.5	27	55.83	27	21.97	19	44.99	19	21.05	13	40.99	11	10.33	9	40.52	7	54.00	6	50.49	4	50.26	0.5
1.0	13	57.91	13	40.99	9	52.50	9	40.52	6	50.49	5	35.17	4	50.26	3	57.00	3	25.25	2	25.13	1.0
1.5	9	18.61	9	7.32	6	35.00	6	27.02	4	33.66	3	43.44	3	13.51	2	38.00	2	16.83	1	36.75	1.5
2.0	6	58.96	6	50.49	4	56.25	4	50.26	3	25.25	2	47.58	2	25.13	1	58.50	1	42.62	1	12.57	2.0
2.5	5	35.17	5	28.39	3	57.00	3	52.21	2	44.20	2	14.07	1	56.10	1	34.80	1	22.10		58.05	2.5
3.0	4	39.30	4	33.66	3	17.50	3	13.51	2	16.83	1	51.72	1	36.75	1	19.00	1	8.42		48.38	3.0
3.5	3	59.40	3	54.57	2	49.28	2	45.86	1	57.28	1	35.76	1	22.93	1	7.71		58.64		41.47	3.5
4.0	3	29.48	3	25.25	2	28.12	2	25.13	1	42.62	1	23.79	1	12.57		59.25		51.31		36.28	4.0
4.5	3	6.20	3	2.44	2	11.67	2	9.01	1	31.2[illegible]	1	14.48	1	4.50		52.67		45.61		32.25	4.5
5.0	2	47.58	2	44.20	1	58.50	1	56.10	1	22.10	1	7.03		58.05		47.40		41.05		29.03	5.0
5.5	2	32.35	2	29.27	1	47.73	1	45.55	1	14.64	1	0.94		52.77		43.09		37.32		26.39	5.5
6.0	2	19.65	2	16.83	1	38.75	1	36.75	1	8.42		55.86		48.38		39.50		34.21		24.19	6.0
6.5	2	8.91	2	6.31	1	31.15	1	29.31	1	3.15		51.56		44.66		36.46		31.58		22.33	6.5
7.0	1	59.70	1	57.28	1	24.64	1	22.93		58.64		47.88		41.47		33.86		29.32		20.73	7.0
7.5	1	51.72	1	49.46	1	19.00	1	17.40		54.73		44.69		38.70		31.60		27.37		19.35	7.5
8.0	1	44.74	1	42.62	1	14.36	1	12.57		51.31		41.90		36.28		29.62		25.66		18.14	8.0
8.5	1	38.58	1	36.59	1	9.71	1	8.30		48.29		39.43		34.15		27.88		24.15		17.07	8.5
9.0	1	33.10	1	31.22	1	5.83	1	4.50		45.61		37.24		32.25		26.33		22.81		16.13	9.0
9.5	1	28.20	1	26.42	1	2.37	1	1.11		43.21		35.28		30.55		24.95		21.60		15.28	9.5
10.0	1	23.79	1	22.10		59.25		58.05		41.05		33.52		29.03		23.70		20.52		14.51	10.0
10.5	1	19.80	1	18.19		56.43		55.29		39.09		31.92		27.64		22.57		19.55		13.82	10.5
11.0	1	16.17	1	14.64		53.86		52.77		37.32		30.47		26.39		21.55		18.66		13.19	11.0
11.5	1	12.86	1	11.39		51.52		50.48		35.70		29.14		25.24		20.61		17.85		12.62	11.5
12.0	1	9.83	1	8.42		49.37		48.38		34.21		27.93		24.19		19.75		17.10		12.09	12.0
12.5	1	7.03	1	5.68		47.40		46.44		32.84		26.81		23.22		18.96		16.42		11.61	12.5
13.0	1	4.45	1	3.15		45.58		44.66		31.58		25.78		22.33		18.23		15.79		11.16	13.0
13.5	1	2.07	1	0.81		43.89		43.00		30.41		24.83		21.50		17.56		15.20		10.75	13.5
14.0		59.85		58.64		42.32		41.47		29.32		23.94		20.73		16.93		14.66		10.37	14.0
14.5		57.79		56.62		40.86		40.04		28.31		23.11		20.02		16.34		14.15		10.01	14.5
15.0		55.86		54.73		39.50		38.70		27.37		22.34		19.35		15.80		13.68		9.68	15.0
15.5		54.06		52.97		38.23		37.45		26.48		21.62		18.73		15.29		13.24		9.36	15.5
16.0		52.37		51.31		37.03		36.28		25.66		20.95		18.14		14.81		12.83		9.07	16.0
16.5		50.78		49.76		35.91		35.18		24.88		20.31		17.59		14.36		12.44		8.80	16.5
17.0		49.29		48.29		34.85		34.15		24.15		19.72		17.07		13.94		12.07		8.54	17.0
17.5		47.88		46.91		33.86		33.17		23.46		19.15		16.59		13.54		11.73		8.29	17.5
18.0		46.55		45.61		32.92		32.25		22.81		18.62		16.13		13.17		11.40		8.06	18.0
18.5		45.29		44.38		32.03		31.38		22.19		18.12		15.69		12.81		11.09		7.84	18.5
19.0		44.10		43.21		31.18		30.55		21.60		17.64		15.28		12.47		10.80		7.64	19.0
19.5		42.97		42.10		30.38		29.77		21.05		17.19		14.89		12.15		10.53		7.44	19.5
20.0		41.90		41.05		29.62		29.03		20.52		16.76		14.51		11.85		10.26		7.26	20.0
20.5		40.87		40.05		28.90		28.32		20.02		16.35		14.16		11.56		10.01		7.08	20.5
21.0		39.90		39.09		28.21		27.64		19.55		15.96		13.82		11.29		9.77		6.91	21.0
21.5		38.97		38.19		27.56		27.00		19.09		15.59		13.50		11.02		9.55		6.75	21.5
22.0		38.09		37.32		26.93		26.39		18.66		15.23		13.19		10.77		9.33		6.60	22.0
22.5		37.24		36.49		26.33		25.80		18.24		14.90		12.90		10.53		9.12		6.45	22.5

SCALE SPEED CONVERSION TABLE
(CALIBRATED OVER A 100 FOOT COURSE)

SCALE	1/200	1/16 1/192	1/100	1/8 1/96	1/4 1/48	3/8 1/32	1/2 1/24	3/4 1/16	1 1/12	2 1/6	(INCHES/FOOT) (FRACTIONAL)
KNOTS	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	MIN SEC	KNOTS
23.0	36.43	35.70	25.76	25.24	17.85	14.57	12.62	10.30	8.92	6.31	23.0
23.5	35.66	34.94	25.21	24.70	17.47	14.26	12.35	10.09	8.73	6.18	23.5
24.0	34.91	34.21	24.69	24.19	17.10	13.97	12.09	9.87	8.55	6.05	24.0
24.5	34.20	33.51	24.18	23.69	16.75	13.68	11.85	9.67	8.38	5.92	24.5
25.0	33.52	32.84	23.70	23.22	16.42	13.41	11.61	9.48	8.21	5.81	25.0
25.5	32.86	32.20	23.24	22.77	16.10	13.14	11.38	9.29	8.05	5.69	25.5
26.0	32.23	31.58	22.79	22.33	15.79	12.89	11.16	9.12	7.89	5.58	26.0
26.5	31.62	30.98	22.36	21.91	15.49	12.65	10.95	8.94	7.75	5.48	26.5
27.0	31.03	30.41	21.94	21.50	15.20	12.41	10.75	8.78	7.60	5.38	27.0
27.5	30.47	29.85	21.55	21.11	14.93	12.19	10.55	8.62	7.46	5.28	27.5
28.0	29.93	29.32	21.16	20.73	14.66	11.97	10.37	8.46	7.33	5.18	28.0
28.5	29.40	28.81	20.79	20.37	14.40	11.76	10.18	8.32	7.20	5.09	28.5
29.0	28.89	28.31	20.43	20.02	14.15	11.56	10.01	8.17	7.08	5.00	29.0
29.5	28.40	27.83	20.08	19.68	13.92	11.36	9.84	8.03	6.96	4.92	29.5
30.0	27.93	27.37	19.75	19.35	13.68	11.17	9.68	7.90	6.84	4.84	30.0
30.5	27.47	26.92	19.43	19.03	13.46	10.99	9.52	7.77	6.73	4.76	30.5
31.0	27.03	26.48	19.11	18.73	13.24	10.81	9.36	7.65	6.62	4.68	31.0
31.5	26.60	26.06	18.81	18.43	13.03	10.64	9.21	7.52	6.52	4.61	31.5
32.0	26.18	25.66	18.52	18.14	12.83	10.47	9.07	7.41	6.41	4.54	32.0
32.5	25.78	25.26	18.23	17.86	12.63	10.31	8.93	7.29	6.32	4.47	32.5
33.0	25.39	24.88	17.95	17.59	12.44	10.16	8.80	7.18	6.22	4.40	33.0
33.5	25.01	24.51	17.69	17.33	12.25	10.00	8.66	7.07	6.13	4.33	33.5
34.0	24.64	24.15	17.43	17.07	12.07	9.86	8.54	6.97	6.04	4.27	34.0
34.5	24.29	23.80	17.17	16.83	11.90	9.71	8.41	6.87	5.95	4.21	34.5
35.0	23.94	23.46	16.93	16.59	11.73	9.58	8.29	6.77	5.86	4.15	35.0
35.5	23.60	23.13	16.69	16.35	11.56	9.44	8.18	6.68	5.78	4.09	35.5
36.0	23.28	22.81	16.46	16.13	11.40	9.31	8.06	6.58	5.70	4.03	36.0
36.5	22.96	22.49	16.23	15.90	11.25	9.18	7.95	6.49	5.62	3.98	36.5
37.0	22.65	22.19	16.01	15.69	11.09	9.06	7.84	6.41	5.55	3.92	37.0
37.5	22.34	21.89	15.80	15.48	10.95	8.94	7.74	6.32	5.47	3.87	37.5
38.0	22.05	21.60	15.59	15.28	10.80	8.82	7.64	6.24	5.40	3.82	38.0
38.5	21.76	21.32	15.39	15.08	10.66	8.71	7.54	6.16	5.33	3.77	38.5
39.0	21.48	21.05	15.19	14.89	10.53	8.59	7.44	6.08	5.26	3.72	39.0
39.5	21.21	20.78	15.00	14.70	10.39	8.49	7.35	6.00	5.20	3.67	39.5
40.0	20.95	20.52	14.81	14.51	10.26	8.38	7.26	5.92	5.13	3.63	40.0
40.5	20.69	20.27	14.63	14.33	10.14	8.28	7.17	5.85	5.07	3.58	40.5
41.0	20.44	20.02	14.43	14.16	10.01	8.17	7.08	5.78	5.01	3.54	41.0
41.5	20.19	19.78	14.28	13.99	9.89	8.08	6.99	5.71	4.95	3.50	41.5
42.0	19.95	19.55	14.11	13.82	9.77	7.98	6.91	5.64	4.89	3.46	42.0
42.5	19.72	19.32	13.94	13.66	9.66	7.89	6.83	5.58	4.83	3.41	42.5
43.0	19.49	19.09	13.78	13.50	9.55	7.79	6.75	5.51	4.77	3.38	43.0
43.5	19.26	18.87	13.62	13.35	9.44	7.70	6.67	5.45	4.72	3.34	43.5
44.0	19.04	18.66	13.47	13.19	9.33	7.62	6.60	5.39	4.66	3.30	44.0
44.5	18.83	18.45	13.31	13.05	9.22	7.53	6.52	5.33	4.61	3.26	44.5
45.0	18.62	18.24	13.17	12.90	9.12	7.45	6.45	5.27	4.56	3.23	45.0

San Diego Ship Modelers Guild
Bob Crawford - Logkeeper /
redacted/

TO: Vic Crosby
/redacted/

San Diego Ship Modelers Guild
Officers for 1981

Master:	John Woodard	Point Loma	/redacted/
Mate:	Doug McFarland	Mira Mesa	
Logkeeper:	Bob Crawford	State College	
Stearing Committee:	Bill Kelly-Flemming	Hill Crest	
	Al L'heureux	Poway	
	George Oliver	Santee	
	Bob Ross	Chula Vista	

Meetings: 3rd Friday of each month, 8:00 pm aboard the Bark Star of India, on the Orlop Deck.

Membership: Dues for Members of the San Diego Maritime Museum and anyone living outside San Diego County -$7.50 Non-Museum Members - $15.00. After July 31, 1981 dues are ½ for the remainder of the year.