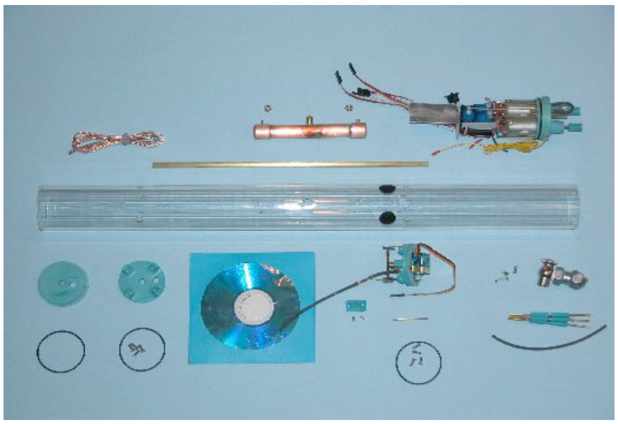
CASWELL
ELECTROPLATING IN MINIATURE

The D&E Seaview Sub-driver

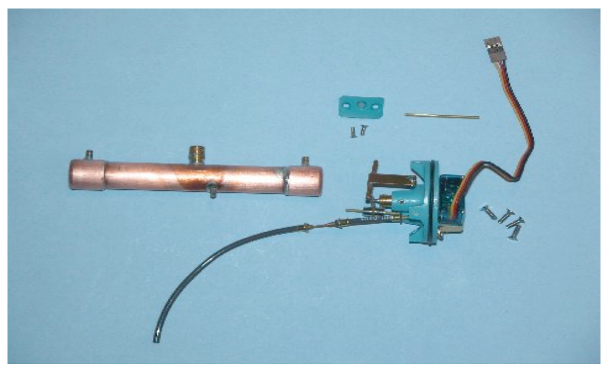
Now in kit form!

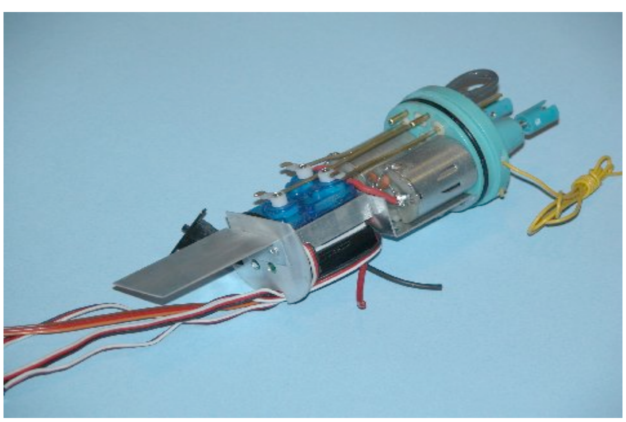
This is the most complete WTC kit on the market today. Save money by doing the simple assembly work yourself without having to worry about the more tricky parts of the system, because they are already done! The rear motor housing assembly comes with motors, servos, pushrods, seals, and even the Mtroniks MicroViper Electronic Speed Control already installed. The Lexan cylinder has the holes drilled ready for assembly.



1. Motor Housing Assembly
2. Power Cable
3. Gas Tank
4. Interconnecting Tube
5. Lexan Cylinder – pre-drilled
6. 2 x Bulkheads
7. O Rings
8. Gas blow/vent system with servo
9. Gas Bottle Adapter
10. Kli-cons
11. Gas Tube
12. Assorted screws
13. CD

The Gas system comprises a copper Gas reservoir with a safety tube connecting to the blow/vent mechanism. This is operated by the installed servo. The vent valve is the small rectangular item – top center.
Here (below) is the rear motor housing with ESC, servos, motors, gearbox, Dog-bone couplers, seals, pushrods, and even the antenna – all installed!
The system has the Snort Low Pressure Blower outlets installed. They are blanked off with the looped tube- top right.





All you have to do is drop in the Radio Receiver of your choice, an ADF pitch Controller with ballast blow failsafe, LiPo batteries and a Snort Low Pressure Blower and you are ready to go on patrol, using the Snort system for most diving, and the Gas Ballast system for deep dives. The Snort system will allow you to run with virtually no consumption of gas, relegating its use for emergencies only.

More experienced model builders can easily convert the ballast system to a bladder system such as RCABS if they require.

Complete Seaview Sub-driver Kit – only $425.00

The tube in this kit differs from the Revell VII Sub-driver

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7696 Route 31, Lyons NY 14489 Voice: 315.946.1213 Fax: 315.946.4456
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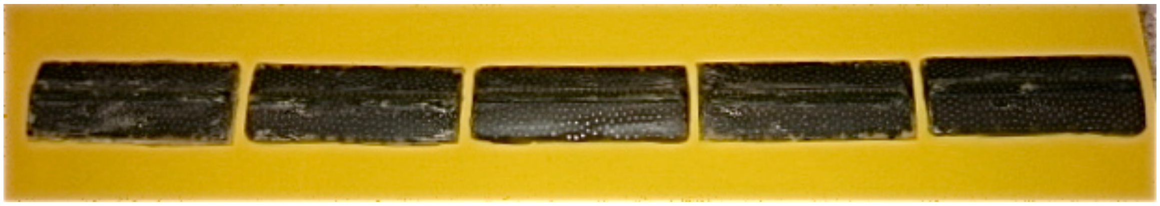
The Moebius Seaview Model Submarine

BALLAST WEIGHTS



These specially designed weights fit perfectly into the keel slot within the model.
Spaced equidistantly, they provide the bulk of the ballast required.
Fine tuning of the boat's trim is accomplished with the use of small amounts of lead cut from the 8" x 1" strip provided with the weights kit.

Weights are made of lead shot encapsulated in epoxy to reduce handling hazard.

Handle as a lead product. Wear rubber gloves.

Glue into hull using RTV Silicone rubber adhesive.

Total weight of 10 oz (excluding the lead strip)

Code GBVSV Cost. $17.00

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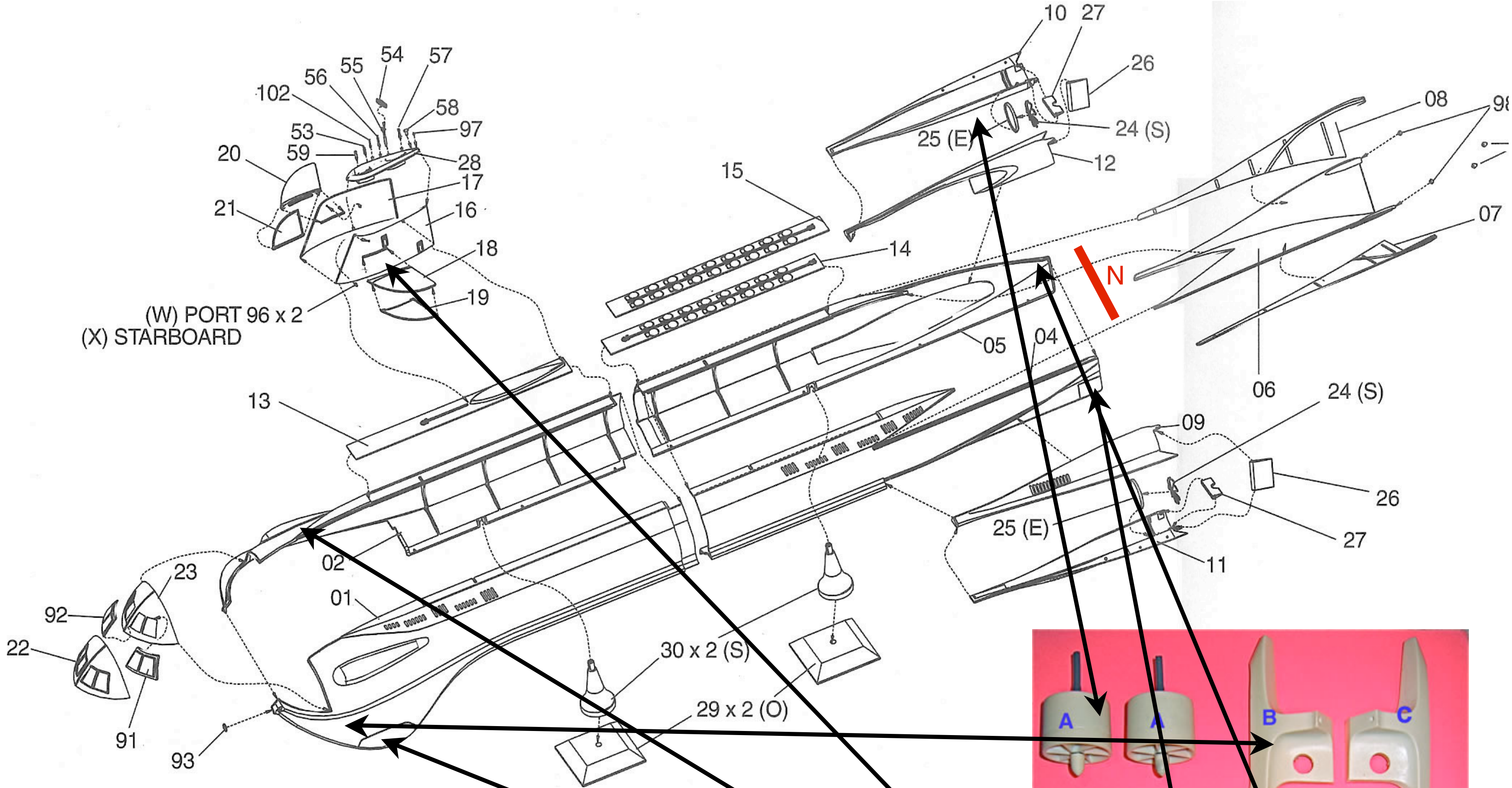
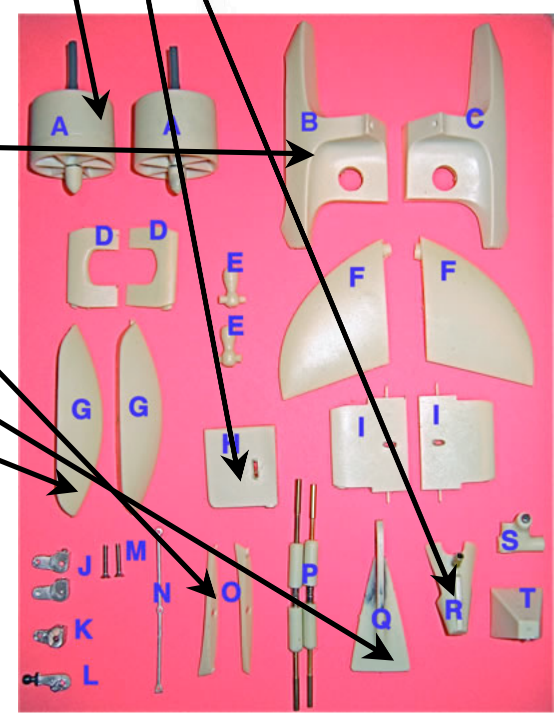
www.forum.sub-driver.com





D = 26

& 27

F = 19 & 20

I = 26

P Kli-Con's

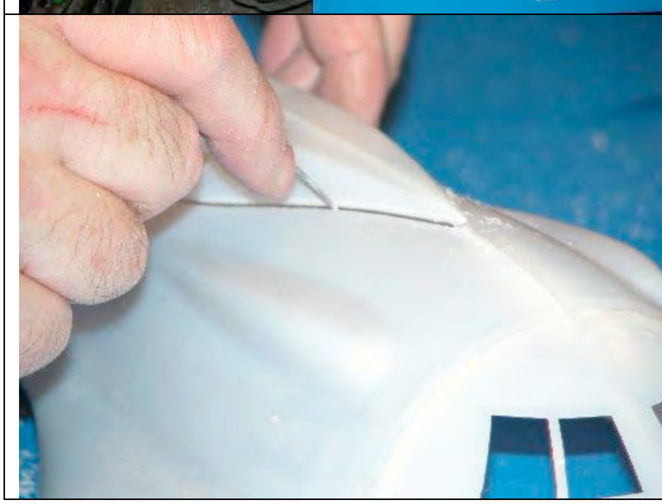
Q bow superstructure capture pin

R stern mounting screw foundation

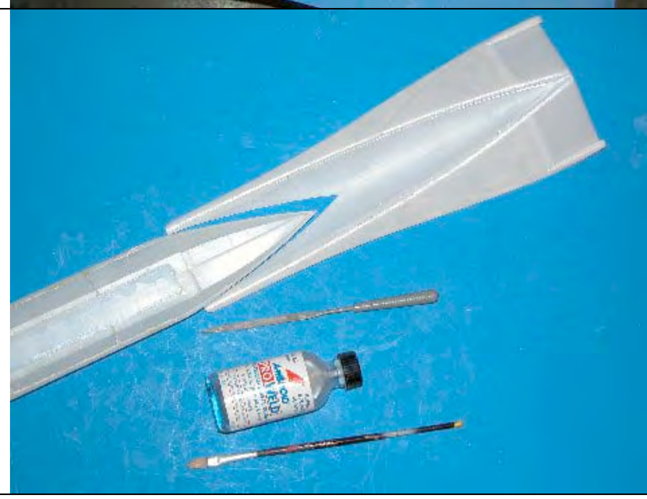
T Low Pressure Blower tube foundation

Cutting The Seaview Superstructure from the Hull

Here are the shots of the removal process -- separating the superstructure from the hull of the SEAVIEW:





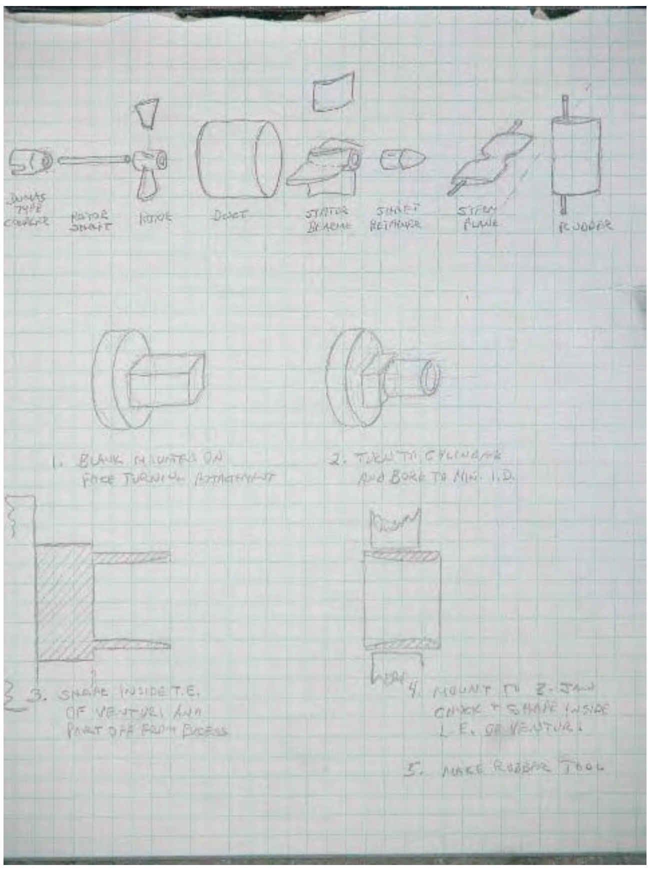



Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-1

A Report to the Cabal:

As the chat rooms buzz in anticipation of the Moebius SEAVIEW release -- with rumor, prissy know-it-all proclamations, shameless name-dropping, guesses, unsolicited kit design advice, and the usual purse-fights --I've been hard at work devising a package that will convert the kit to operation as a fully capable r/c model submarine.

While the Internet noise-to-signal ratio increases to the point of distraction, let's tune it out a bit and look at what a real Model Builder has been up to. Already mocked up is a Sub-Driver -- the cylinder that contains the propulsion, control, and ballast sub-systems needed to operate the model. Further, I'm working on the pump-jets that will fit within the SEAVIEW's propulsion tubes. Let's look at that work:



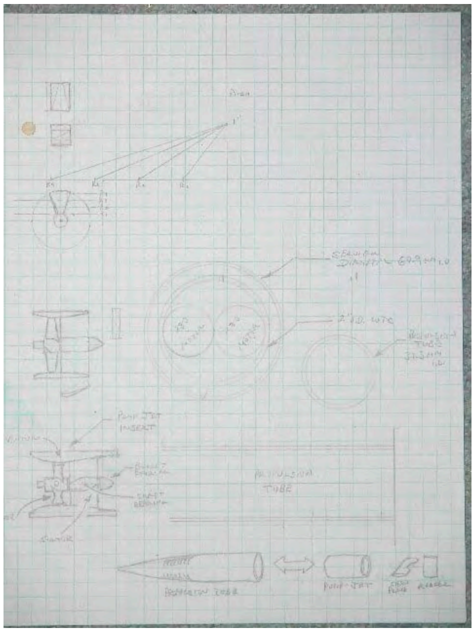
At the top is an 'exploded' graphic representation of what I had in mind -- the many parts that make up the proposed pump-jet master, their orientation to one another suggesting how things would fit and in what order they would integrate. This presentation is a quick and dirty first-draft of the proposed methodology. A more detailed methodology -- outlining how I would form the duct master, comprises both text and graphics -- takes up the rest of the sheet.

While I await a SEAVIEW kit I intend to perform in-water evaluation of different rotors -- the objective is find the one that produces the most thrust for the least amount of motor current draw.

I was able to secure from Moebius the mockups propulsion tube inside diameter, as well as the inside diameter of the hull -- two measurements that permitted me to immediately start work on pump-jet and SubDriver hardware. But, first, do these ideas work on paper? I project them orthographically in plan, profile and section, that's the best means of identifying and correcting fit and function anomalies.

Think it. Draw it. Build it.

I've updated the initial drawing after receiving the Moebius SEAVIEW kits propulsion tube and hull diameter information. I laid out the basic component placement and mode of construction. Last



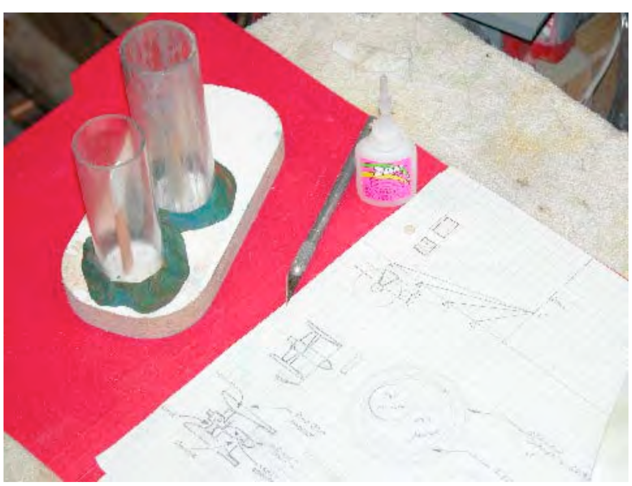
week I amplified on that work a bit by defining the shape and pitch of the rotor (propeller) and worked out a blade chart and blade blank. (Note that I've also been doodling different pump-jet geometries).With this material in hand I started work making masters of the pump-jet rotor, duct, and stator.

The project was well underway. And the Internet rumor mill says that the kits are only ten days away. Yeah ... right.

Not all heat forming of plastic sheet (thermoplastic type) is done with a differential pressure, otherwise know as vacuforming or blow molding. No. sometimes it's as basic as this set-up: A wide strip of polystyrene sheet held between two hands, heated with an open flame, then quickly draped and pulled around a form -- in this case a section of 3" Lexan tube suspended by a copper tube clamped in the bench vice.

And why all this nonsense, you ask? To give a basic curved shape to what would become an under-cambered foil section, the master for the SEAVIEW pump-jet stator blade.

The rotor and stator blade masters were mounted within Lexan cylinders which formed the containments within which catalyzed RTV rubber would be poured. I would wind up casting enough rotor blades for a two-bladed, three-bladed, four-bladed, and five-bladed rotor master. Cast metal rotors would be evaluated within the pump-jet to find which rotor gave the best thrust for current drawn by the motor. This work can be done now. All I needed was the inside diameter of the kits propulsion tube -- that puts me ahead of the competition. And, in the r/c submarine world, there are real competitor's out there!



I'm in a race: To successfully capture customers with my fittings kit and SubDriver. But, to do that I have to be ready with product as close on the heels of the Moebius SEAVIEW kits introduction as I possibly can.

The clock is ticking, the kit will be on our shores soon. In preparation I can evaluate the different configurations of the SEAVIEW pump-

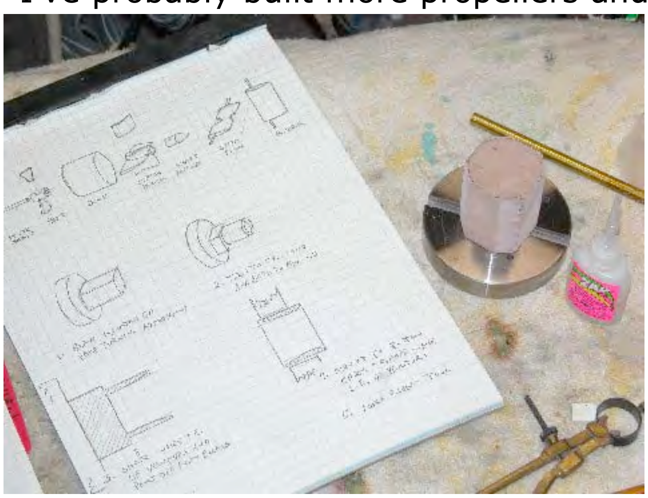
jet, and prepare a prototype SubDriver unit. When I get my hands on a kit (hopefully a pre-release test-shot) I'll do the control surface integration work, shave or shim the production master pump-jet duct to fit the kits propulsion tube, produce the production tools, size the SubDriver ballast tank, determine amounts and placement of fixed ballast weight and buoyant foam, and in-water test the model, and start production of SEAVIEW conversion fittings kits and SubDrivers.


Cutting out the Renshape 40 pump-jet duct master blank on the band saw

Slit type rubber tools were cast around the pump-jet rotor blade and stator blade masters. Initially encapsulated, the masters would be extracted after slitting the tool with a sharp #11 X-Acto blade. The BJB, TC-5050 rubber can withstand the

temperatures of the molten white metal I would later use to cast the blade masters, those masters used during the assembly of the rotors and stator production masters.

I've probably built more propellers and pump-jets than anyone who ever lived! Even so I like to have a well organized procedure worked out before I lift the fist tool in anger --doing so saves both time and aggravation!



The pump-jet duct master was worked out in my head and captured on paper and the concept checked for paradox. Only then did I mount a piece of Renshape onto the face-plate of the Taig lathe, turning it to outside and inside diameter. The work itself went very quickly.

On the lathes face-turning fixture I simply CA'ed the blank in place. Sure, there are taped holes in the face of the fixture in which to screw holding brackets and clamps, but the work was small enough, and would not present so much of a torque or chatter problem that the glue option would not suffice.

I worked out the SEAVIEW's pump-jet master fabrication methodology on paper before going to work on the masters. As with most model building tasks: you do the research; you think about how you're going to accomplish the tasks involved; you sketch the plan out and study it; make changes as paradoxes and fit difficulties present themselves; and only then commit the concept to hardware.

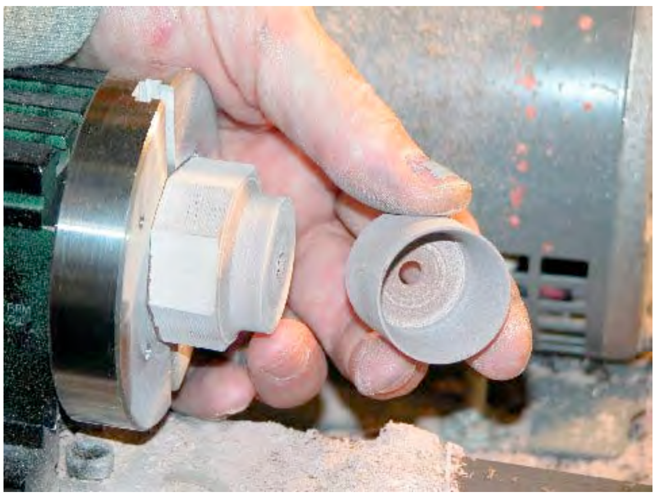
Measure twice, cut once as the saying goes! On the lathe I turned the pump-jet duct master to shape. Here I've already taken the master down to its outside diameter and now am addressing the bore. First I take out the internal material till the inside diameter is that of the maximum duct internal diameter (at the throat of the venturi), then I work to taper the trailing edge (the open end of the work we see here), part the duct master off the blank, invert it, then shape the leading edge. Simple. It's taken me longer to describe this nonsense that it took me to actually fabricate the master!

Doing this work is kind of a crap-shoot: I recently got the inside diameter of the mockup's propulsion tubes from Moebius Models. But, there is a lot of room for variance between mockup and eventual kit parts produced by the Chinese: Will the same software be used to build the tools as was used to build the mockup (was the mockup CNC produced, or hand-crafted)? Will a change based on mockup examination by the Moebius design team alter the sterns parameters, and will any of that effect propulsion duct diameter? Will the production process (injection forming) render symmetrical propulsion tubes, or will things get a bit 'squeezed' back there as the floor engineers at the plant work to minimize shot flash on the production molds?
A lot of things can happen that will effect the eventual diameter of the kits propulsion tubes. Frankly, I would be surprised if the outside dimension of the pump-jet duct I'm working now is captured on the kit as the Chinese go about their task of converting the mockup model to production SEAVIEW's.

That's why I've built a bit of beef onto the outside diameter of my duct master; it's a bit fatter than the dimension I was given, and can be shaved back if the kits propulsion tubes come out tight. And I can shim the duct master outside diameter with a thin wrap of tape if the kit propulsion tubes come out a bit too large. This is why I'm going to make resin intermediate masters of the duct and stator assembly -- a set will not be joined and used as a production maser only after I have sized it to fit a Moebius SEAVIEW kit propulsion tube.

The inside trailing edge of the duct master was finished off by careful scraping action with a knife blade as the work was turned. The taper was finalized with descending grits of sandpaper. Notice how I'm using a mounted tool as a tool-rest for the blade as I give form to the venturi -- a shape that will work to accelerate the water as it approaches the propeller/rotor disc.

I've just parted the pump-jet duct master off the remainder of the Renshape blank,



which was glued to the face-turning attachment of my trusty little Taig lathe. I then swapped the face-turning attachment with the three-jaw chuck and installed the duct master, this time with its leading edge to the right, and finished off the venturi within with cross-slide directed tools, hand-held knife, and sandpaper. The duct master was then set aside for later tool making -- best to do the tool making all at once: one batch of rubber to cast up the first halve tools of the rotors, the stator and duct. There's economy in numbers, boys and girls.

R/C'ing the Trumpeter 1/144 SEAWOLF (SSN21) Submarine, Part-2

A report to the Cabal:

OK, a few words about 'glue'. The differences and usage of adhesives and cohesives. Huh? ... What? ...

Most of us build fiberglass hulled r/c model submarines, usually from a commercially available kit -- a kit that likely also contains parts formed from other type substrates. Substrates such as polyurethane (control surfaces and stabilizers), cast white metal (detail items and propellers), and wood (those old Krick kits still floating around) are typical of the types of materials a model kit will feature.

There are no readily available cohesive that effect a fusion weld between epoxy/ polyester/polyurethane/wood/metal parts; we can't weld these items to one another. The only practical and available bonding process we have (other than using mechanical fastener) is to use an adhesive to stick these parts to one another --introducing a 'bonding' agent between the two (or more) items being stuck together. **COHESIVE GLUE** Cohesive glues work by dissolving the adjoining areas of two or more items being fused together. A crosslinking of the substrates molecules across the union plane occurs; its a welding operation where molecules from part-A fuse with the molecules of part-B. Like ark or gas heat welding of metal, plastic welding works by changing the state of the substrate from its normal (at room temperature) solid state to a temporary liquid state. during the liquid state during the welding operation the substrates molecules intertwine -- they fuse. When the work returns to the normal solid state (either through a temperature change or liberation of a reducing solvent, the seam between the parts being fused together disappears as the two [or more] welded parts become one. This is the strongest union between two (or more) like items one can achieve -- a fusion weld. Cohesion describes the process.

Point of interest: almost the entirety of this model kit assembly will be done with a solvent type cohesive cement, applied with a paint brush!

ADHESIVE GLUE An adhesive is an element applied between two or more items being bonded together. There is no cross-linking or fusion of substrate molecules; the two or more substrate items bond only to the adhesive, not each other. The bonding action is a result of mechanical interlocking of microscopic pits and ridges in the substrates surface and through forces that result from the closely spaced molecules to hold the three (or more) elements comprising the bond together. Adhesive bond quality is a function of how closely the molecules of adhesive and substrate are packed together.

In the real world, the degree of adhesion is much, much less that optimal; the strength of an adhesive bond being basically a function of how good the bonding agent is at 'wetting' to the surfaces of the parts being joined. Adhesives applications and substances include soldering-low melt alloys; brazing-high temperature alloys; and animal, epoxy, milk, egg, cyanoacrylate (super

glue), phenolic, starch based
glues, all are used to bond all sorts of different substrates together. Some glues work better than others.

This project offers up our chance to fusion weld the parts together -- let's take advantage of this opportunity!

The typical 'model kit' we grew up building as kids -- and the Trumpeter SEAWOLF kit is representative of that type -- are produced via the injection method: Hot, molten polystyrene plastic is squirted into a steel mold at several thousand PSI. The hot plastic is slammed through a central sprue hole in the face of one-half of this massive tool where internal channels direct the plastic to fill the many cavities within. The styrene plastic cools and changes state freezes back to a solid, the mold is opened, the parts, still connected to the sprue channel 'tree' system, are ejected, then boxed up and sent to your friendly hobby shop. The process, when employed on a mass-production basses is fast, cheap, and the machine (once set up) can be operated by slavish drones (the kind you find in the infield picnic area at NASCAR races) through three shifts, seven days a week. The injection molding process lends itself to production of large quantities of product. The polystyrene parts produced this way are tough, dimensionally stable through moderate temperature fluctuations, and this substrate can be fusion welded with solvent type cohesive cement/glue/what-have-you.

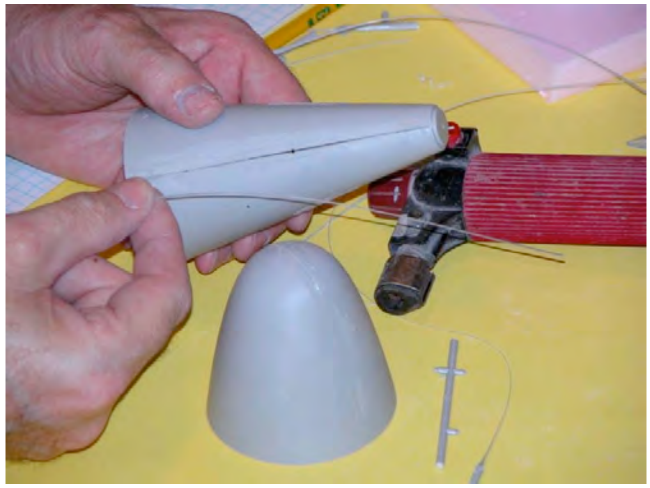
Above you see a typical 'tree' of styrene plastic kit parts, the parts still clinging to the nibs where the sprue feed channel enters the cavity that gave form to the part within the mold. I'm holding a tree of parts that will make up the rather cheesy looking 'display stand' for this model. I'm busy snipping them off the tree and bagging them as I do so. I prefer side-cutters for this task. And that's the first thing you do when you open the kit box: snip off the parts and segregate them as to function -- all stern control surfaces in one bag, all sail related parts in another bag, and so on.

Never use a Cyanoacrylate adhesive (or any other type adhesive) when the substrate lends itself to being fused together into a proper welded union with a cohesive type cement. Three cohesive glues, formulated for hobbyist and OEM alike are pictured above.

You all remember the tube-glue we smeared recklessly over our model kits as kids, right? Well, it's nothing more than a gelled version of the much superior 'liquid cement' you see in the bottle containers, one marketed by Ambroid, the other by Plastistruct --these are very volatile solvents which chemically cause the styrene (or ABS, or acrylic) plastic parts to dissolve locally (just at the union point between parts being attached to one another) into a gel; when the parts are in close enough proximity to one another the union faces of each part dissolve partially when exposed to the solvent and fuse into one another. When the solvent of the cement (ideally there are no fillers or contaminates present) evaporates away (and that may take days depending on the depth of the weld) what is left is a hard, seam-free union between parts. A weld!

Note that I mount the bottled glue in a Styrofoam base to mitigate accidental overturning of the bottle while dipping the application brush ... hard learned lesson there! Also note the selection of application brushes on hand for special jobs. However, most of the time, I use the brush supplied and attached to the cap to transfer this solvent type glue to the work.

As a matter of fact, I have not used tube-glue cohesive cement for twenty years ... is that tube you see here that old? Man!



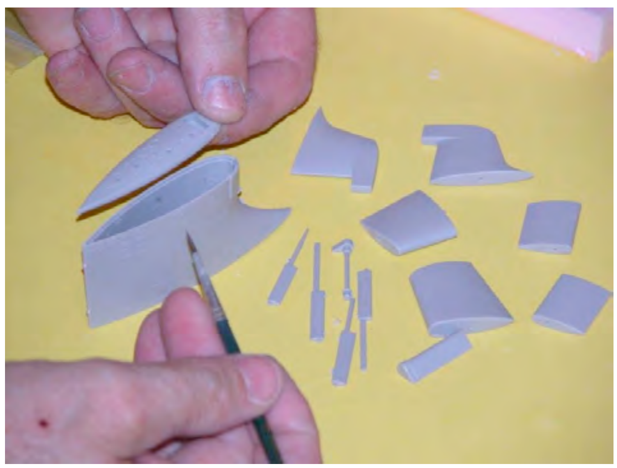
Just like heat induced fusion welding when working with some metals, fusion welding of structurally important plastic items, such as the two bow halves on this SEAWOLF build, is the preferred attachment method between like substrates. it is wise to chamfer the edges of the parts being joined and to introduce, at the time the weld is being effected, to introduce a 'filler rod' of like material to melt and fill the gap presented by any miss-match between the items being fused. And what better filler rod than stretched sprue pulled from scrap pieces of the kit tree? That's what you see here. Heat source can be an open candle flame, but I prefer a small Propane torch. The diameter of the stretched sprue is a function of how much heat is applied (time exposed to the flame) and how hard you pull during the stretching operation),

First, I chamfer (scrape and file) a 45 degree bevel at the outside corner of each mating surface, this forms a 'V' at the seam of the assembled parts that will be occupied by the filler rod. Holding the two bow pieces together, by hand, I spot weld them together -- the cement melts and partially flashed out of the plastic quickly so the work can be put down almost immediately without fear of the pieces falling apart or creeping out of alignment. I then take selected diameters of stretched sprue and lay the rod into the V-groove, then thoroughly wet out the filler rod and seam with the solvent cement -- the filler rod and adjacent model part edges quickly change state to a semi-liquid, diffuse into one another and become a fused whole. A weld.

And that, boy's and girl's, don't a stronger bond make!

Whenever possible achieve your glue bonds using a cohesive, not an adhesive!

Ambroid's ProWeld is the cohesive of choice for sticking polystyrene and ABS plastic parts together by welding. Note the rather massive cap-mounted application brush. Good for ninety-percent of the jobs you'll do. Here I'm simply showing off the fact that just about any type brush can be used for application of the water-thin cement. Oh, ProWeld is also an excellent cohesive on acrylic plastic -- I use it on the WTC's I produce for video camera-transmitter housings.



Assembly of the SEAWOLF's well detailed sail, comprising only three major pieces, took about three minutes.

It's my practice to snip off the little alignment pins that almost always are placed on one-half of a model kit subassembly -- this permits me to sand the flange face of each half with a sanding block to insure a truly flat surface. It's no problem to align the parts by sight and feel before introducing the solvent type cement. Application of the cohesive is made only after the parts are held together and registration between them assured. Capillary action quickly draws the thin, runny liquid into and throughout the seam where its solvent action

The two hull halves on this big submarine kit are each capped at the ends with semicircular transverse bulkheads, built into the parts. This gives each half hull great torsional resistance and of course prevents handling or other outside forces from deforming the hull shape near the bulkheads.

Of course, this plastic kit was designed to achieve much of the hull parts structural integrity by gluing together the halves along the long running seams that separate them -- an operation that would further increasing the stiffness of this static display model. However, we will not glue the two long running longitudinal breaks between upper and lower hull -- it is through that break that we separate the upper and lower hull halves in order to access the interior of our practical r/c submarine. Therefore, retaining three of the four semicircular bulkheads is essential.

Only the upper semicircular bulkhead, at the stern, is removed. That job easily accomplished using the rotary saw (affectionately known in my shop as, 'man eating shark') mounted in my trusty Dremel Moto-Tool. The semicircular flanges stand away from the hull proper, forming a foundation upon which the inserted bow and stern subassemblies fit and are glued. Cutting through the band, with blade axis of rotation parallel to the hulls longitudinal axis, removed the semicircular bulkhead. A little work with the rotary drum-sander cleaned up the stern of the upper hull.

Removing the bulkhead opens up passage between the hull and tail-cone of the WTC's intermediate drive shaft and control surface pushrods. Also, removal of that bulkhead permits installation of a radial lip within the tail-cone that extends forward about a half inch, forming the mounting flange upon which will sit the after section of the upper hull. Later, a mechanical fastener, passing through a hole at the after end of the upper hull, attaches to a dead-bolt bonded onto the bottom of the radial lip/ flange, securing the two hull halves together ... more on that item in a later chapter of this Cabal Report.

Note that I've ground out a hole into the bottom of the lower hull after semicircular bulkhead, this to allow for water to pass back and forth within as the model is placed into and taken out of the water. Remember: this model will be operated as a wet-hull type submarine; the interior, less the WTC, is free flooding. Similar holes were drilled into the top and bottom of the semicircular bulkheads at the bow, the upper hole to permit entrapped air bubbles in the bow to find their way aft and out the sail and holes in the deck of the hull as the model submerges.

You can just make out the short flange molded into the lower hull half (now upright on the inverted model). I'm making things ready to weld the tail-cone to the lower hull. To insure correct radial registration of the tail-cone to the hull as I pour on the solvent cement, I'll use the engraved outlines of the after ballast tank groups flood and drain openings. To better see those shallow outlines during this critical phase of kit assembly I've filled the lines with black artist oil paint -- wiping off the excess paint with a tissue leaves the black paint only in the engraved lines -- very easy to see now!

Holding the tail-cone tightly onto the bottom hulls after flange, I brushed on heavy quantities of cohesive solvent cement to weld the tail-cone to the bottom hull. To prevent any glue finding its way onto the after face of the upper hull I had slide the upper hull forward upon the lower hull about an eighth-of-an inch ... easy to do as I had earlier snipped off the hull indexing pins.

I also bonded the bow piece to the upper hull forward semicircular bulkhead flange in a similar manner as that done for the tail-cone. I allowed the tail-cone and bow piece to hull unions to dry out for about twelve hours, then set in with the work needed to fair in the slight miss-matches between parts with fillers and abrasives. First, I used a second-cut file and descending grits of abrasive (the two sanding sticks seen here are #100 and #240 grit respectively) to knock down any projecting filler rod standing proud over the surface of the tail-cone and bow piece longitudinal seams. I then sanded all areas with #240 sanding squares. These are made by folding over a piece of sandpaper, grit side out, in half to form a crease, opening it back up, placing some CA adhesive on one face, closing it back up, compressing it a few seconds on the table, snipping off the raged edges with scissors, and, wa la! You have a stiff piece of double-sided sandpaper that can negotiate simple curves.

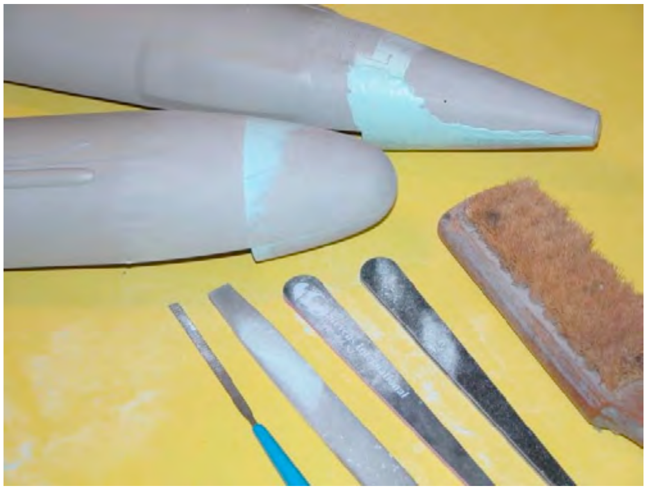
There are four major areas on the hull that will require filling to properly contour the two hull halves and end pieces (tail-cone and bow) together into a seamless whole ... less those two long breaks where the upper and lower hull part and the two semicircular radial breaks at the lower forward and upper aft ends. In other words: where ever a part is glued to another, you gotta first knock off any high relief anomalies with file, dress up the area with sandpaper to make it receptive to filler bonding, then troll on the filler, then grind most of that down till only that putty needed to fill depressions remains. The objective is to fill and abrade the work till you've established the intended curvature of the structure, without an unsightly seam. The above filler and putty is how I do it. The two bottles in the background contain different formulations of a heavily filled polyester resin base that, when mixed with the cream hardener in the little white tube, hardens into a solid mass through isothermic reaction (self heating). For more dope on these and other Evercoat fillers: http://www.
evercoat.com/productCategory.aspx?cat=1

The Glazing Putty goes on rather thick and has limited use for casual kit-assemblers. However, the squeeze bottle packaged Metal Glaze is just thin enough to do the job, and do it well -- highly recommended.

Note the mixing pallet: I use it to prepare filler. It has about one-hundred edge glued sheets of very heavy, chemically treated paper that is stout enough to tolerate mixing and scooping of catalyzed filler.

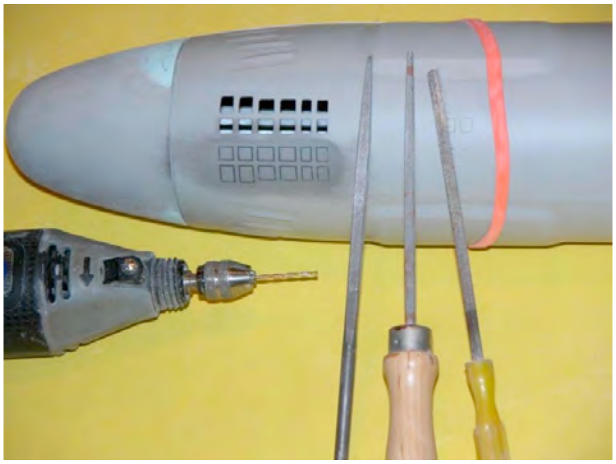
The above items were purchased at Mattos Inc., an east coast franchise that specializes in the sale of automotive refinishing products. Sherwin Williams has a similar line of products. Look 'em up in the phone book.

An air-dry putty is in the yellow tube, it's Nitro-Stan and is perfect for filling shallow scratches and minor contouring jobs, but little else -- a fine replacement for all those shitty air-dry putties sold at the hobby shop. Here's a good look-see at this product:
http://www.nitrostan.com/spotputt.html Excellent stuff.



Both the stern and bow pieces were a tad undersized to the hull. This evidenced, after assembly, a slight overbite at the radial union points. These high-relief gaps had to be filled and re-contoured to preserve the gentle compound curve at the bow and the simple curve taper at the stern. The filler of choice here was Evercoat Metal Glaze.

In foreground the bow filler has already been worked with file and sanding sticks, in back is the yet to be abraded filler on the stern. The brush at the extreme right is a 'file card,' used to clean out the gunk that collects and fouls the cutting teeth of a file. One face of the file card is a fiber brush, the other face is a wire-brush. A must have in the shop if you are to keep your files in tiptop shape.



The Trumpeter guys got the location and look of the forward and after ballast tank group flood/drain holes pretty much right. It was a simple matter to use the engraved penetration outlines to guide me as I used first a small drill bit, then square sectioned hand files to open up these rectangular opening in the bottom of the hull.

Artist oil black paint was rubbed on first to highlight the shallow engravings. My eyes ain't what they used to be!

For no apparent reason (Trumpeter had access to good documentation that did not promote this feature) the six lower hull blisters that fair in the flank transducers take the form of sharp cornered structures, not the smoothly transitioning hull standoffs their supposed to be. If you're anal about scale fidelity like me you're going to have to grind the edges down and sand the blisters to a more unassuming form. Upper is a SEAWOLF hull who's blisters I've already softened, below is the current project, ready for some hack-and-slash with Moto-Tool sanding drum and #100 grit sanding pads.

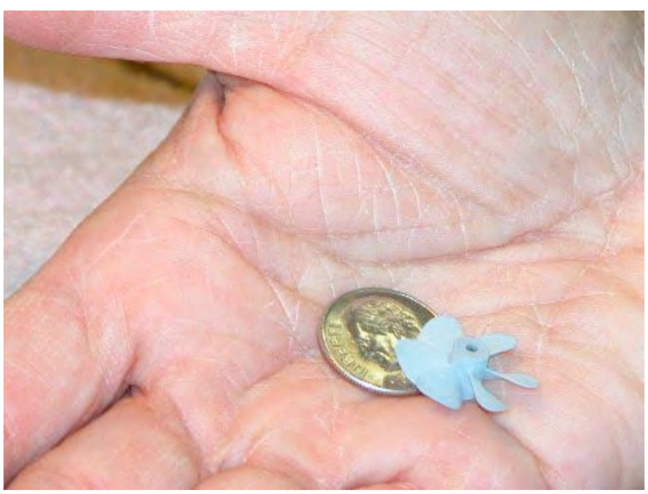
Cry havoc and let loose the dogs-of-war!

Subject: Working up a fittings kit for the upcoming Moebius SEAVIEW kit Part 3

A Report to the Cabal:

What you see here is the claying up of the masters for the Moebius 1/128 SEAVIEW pump-jet evaluation unit, as well as the Trumpeter 1/144 KILO fittings kit, getting the same treatment -- I've taken shots of the collected work. It's better to gather up various shop projects and to perform the required tool making all together, rather than go through the operation multiple times -- that would make for a very inefficient approach to the task of tool making.

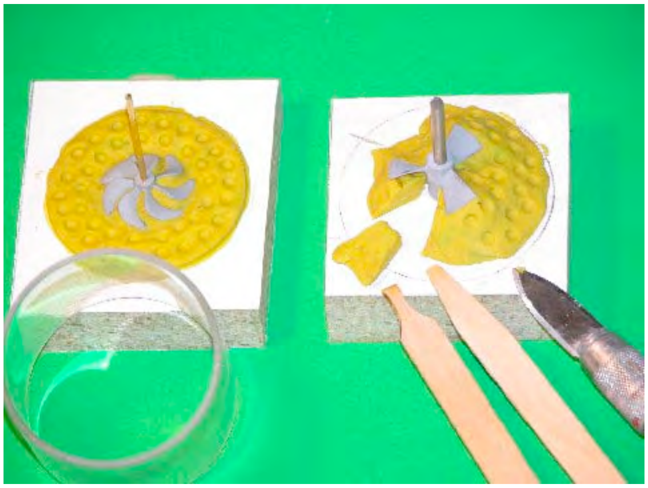
Little mold-boards are cut from 3/4" MDF laminated shelving board and the rotor and propeller masters suspended over the board using the appropriate sized shafts as holding pins. Also, a portion of shaft extends upward past the rotor and propeller hubs, this will form a bore in the first half of the molds being poured tonight, the bottom half. Later, during casting of the metal propellers and rotors, a stainless steel shaft will fit the bore in the rubber, serving as a mandrel that will give form to the required bore in the center of the propeller/rotors hub. The rotors and propeller masters, at this point, during the first pour, are upside-down.

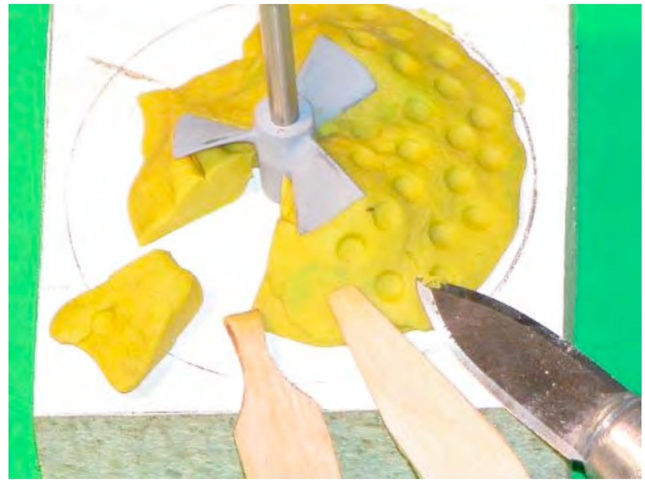


All masters were given a final, very careful sanding and laid out for mold-board mounting. The two rows of masers at the bottom are for the SEAVIEW job, all others are for the KILO fittings kit.

Ellie holding one of the smaller 1/144 KILO propeller masters.

The mold board has a hole through which a shaft is used to pin the propeller/rotor master to it. The propeller/rotor master is upside-down. Secured to the mold-board like this it is an easy matter to force heated oil-based clay under the blades to form a mask. The upper face of the blades and hub and clay form the flange of the first tool half.

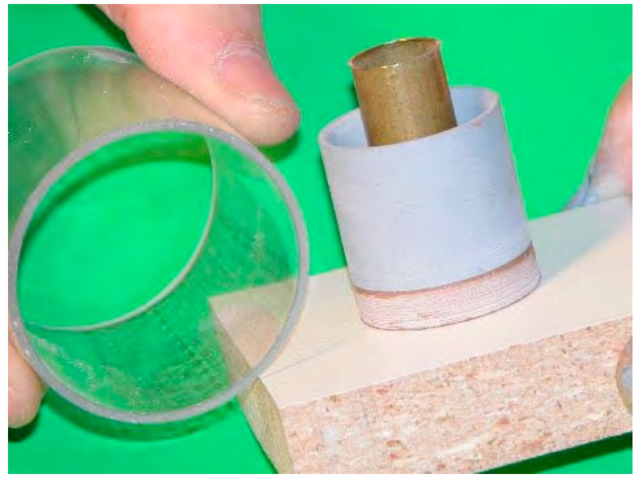




The tools to push and form the clay to shape against the edges of the glades and the sides of the hub. The dimples are for registration, they insure proper indexing of the two tool-halves when they are assembled in preparation for casting.

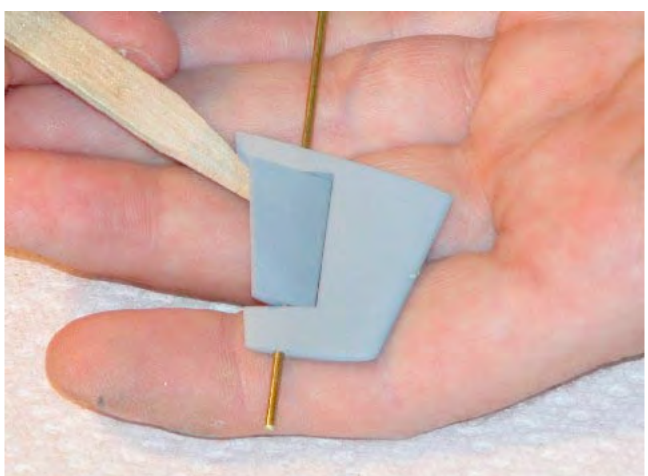
A clayed propeller master without containment. Small!

The SEAVIEW pump-jet duct received a little stand-off piece that would place the master about a quarter-of-an-inch off the surface of the mold-board. The one-piece tool here, when inverted will fill through the cavity formed by the stand-off piece, which also acts as a 'bubble-catcher'. The central core (length of brass tube) both economizes on rubber, but more importantly give some flex (the bore it creates in the tool) so duct part extraction from the tool is easier than it would be if the center were solid.

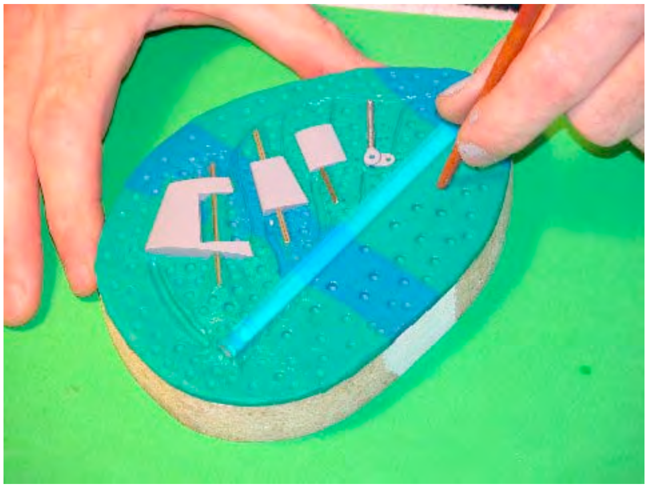
 

Laying in the clay.

Punching in the dimples -- the back end of a paint-brush handle is perfect for this, but dapping tools also serve here.



I made a special intermediate rubber tool off all the masters of the Trumpeter KILO kit that required duplicate or triplicate production masters. Here I'm making one last check for unbinding operation of the horizontal stabilizer and stern plane. These masters were then taken apart and mounted on a mold-board in preperation of making a conventional two-piece rubber tool.



This rubber tool will be used to cast the multiple pieces needed for creation of the production tool. I'm putting in the last of the indexing dimples here. Note that I've also indicated in the clay the location of the sprue channels leading into the eventual cavities as well as the vent channels needed to displace air as the resin fills the cavities.

Two-weeks of work here, boys and girls! The masters, clayed, contained, and ready to receive rubber.

After pouring catalyzed rubber into the containments, the work was placed into the hot-box and left to cure for about four hours.

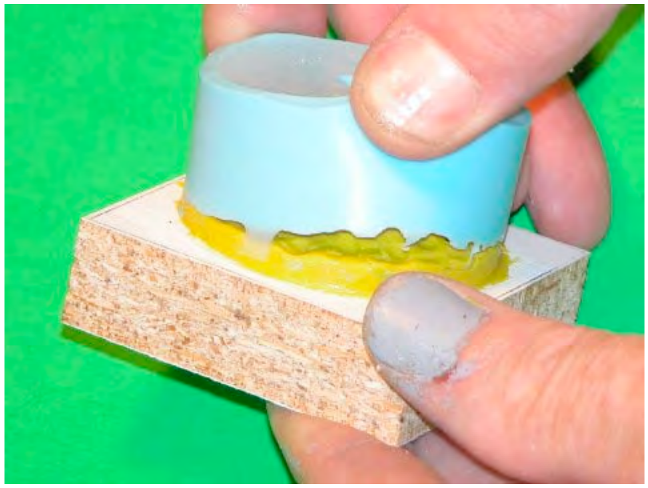
Subject: Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-4

... This morning the first half of the rubber tools were cured hard. I pulled the plastic cylinder containments away, peeled away the backing clay from the cured rubber, removed and cleaned up the masters, applied mold-release to the face of the molds, re-inserted the masters, slipped the cylindrical containments back on, installed a sprue mandrel to produce a stand-pipe for metal pouring, and mixed up another batch of rubber and poured the second half of the propeller/rotor tools. Later I poured rubber in a smaller diameter containment to form the stand-pipes which give head to the metal, the resulting pressure at the bottom of the column sufficient to get the molten metal into all crevices of the tools cavities.

Keep in mind that I'm not only working up SEAVIEW tools here, but also KILO fittings kit tools as well, so don't get confused by the large number of tools being worked here.

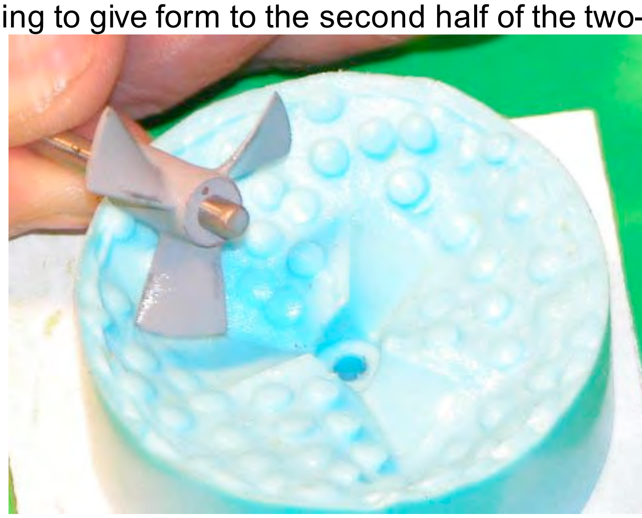
First step, before making any other move to free the master from the first half of the tool is to pull out the shaft that runs through the masters hub and into the mold-board.

Even the mold-release I sprayed into the containment cylinder prior to pouring of the first rubber tool half was not enough to thoroughly prevent slight bonding of the rubber to the Lexan. To complete the break from cylinder and rubber,as I prepared for the second pour, I insert the needle of this silicon oil filled squeeze bottle and injected some oil between the two. This broke the slight bond between the two and eased extraction of the hardened rubber from the stiff Lexan tube.



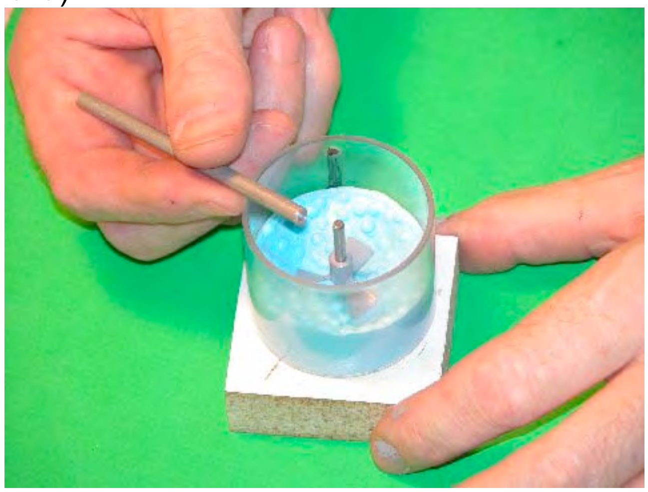
The containment cylinder out of the way I applied a bit of tension around the clay/ rubber interface point. This forced the two items to separate neatly at the flange point, defined by the clay and exposed face of the master. It helps to cool the work in the fridge a bit before doing this -- it stiffens that clay, so it won't go all 'gooey' on you.

The master is freed from the clay and cleaned up with rag and brush. A putty knife was used to pop the clay, with master still in place, off the mold-board. Careful here ... you don't want to damage the maser, you still need the thing to give form to the second half of the two-part tool.

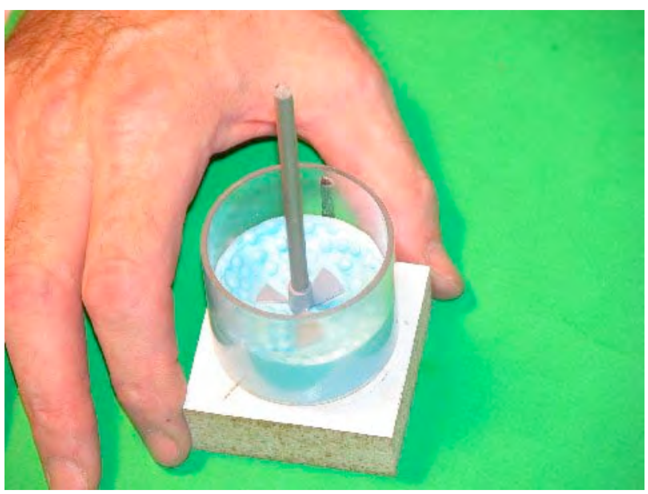


Mold release spray was applied to the flange face of the first tool half and the master re-inserted.

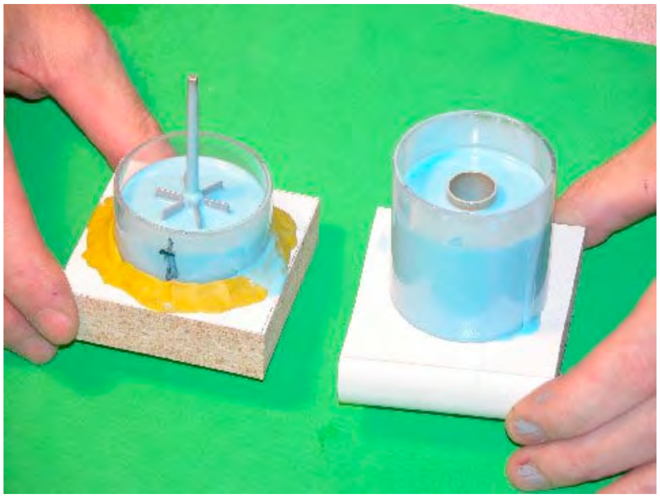
Note the little indexing mark on the masters hub and how it left a corresponding 'tit' within the cavity formed by the rubber. This permitted me to re-install the master in the same orientation it was as the rubber was cast around it -- no matter how careful you are, no propeller/rotor blade arrangement is perfectly symmetrical (made obvious if you don't put the master back into the tools the way it came out -- it won't fit!).



Further preparing the work for pouring of the second half of the tool I installed an aluminum sprue mandrel that fit over a bit of the shaft that projects through the upper end of the masters hub. You need the tall sprue channel to create the pressure-head needed to insure that the eventual pour of molten metal has the force needed behind it (gravity) to fill all blade cavities within the tool. Gravity is our friend!



In actuality the rotor/propeller tools involve three pours of rubber: one for each half of the tool, and a third to create the column of rubber with the sprue hole in the center.



Two different type tools are the stator assembly master to the left, which requires a two-piece tool; and the duct master to the right which is a single part tool with a hollow center.

While I covered the entire duct with rubber, I only covered 2/3 of the stator assembly master with the first half of its tool -- doing it this way eliminated the need of masking clay, this technique useful on masters possessing vertical surfaces.

I removed the stator assembly master from the first-half of its rubber tool and cut out registration divots in the flange face around the cavity formed by the master. I also cut back the raised edges around the cavity (capillary action causes this). Within the cavity and over the flange face was coated silicon mold-release; the master reinstalled; and the second half of the rubber tool poured in.

Pouring the second-half of the propeller/rotor tools and the second-half of the multiple part tool (to produce KILO production master duplicates) to the left.

Since these tools (the rotor/propeller ones, anyway) would be subjected to high temperatures during the metal casting operation, the rubber had to be completely de-aired -- this done by subjecting the mix to a hard-vacuum for several minutes after the mix had passed the 'froth' stage. If tools will be used for vacuum, pressure, or metal casting, they have to be de-aired or pressurized to either chase bubbles out of the mix or to crush the gas into solution. If you don't, you will get pock-marked castings as the bubbles within either expand or contract during the casting operation.

Smaller diameter containments were glued with gasket-making RTV adhesive to the upper face of the two-piece tool. Once the glue dried enough to insure it would hold, I mixed up a last batch of RTV mold making rubber and poured the stand-pipes.

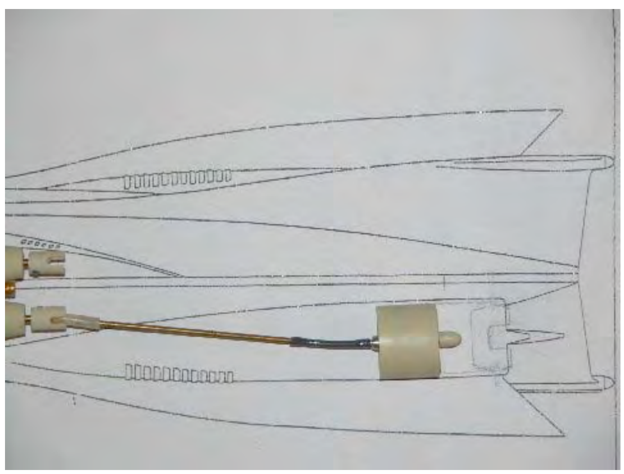
The final pour of rubber creates the stand-pipe element of the tool. The height produces the pressure-head that will drive the molten metal quickly, and with some pressure, into the tight cavities that give shape to the white metal rotor/propeller blades.

Subject: Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-5 Date

Finally, I have cast metal and resin pre-production pump-jet parts to stick together and show off. Tomorrow I come up with a simple water tight cylinder in which to house a Graupner 280 motor, equip that motor with a shaft extension, work out a watertight seal, and a means of mounting this little WTC to the face of an evaluation SEAVIEW pump-jet -- with enough stand-off distance to insure I don't restrict intake flow -- so I can start rotor evaluations.

(You know what I'm gonna do with that test rig, don't you? Come on, Rick ... you guessed it by now, right? That's right: I'm going to turn some of these things into the prime-movers for the little Teskey FS-1 kit. Look out, SubRegatta 08, major ass kicking going to happen when I show up with my screaming 18" FS-1! Where's my kit, Rick!??).

Till then ... here are the pretty pictures of the pre-production pump-jets in support of the Moebius SEAVIEW fittings kit project: Here's a shot of the near end-game: a pump-jet pre-production unit with running gear made up to the SubDriver motor output shaft through Dumas (WTC side) and hose (pump-jet side) type universal couplers.

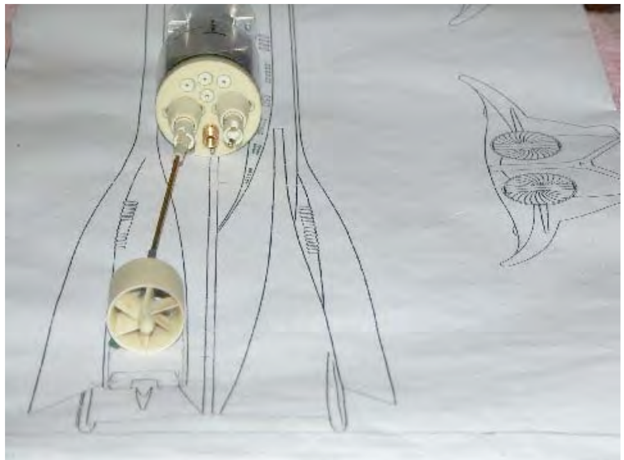


The drawing was done by Rick Knorwoski who lofted the lines straight off the actual 17 foot studio miniature -- this particular copy of his drawing has been reproduced to an overall SEAVIEW hull length of 39" which is the reported length of the soon to be released Moebius SEAVIEW kit.

I've pencil sketched on the plane a proposal for the stern plane arrangement -- I have to make sure it clears the right-angle rudder and will not interfere regardless of rudder or stern plane position. I won't progress any further with the stern plane or rudder work till I have a test shot or a production copy of the kit in hand. Some things have to wait, damit!

This running gear arrangement is not too far removed from that I developed and successfully employed aboard the DeBoer SEAVIEW model I built and operated a few years ago.

Pump-jets? Yeah, I've designed and built a few!



The running gear is pretty simple: the rotor within the stator assembly bushings is secured from coming forward by the retaining 'bullet' fairing bearing against the rear of the stator hub where the 'ahead' thrust load is absorbed. The after end of the rotor hub bears against the forward hub of the stator where the 'astern' thrust load is absorbed. No thrust loads are presented to the intermediate drive shaft. The interconnecting universal joint between pump-jet and intermediate drive shaft is nothing more exotic than a length of flexible plastic tubing -- the same stuff I use in my gas type ballast systems! The angular displacement of the intermediate drive shaft is, as you can see, not too extreme. So, the two types of universal couples at the ends of the intermediate drive shaft should not evidence much mechanical loss.
You can make out the motor bulkhead of the SEAVIEW SubDriver pretty good here. Note the four outputs for the pushrods (rudder, stern planes and bow planes, fairwater planes, and on-off switch). The brass fitting on the bottom of the bulkhead is the equalization valve. The stern planes and bow planes of the SEAVIEW will be directly coupled to one another -- I'll explain that departure from canon in a later chapter.

OK. With the tooling done I poured resin for three pre-production pump-jets, these would become evaluation units, used to find which of the four types of rotors would give the best performance aboard the SEAVIEW model.

A one-piece tool, this one a slit type, was used to cast the rotor shaft retainer-bullet fairing. The castings pour/vent channels are still attached.

The duct tool is a one-piece type that accepts resin through the annular opening at the top face of the tool. Before forming the rubber around the master I attached a stand-off ring to the after end of the duct. This 'bubble-catcher' insures a complete fill of the tight cavity of the tool - the stand-off ring is the sprue through which both resin fills the cavity and out of whcihdisplaced air escapes the cavity.

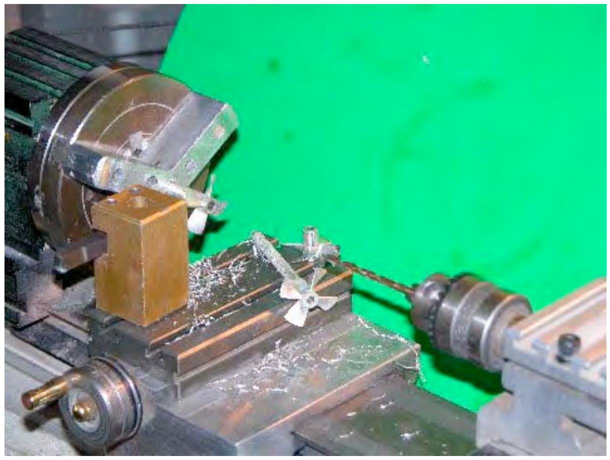
The two-piece stator assembly tool accepts catalyzed resin through the 1/8" bore in the center, the displaced air coming out the many little vent channels I punched into the upper half of the tool -- before placing the filled tool in the pressure pot I inserted a 1/8" rod into the center hole to form an equivalent sized bore down the center of the eventual cast resin pieces hub.

I pressurize the resin filled tools to about one-atmosphere -- this is enough to crush any bubbles (introduced during mixing or captured in the tools during the pour) to a size were they go into solution. The pressure is held till the resin changes state to a solid. My pressure pots for this small work are those cheap paint-pressure pots you can get from Harbor Freight for about forty-bucks

The tool to the left is for the KILO job. However, it's representative of the tools I produced to make the evaluation rotors for the SEAVIEW project. Note that the metal I'm using to cast the evaluation (and later production) rotors is simple 'leadless solder', otherwise know as white-metal -- Tin with a bit of Antimony. The means of heating the alloy is an electrical pot intended for use by fisherman and re-loaders to melt lead and tin alloys. I've been using this hand-unit for nearly 20 years now and it's still going strong!

My metal casting clamping system makes use of Mr. Gravity: A piece of plywood --with a hole just large enough to pass the sprue tower of the tool -- sits atop the upper half of the tool, compressing it down on the lower half of the tool. Lead weights either side of the plywood strong back provides the clamping force.

Yeah ... yeah, these are KILO propellers. Sue me! Same deal was used on the SEAVIEW rotors!



Though the mandrel present during rotor casting produced a significant length of the bore needed to pass the rotor shaft, it had to be deepened. And that's what I'm doing on the lath: Chucking up the rotors by their sprues, spinning them, and finishing the bore with a tail-stock mounted 1/8" drill bit. Once that was done the rotors were parted off the sprues and set aside for later work.

The 1/8" bore within the hubs of the cast resin stator assemblies were bored out to 3/16" to fit Oilite inserts needed to provide low-friction thrust and journal surfaces contact between stator and rotor shaft. Here I'm using a hand-press to drive an Oilite bearing into the bore of a stator assembly.

Four types of SEAVIEW pump-jet rotors will be evaluated. That meant I had to make four masters, four tools, and at least one evaluation rotor per type. Pitch, blade geometry, and diameter are all constant -- the only variable of the experiment will be blade area. The two blade unit is base-line, the three blade unit is 150%, the four-bladed unit is 200%, and the five-bladed rotor is ... duh! ... 250%

Andy's put his money on the three-blade unit. I have any other betters out there?? ....

Here's the two-blade rotor metal casting tool (a casting still within the upper half of the tool) alongside a casting with sprue still attached. The long length of the sprue resulting from the need to equip the tools with a high fill point -- the taller an item, the greater the pressure presented to the bottom of the item. Mr. Gravity at work!

Note that during casting a short length of 1/8" stainless steel rod is secured within a bore of the lower tool half. This rod becomes a core, or mandrel, that forms the bore of the cast metal part, that bore accepting the rotor shaft.

Here we have a complete breakdown of a pre-production SEAVIEW pump-jet unit. The duct, stator assembly and bullet fairing are cast resin. The stator has been bored to accept press-fit Oilite journal-thrust bearings. A stainless steel rotor shaft has been machined to a smaller diameter forward to make a tight friction fit of the rubber tube universal coupler. The rotor will later secure to the shaft with a 4-40 set screw (I have yet to mill a flat on the shaft for that set-screw). The production bullet fairings will be metal and will be drilled and taped to accept a set screw. Stainless steel washers between the rotor and bullet fairing provide a low friction bearing surface to the stator assembly installed Oilite bearings.

Two assembled pre-production pump-jets and a unit in 'exploded' layout so you can see how these things go together.

Subject: Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-6

First things first: I want to thank Mr. Frank Winspur and his associate, Mr. David Metzner, for sending me a test-shot of the Moebius SEAVIEW kit. Their effort to keep me in the loop on this project is most appreciated. It is with the kind permission of these gentlemen that I give you here a blow-by-blow account of what the kit looks like.

And I would be remise if I did not also publicly acknowledge Steve Iverson (CultTVman) who put me onto the Moebius SEAVIEW project in time to be of some assistance with research and resources. Thank you, Steve You are a true friend of the industry.

OK, readers: keep in mind as you drool over the pretty pictures here, this example of the kit is a test-shot -- an initial pressing of kit parts, intended to check machine performance and parts fit. There may be things incorporated on the production kits that differ from what is presented here; so, take my observations as a general description of how the kit will look when you open your box.

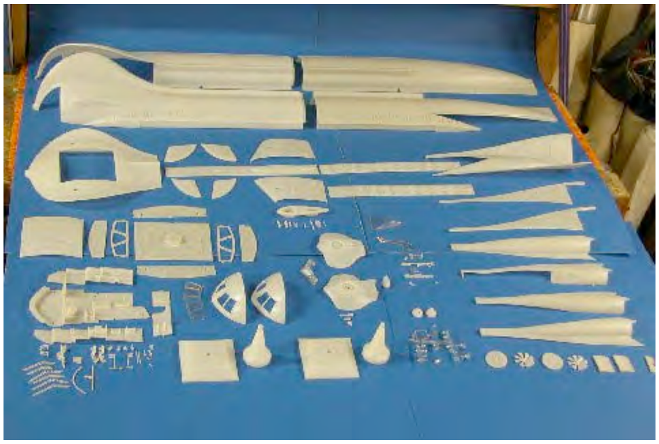
Your kit(s) should be here next month. I have two trustworthy Internet sources for the kit for you to go to. Both offering the product at a very reasonable price. I highly recommend them both as your point of purchase:

Caswell Platting, http://caswellplating.com/models/seaview.html This outfit is also making available a specialized 'fittings kit' for the SEAVIEW, which will comprise the resin and metal parts needed to super-detail and convert the SEAVIEW kit into a practical r/c model submarine. Additionally, Caswell will be selling the D&E Miniatures SEAVIEW SubDriver -- a unit that will handle the propulsion, ballast, and control functions aboard the model.

And the CultTVman Hobby Shop, http://www.culttvman.biz/cgi-bin/Commerce.exe?preadd=action&key=MOEB-05&reference=/cgi-bin/Commerce.exe%3Fsearch%3Daction%26keywords%3Dseaview%26searchstart%3D0%26template%3DPDGCommTemplates\cult\SearchResult.html <http://www.culttvman.biz/cgi-bin/Commerce.exe?preadd=action&key=MOEB-05&reference=/cgi-bin/Commerce.exe%3Fsearch%3Daction%26keywords%3Dseaview%26searchstart%3D0%26template%3DPDGCommTemplates\cult\SearchResult.html> A good place to go if you simply want a stock SEAVIEW, ready to be built into a static display piece.

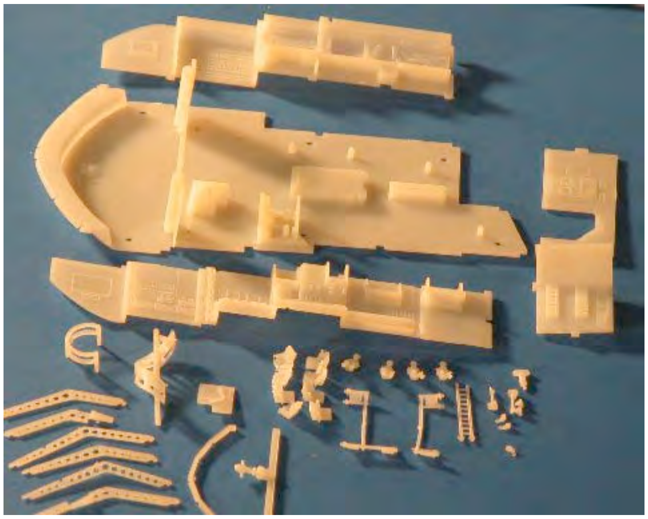
In this chapter I'll lay out the test-shot SEAVIEW kit for you to look over while I offer some commentary. In later chapters I'll assemble the thing and convert it to r/c operation.

I took care to throw the lighting off to the side in order to capture shadows from the high-relieve items on the kit parts; the color disparity between shots is a consequence of using a mix of flash and incandescent lighting -- I'm interested here in presenting you the detailing of the kit components, not consistency of color from one shot to the next.

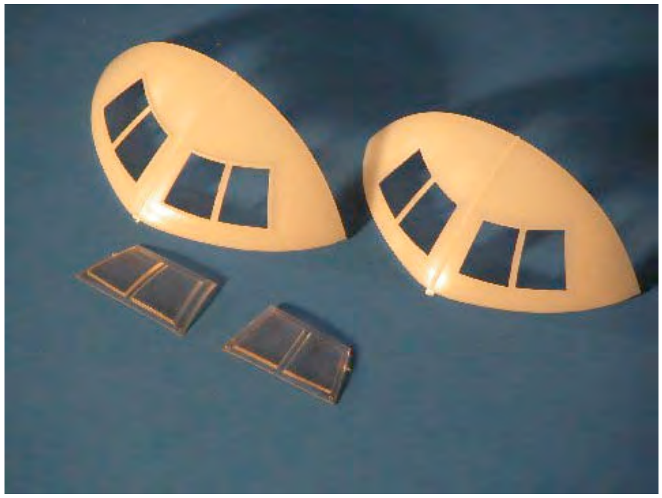


Thirty-nine frig'n inches long!!!! There it is, boys and girls. The Moebius 1/128 scale, SEAVIEW injection formed model kit, in all its glory.

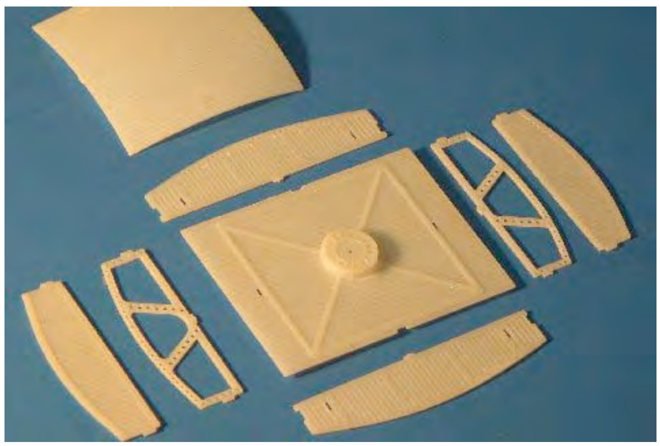
This kit is just about perfect! I've been watching the Internet reaction since the project was first announced, and the only reasonable discussions I've seen have been brief, bright, and relevant -- and exclusively at the CultTVman site. How have the other boards handled the news? Well, I'll put it this way: stupid, pointless, and vacant. Typical for a bunch of get-a-lifes who can't seam to jerk themselves away from the keyboard.



The Observation Compartment and Control Room interiors -- what you will see when you peep through those four big clear windows at the bow. The Chinese did some simply amazing things here. We have Fred Barr to thank for the accuracy of this area of the model kit -- the engineering of these parts captures the documents Fred first published in his fan magazine, Seaview Soundings, many moons ago.



The eight-foot and seventeen-foot effects miniatures differed in how their window frames looked -- the smaller miniatures had a slightly raised frame around the window seams. The big miniature did not. Moebius gives us a choice!

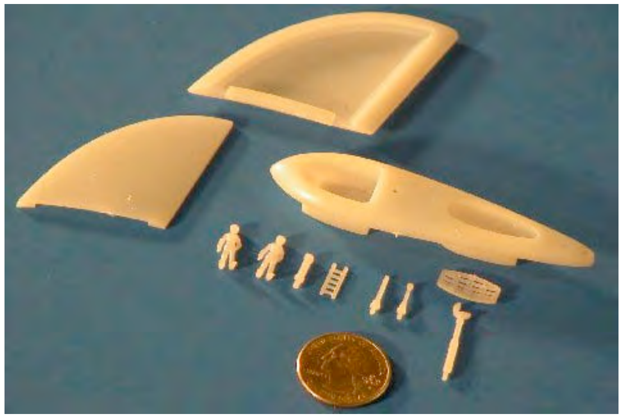


Attaching to the bottom of the control room deck sits the roof piece of the FLYINGSUBMARINE (FS-1) hangar bay. Though this wealth of detail never existed on the actual seventeen-foot miniature, it was suggested by some translucent back-lit semi-opaque bulkheads and masks. If I were to engineer this space, I would have been proud to have come up with the above arrangement. More of Fred Barr's work I think.

The kit comes with three of the exploratory craft that rode along with the SEAVIEW on its mission of national security and run-ins with spooks, werewolves, UN submarines, depth-charge dropping drones, aliens, banana-republics, pissed off Japanese, and mad-scientists:

The FLYING SUBMARINE, the two-man mini-submarine, and a tethered bathysphere are pictured above.

The FS-1 is a jewel in itself. Very well detailed and showing of a very faithful use of the studio drawings and production stills from the TV show. Superb!



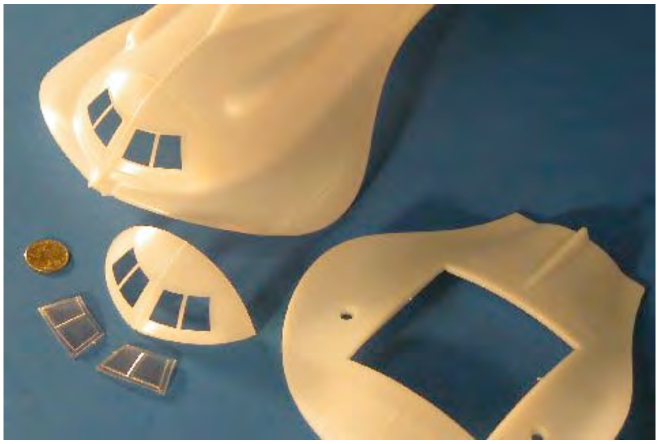
The two sides of the sail structure are a bit sparse on detailing, but it has all the essentials: the two doors each side of the sail. The top piece to the sail with the openings and foundations for the scopes and antennas has it pretty much right. And the bridge well within the upper sail piece is just fine. I have no complaints.

What I miss on the sides of the sail are the engraved lines that denote the 'plating' so evident on the studio drawings and the eight-foot and smaller miniatures. But, that's an aesthetic call; just something I would have liked to see on the kit. (An hour or two with a Machinists surface gauge, right-triangle, a flat surface and a sharp scribe will put that right).

The fairwater planes are too fat for my liking. anyway, I'll have to make a new set for the fittings package as I want this set of control surfaces to be practical on my r/c version of the SEAVIEW.

The little mini-sub and bathysphere. Rick Teskey was the source of studio plans for the mini-sub, I'm sure of that. Not sure who the source was for the bathysphere. Rick again? Or was it Gary Kerr.

Gary was a very big player in the researching end of this project -- the guy is smart, an expert draftsman, excellent at photographic interpreter, a relentless fact finder ... but he also dresses funny and votes Democratic. Oh, and I don't think I'm out of line here: Gary is right now well underway assisting the Moebius team with documentation in support of other SF model kit projects in the works -- kits that will be of great interest to we 'baby-boomers'. Stand-by!



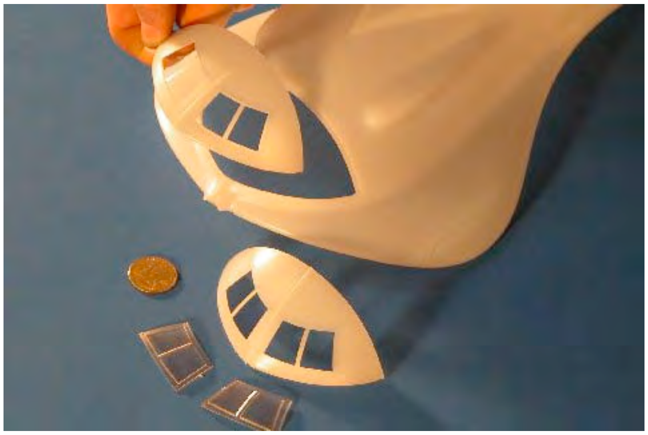
There's little I can criticize about how Moebius engineered the part break-down of this kit. Rational, easy, and very smart. The alternative window frame styles offered here is a real touch of class. Also, the clear parts are crystal clear, flanged so as to eliminate glue smearing from all but the most incompetent of kit-assemblers out there (you know who you are!).

This kit is an easy build! ...

... Hell, Rose can build the damn thing, it's that easy to stick together.

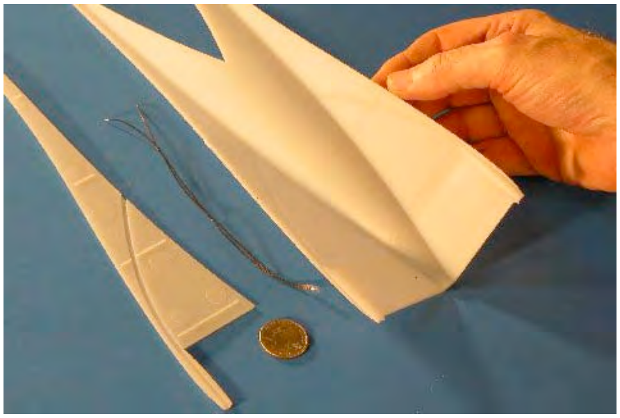
In the course of this photo-shoot I stepped back into the shop after a quick piss-break, only to find Rose hard at work in a corner snipping SEAVIEW parts into a bag, preparing them for gluing... stopped her just in time!

"Patience, kid. Patience! Get back to work on those ant mandibles!"

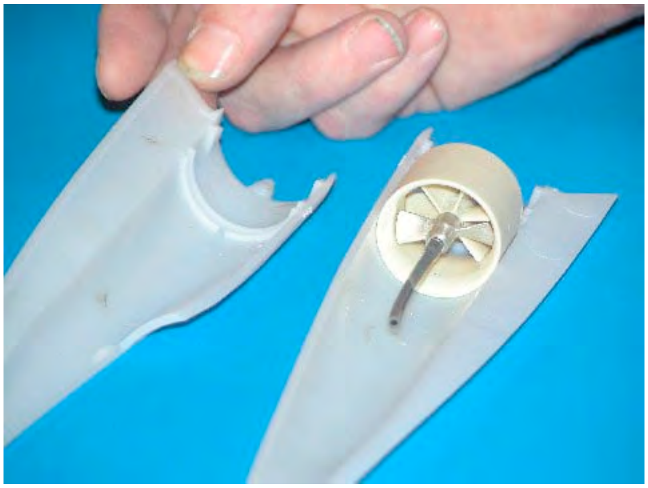


The fit of the window insert piece into the bow is very tight -- how do they do that! And the gauge of the plastic is thick, I would say it's a nominal 3/32" throughout. Beefy! The sonar domes either side of the bow -- perfect. Again, keep in mind that prototype for this kit is the seventeen-foot effects miniature.

In the fittings kit I'll produce to help those wishing to convert this kit to r/c operation I'll provide separate bow plane control surfaces that will plug into spots opened up at the scribed lines you see at the tips of the 'manta fins' at the bow.



I'm told that David Metzner insisted on providing a channel within the huge vertical stabilizers at the stern. through these conduits will pass the wiring for those wishing to equip their model with practical stern lights.



Checking how my pump-jet duct fits within the kits propulsion tube. Perfect!

That chore out of the way I moved on to check how the propulsion tubes fit to the hull. In a word: outstanding!

And I like the fact that there is a solid partition, separating hull from propulsion tube where they join -- this will provide a bearing foundation for the drive shafts. Holes in the hull under the propulsion tubes will pass additional water mass into the intakes of the pump-jets (the source of that water the open mini-sub/bathysphere hatch). A flapper type check-valve in the stern will insure that backing water is ported to only the intake/exhaust louvers at the forward end of each propulsion tube.

Subject: Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-7

I've started assembly of the Moebius SEAVIEW kit. It's a straightforward process and there has been no major fit problems to report -- just making sure I knock down the few raised ejector pin artifacts that would otherwise get in the way of a tight fit between pieces. God, I would like to have something to bitch about, but not with this product. Damn! What's going on here?!

Anyway, here's the photo essay: I wanna show you something: The bow half at the left had been scrubbed with steel wool drenched with a soap and cleansing powder slurry, then rinsed off. The kit part to the right is right out of the box. I had just dunked both of these items in water and then sat them on a towel, just as you see here. Note how the water has beaded up into compact little droplets on the still oily right-hand item -- the surface tension of the water against the oily surface of the model part permitting discrete droplet formation. Not so on the well scrubbed piece on the left -- no oil on the surface there. Clean and scrubbed down to the polystyrene substrate, the part to the left is now highly receptive to a good bond between it and primer, paint glues, fillers and putties.

Moral of the story, boys and girls: Scrub off the dirt and oil from the surface of your kit parts before you apply adhesive, cohesive, primer, paint, filler, putty or decal! A clean surface is a good stick surface.

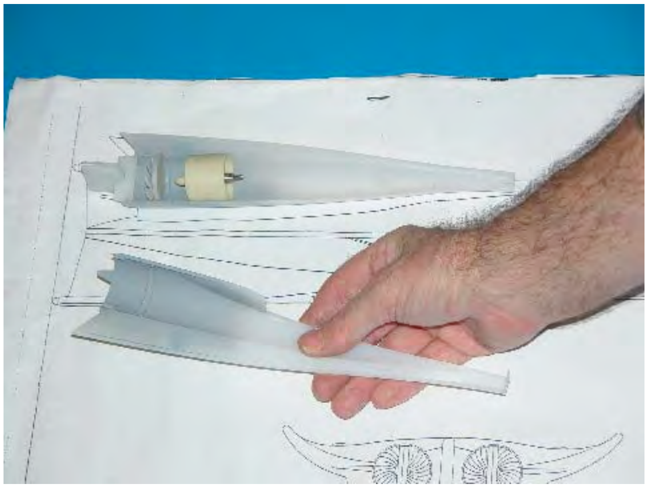
A scrubbing slurry of liquid dish-soap, scouring powder, mixed with just a little water to the consistency of warm syrup is what you want. The abrasive slurry is ground into the work with 0000 steel wool or stiff brushes. The abrasive action of the slurry (and the small metallic fibers of steel wool) quickly cuts the bond between grease, oil, and dirt on the model parts surface, making the crud easy to rinse off with fresh water.

Using a hunk of slurry saturated 0000 steel wool to abrade the surface of a SEAVIEW hull piece. The process of cleaning goes like this: Dunk the piece in water; dunk a stiff brush or the steel wool pad into the slurry then rub it vigorously over the model part, using the brushes to get into crevices and high relief items; rinse the item in warm flowing fresh water until all soap and abrasive is gone; blow dry; hand-dry with a towel; then set aside for a few hours to thoroughly dry before priming or other work. From that moment on keep your hands recently scrubbed or handle the parts with gloves.

The smaller, high-relief detail items -- like this side-wall to the control room and observation compartment -- are scrubbed with a short-hair stiff brush. The thin walled, brittle items -- like the girders seen at the bottom of the picture -- are sat on a piece of board and scrubbed flat down on the board. This to prevent overstressing and breaking them through aggressive scrubbing. And ... you have to be aggressive with it; get all the grease and grime off or you may suffer a 'masking accident' later.

the Richard Knorowsky drawings, reduced to the 39" of the Moebius model, were used to help me work out the assembly order and to figure how I would access the internals. Here I'm checking how the pump-jets will fit in the propulsion tubes as well as establishing what I can, and can not use from the kit provided control surfaces.

Two closely spaced radial flanges within the stern of the propulsion tubes served as foundations for a bulkhead that in turn mounted a propeller. A nice looking piece of detailing for a static display version of the kit, but something that had to be ground away to make room for the pump-jet unit. Here I'm making the initial grind with a mototool swung sanding drum. Final removal of the material was done with a sandpaper wrapped metal dowel, and finally a soft sanding block (foam insulation material) that had been shaped at one end to the radius of the tube. The hand sanding started with #100 grit and worked down to #400.



I've highlighted the interior of the propulsion tube parts with primer so you can better make out the radial flanges and control surface foundations that have to be ground off. The portion of propulsion tube on the plan has installed both the kit supplied propeller and propeller bulkhead (nice looking, but impractical) and ahead of that one of my SEAVIEW pump-jet prototypes.

The majority of the abrasives used on this job is pictured here. Sheets of #100, 240, 400, and 600 grit wet-and-dry sandpaper was wrapped around blocks and folded over and glued to form stiff sanding squares of different grit. Sanding blocks, jeweler's file, riffler files, and double-cut flat files were used to dress up the edges of the kit parts before gluing sub-assemblies together.

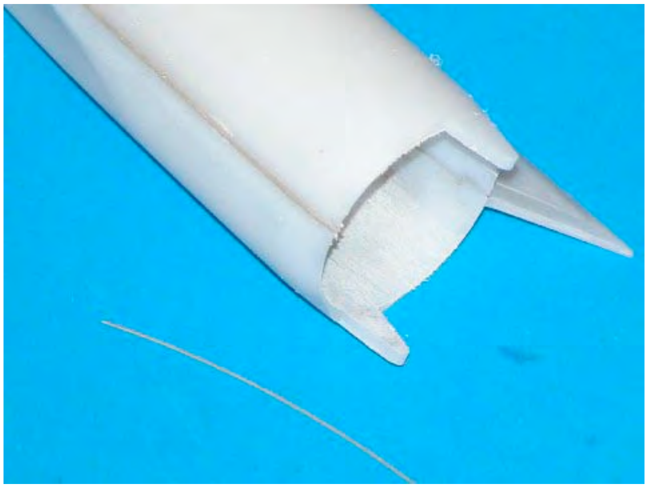
Note the use of commercially available sanding sticks of various grit -- very useful tools later, during the finishing operation. The local hobby shop or catalog are good resources for these items

Remember, your local hobby shop is good for only three things: Glue, magazines, and bad advice!

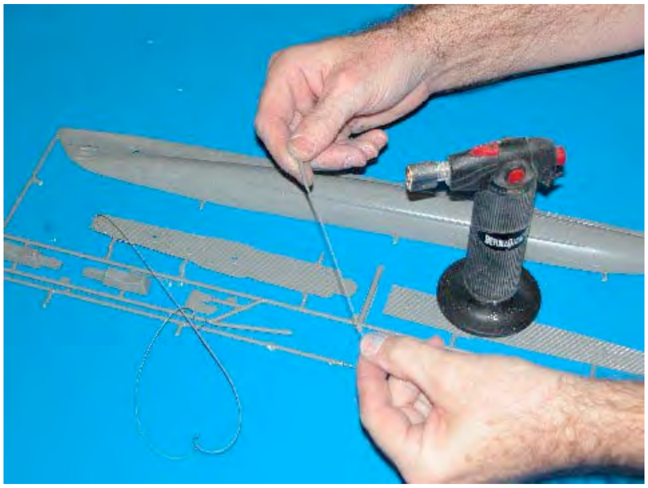
The adhesives and cohesive's used on this project. Cohesive's weld things together by reducing the plastic to a liquid at the joint interface line; the molecules of one piece mingles with the molecules of the adjacent piece forming a bridge, effectively eliminating the demarcation point between the two pieces, once the highly volatile solvents leave the mix, the mass resumes a solid state and the union is complete. Cohesion is a welding process. Examples of cohesive cement is the thin, brush applied formulas like those in the bottles, and thickened glues such as those in the squeeze tubes ('model airplane glue').

Adhesive work by introducing a third material between the two items being bonded. Examples of adhesives are cyanoacrylate (super-glue), silicon RTV sealant, white-glue, contact cement, epoxy, and animal glue.

As much as possible stick your plastic model kit together with cohesive type cements. A proper weld is much stronger than an adhesive bond.



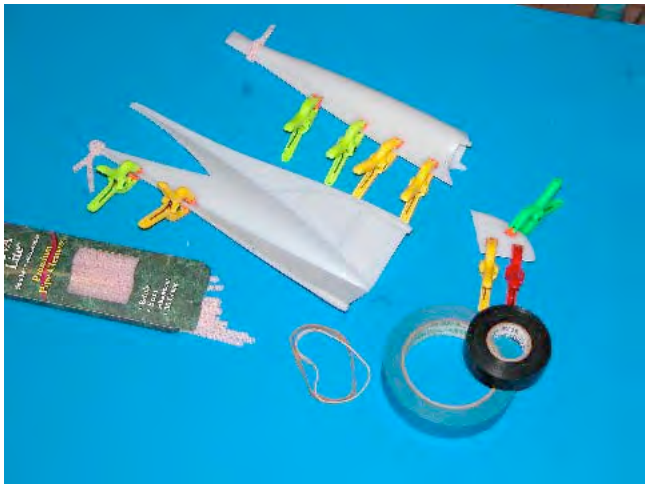
I had beveled the outside edges of the inboard joint lines of the propulsion tubes. I did this so I could lay in a length of polystyrene filler rod, AKA stretched sprue. The filler rod literally melts between the adjoining areas of plastic and mingles, fusing the materials between the gap. A proper fusion weld. In this case a chemically induced state change, not thermal.



The only real utility found for most plastic model kits is as a source of sprue from which 'stretched sprue' can be formed. I'm doing just that here with that awful Revell 1/178 LIONFISH POS kit.

Stretching sprue is a bit of a black-art, but it can be mastered: Heat a short length of sprue (I use a mini-torch) -- the plastic has to be of the thermoplastic class, which almost all model kits are today --till it sags under its own weight; wait a few seconds then gently pull it apart; as the material stretches it reduces radically in diameter. The rate at which you pull it and the length of material you heated dictates how long and how thin the material can be drawn.

All this nonsense so I could derive some welding rod for the Moebius SEAWOLF assembly job. The LIONFISH kit ... finally put to good use!



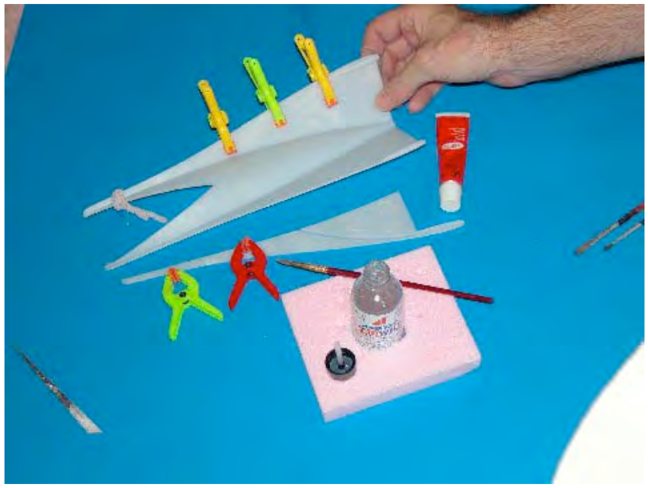
A few words about the means I use to hold the plastic model kits together after/as cohesive is applied would be instructive here:

We all remember our days of gluey fingers and spoiled finishes as we used only our hands to hold the parts as we smeared the glue on. Things are a bit more sophisticated now. Clamps, rubber bands, stiff and flexible masking tape, pipe-cleaners and the like can be pressed into service when you need to hold things together during assembly. Work out the means of clamping during your dry-fit trials as you insure unobstructed fit between kit parts.

Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-8

Gluing the sail and sail (fairwater) planes together. Later I'll use one of these as a master from which I'll make resin pieces that will be used to make discrete plane fairings and planes themselves. This work done, of course, with the kits owners permission.

The r/c SEAVIEW will need to pass a camera-transmitter coaxial cable and a ballast system low-pressure blower induction line from the hull up into the sail. Here I'm grinding away material from the sail foundation piece to make way for those items. I also need this opening to vent off the hull as it makes the transition from surfaced to submerged trim.



Solvent cements were used throughout the basic joining of parts. Nothing beats a proper weld! Clamps were shifted often during the first few hours after glue was applied. I used the tube glue for the broad contact areas between the vertical stabilizer pieces. The thin brushable cement was gopped on at the edges after assembly where capillary action drew the cohesive between tight fitting parts.

Gluing the left-right forward and after hull pieces together I held them tight with both clamps and electrician's tape. The elastic tape permitted me to apply a lot of clamping force. But care has to be taken not to leave the tape in one position for too long, else the liquefied plastic under it distort -you want to shift the location of the tape a few hours after the initial joining. After about four hours you take the tape off, it no longer being needed -- the weld is that far along that you don't have to worry about things springing apart.

Plenty of room in there for an Up-Periscope video camera system, practical bow planes, lights, an Observation Compartment, and torpedo tubes!

Note that I've stuck a length of polystyrene sheet under the seam at the top of the bow -- never hurts to re-enforce where you can.

Test fitting the lower hull piece -- another perfect interference fit. Wow!

I still have to make the bow plane operating shaft foundation pieces for the fitting kit, that's why I have not yet glued this piece permanently in place.

SEAVIEW, meet Up-Periscope WTC ... ... Up-Periscope WTC, meet SEAVIEW! Man! is there anything with this kit I can't do? Hey! Who's the geek in the awful T-shirt!?

After moving the camera-transmitter fore and aft within the bow I determined the best distance between lens and windows. About four-inches. Incidentally, that's just about where the transverse 'crash-doors' are located. So, If I chop off the Control Room section of the interior, make a crash-door piece with a pin-hole for the lens, I'll have an unmolested Observation Compartment separated from the Control Room by the crash-doors.

Now, this is the standard Up-Periscope camera-transmitter and battery WTC and is more bulky than need be for this application. I'll engineer a specific unit for the SEAVIEW that will have a simplified aft access cap and elimination of the bulky antenna fairing foundation -- I'll exit the coaxial cable (which runs to an antenna up in the sail) through a gland in the access end cap. The camera-transmitter WTC will be accessed in the finished model through the removable (magnet fasteners, Brian?) FS-1 hangar door piece.

"I see you! ... I'm crushing your head ... I'm crushing your head!".

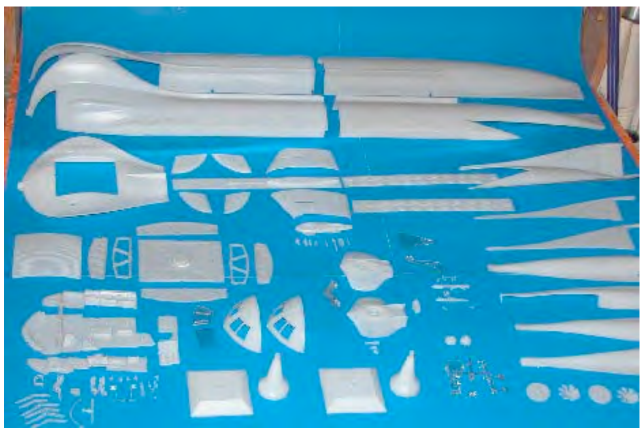
I'm wearing virtual goggles, I see what the camera sees.

A belt around my waste holds a poncho that contains a battery, video receiver, voltage regulator, and goggle controller. This makes me a mobile video/audio receiving station.

Subject: Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-9

Little work involving assembly of the test-shot kit parts has occurred since the last update. The time and effort between reports has been spent building masters of the things needed to convert the basic SEAVIEW kit to r/c operation. And that's the emphasis of this Report: showing off the different masters built (some modified kit parts), and why I built them.

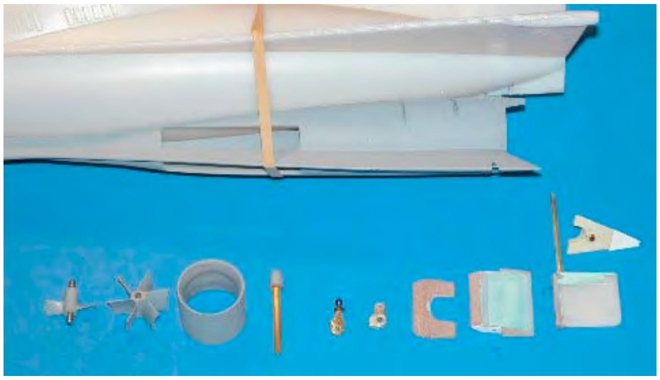
It was a 'what came first, the chicken or the egg' sort of deal: I had to keep the kit parts separate and un-glued till I made masters (some of which had to be cast to conform to specific geometries of specify areas of the model); first the masters had to be made, only after that could I continue with the assembly of the kit.



The majority of the Moebius SEAVIEW kit parts laid out. The fit between parts is tight and warp free. And the break-down of parts proved ideal for the later tasks of conversion to r/c. There's not one single damn thing wrong with this kit.

A review of how my pump-jet goes together as well as how a completed PJ unit fits in a still-to-be-assembled propulsion tube. Note that in this shot I've installed the raw kit rudder, stern planes, and impractical propeller and propeller foundation -- attractive, but not practical. I would later take one of the kit propulsion tube rudders and build upon it with Renshape and filler to enlarge and re-contour it into a practical rudder master. The kit stern planes had to go, eventually replaced by purpose built ones.

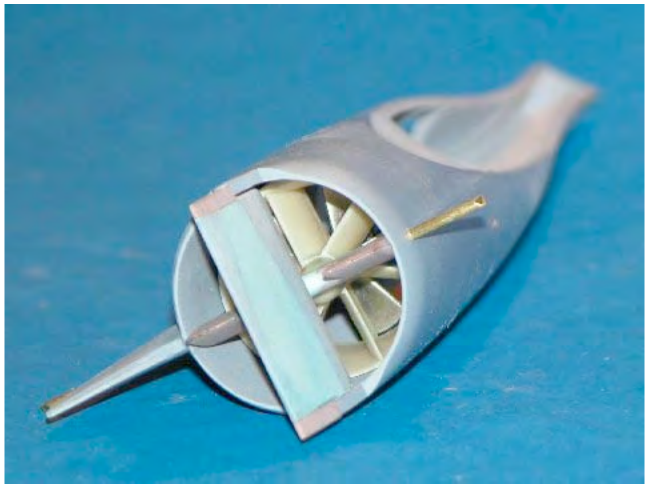
(Though a four-bladed rotor is shown here I've since completed evaluation of the 2, 3, 4, and 5-bladed rotors and found the most efficient unit to be the 2-blader, so that's what I'm going with on the production pump-jets).



Some of the masters built in support of the eventual SEAVIEW fittings package needed to convert this kit into a practical r/c submarine. The triangular master at the extreme right is the foundation and bearing tube for the skeg rudder operating shaft.

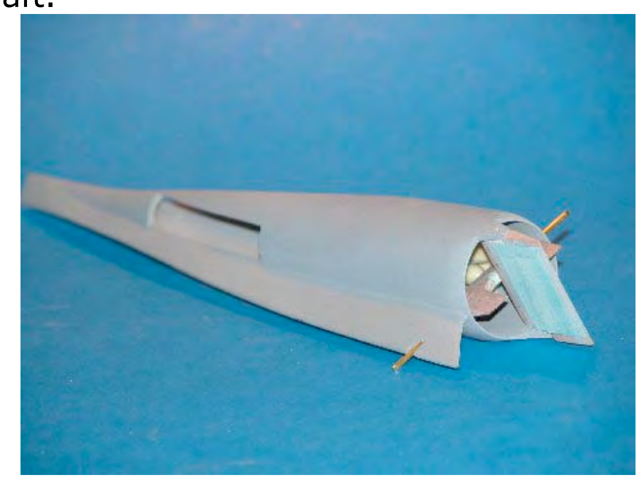
The central skeg rudder does not have a bearing at its bottom, so the single support bearing up high, within the hull, has to be massive enough to resist the sheering and bending forces presented when the model strikes bottom (and it will, with no doubt what-so-ever!).

The skeg rudder foundation master was formed by first waxing the interior of the lower hull at the stern, building up a little transverse damn of clay forward of where the leading edge of the skeg rudder would be, and pouring in some catalyzed Alumilite resin. Once the resin blank had cured hard it was popped out and worked with file and sanding tools. I then mounted a vertical tube into the master to form the skeg rudder operating shaft bearing bore. The 'U' shaped notch at the front of this master is to clear the stern plane operating shaft bell crank as it swings to the extreme 'dive' position ... things are tight back there in the stern of the SEAVIEW!



The port propulsion tube kit part was assembled and used as a fit article as I worked out the geometry and function of the rudder and stern plane masters. To make things easier to see in there this was the first kit part I sanded thoroughly and primed. Here I've test fit the stern planes and rudder masters behind one of the pre-production test pump-jets.

Note the brass rod projecting well past the inboard side of the propulsion tube. The rod passes through a hole in the stern planes and into a bore drilled through the span of the outboard horizontal stabilizer. At this time, for trial fit, I'm using a simple 1/16" piece of rod for the stern plane operating shaft. The production set of planes (port and starboard propulsion tubes) will mount to a common 1/16" square section operating shaft, that shaft passing through the two propulsion tubes as well as the skeg of the hull. It is within the tight confines of the hulls skeg that I'll make up a bell crank to the stern plane operating shaft.

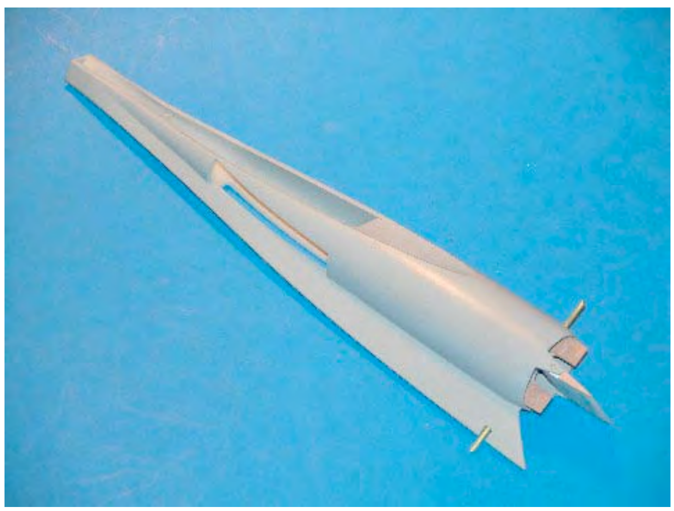


After securing permission from Moebius to do so I used the kit supplied rudder, sail planes, and removed portion of the hulls skeg, using these kit parts as the basses upon which I built intermediate and production masters.

Those of you even thinking of taking the work of someone else and turning it into a commercially viable item must first seek and secure the permission of the party who owns the rights to that property. And that includes copies made for your 'own use'! Failure to do this is THEFT!

Don't let me catch you ripping someone's product off! Either secure permission or scratch-build your own damn masters!

You can see better here how the stern plane operating shaft runs through the propulsion tube transversely. Note that I've cut a 'V' notch into the outboard tip of the horizontal stabilizer -- this needing to be done because of the narrowing in section of the stabilizer across its span from root to tip.
Later, after all assembly is done, and the control surfaces tested satisfactorily, will the notches in the stabilizers be filled and faired over -- you'll never have known they were there!



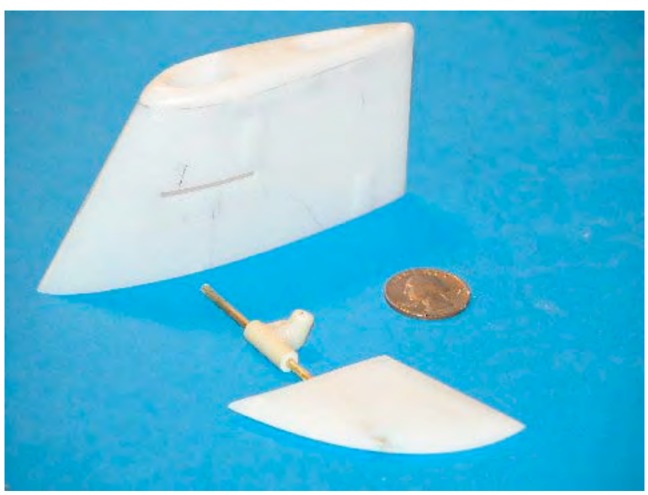
Note that I've moved the pivot point of the rudder o a bit on the molded-in-place rudder support bearings -- more in keeping with the workings of the real (effects miniature) boats. A 1/16" brass rod rudder pivot pin runs through the rudder and through holes in the rudder support bearings.

Eventually the two propulsion tube mounted rudders will be linked, with a single transverse rudder linkage arm, to the center skeg rudder attached to the extreme stern of the hull -- just like they did it on the eight-foot effects miniatures. Motion of the central skeg rudders causes the two outboard rudders to follow.

I scratch-built the master for the stern planes. Since I moved the center of rotation of the rudder aft about a quarter-inch that changed the swing radius of the enlarged rudders leading edge -- that meant a specific cut-out shape in the trailing edge of the stern planes was needed to clear the rudders leading edge as it moved back and forth. I also wanted more area to the stern planes, so my master was made a bit longer in cord than the kit supplied unit.

I've already opened up two large rectangular holes to admit water that will feed the intake of the pump-jet. This is the most significant scale departure from what the SEAVIEW should look like, but I needed to do this to insure I had adequate intake area to achieve some semblance of efficiency from the deeply buried pump-jet. also, having these large intakes in this spot will permit a reasonable amount of backing water to be directed forward when I command the model to go 'astern'.

Yes, I would have loved to have kept the molded in louvers, but they (even had I opened them up) could not, no mater what, pass enough water to feed the maw of the pump-jet adequately.



The Moebius kit sail plane parts need not be practical so the fixed fairing (which glues to the sail) and adjacent plane (the demarcation line between them represented by an engraved longitudinal line near the root of the assembly) are consolidated into one item.

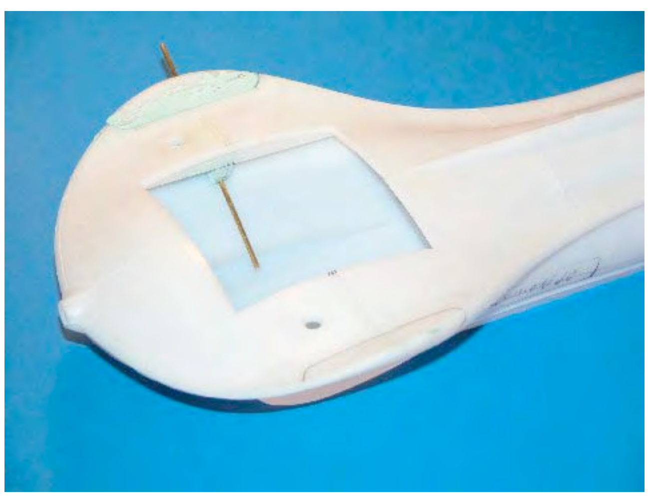
However, on the practical r/c version of this item, fairing and plane have to be independent of one another, connected only through the sail plane operating shaft.

The one modification I made to the kit sail plane (which was used as the foundation of a sail plane and fairing intermediate master) was to re-contour the outboard tip of the plane to a sharp point. The kit has it rounded off -- not in keeping with how the big effects miniature sail planes looked.

I've taken one of the Moebius SEAVIEW kit sail planes and used it as an intermediate master. From the tool I pull off of that I'll make two copies, split them at the engraved line that denotes sail fairing and plane proper.
These four castings (two fairings, two planes) become production masters which in turn will be used to produce the production tools.

The fairing section is eventually glued to the sail, and provides a flat, in the vertical plan, about which the movable plane section rotates. The fairings job is to make a streamlined transition from the sharply curved side of the sail to the flat faces of the outboard side of the fairing and root of the sail plane.

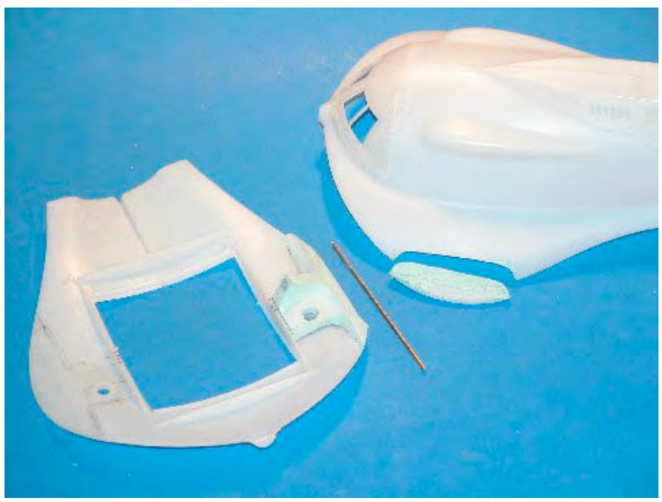
That bizarre looking item on the sail plane operating shaft is a master for the bell crank needed to interconnect the sail plane pushrod (leading from the after end of the SubDriver) to the sail plane operating shaft. The eventual cast resin sail plane bell crank will contain a magnet that will hook up to another magnet mounted at the forward end of the sail plane pushrod.



Nowhere more than at the bow has the SEAVIEW kit proved more receptive

to the special work I've had to do to make this thing work as an r/c model submarine. It's here where I've put the most work into forming the special conformal foundations needed to make the bow planes practical control surfaces. With the left and right halves of the bow welded together there remains a separate bottom piece that features, in its center, the rectangular opening that gives access to the FS hangar within the SEAVIEW. It is through the still removable lower pow piece (and later the accessible FS hangar access hatch) that I get unencumbered access to, first, form the bow plane operating shaft foundations and later to access the space within to make up, adjust, and maintain the bow plane linkages.

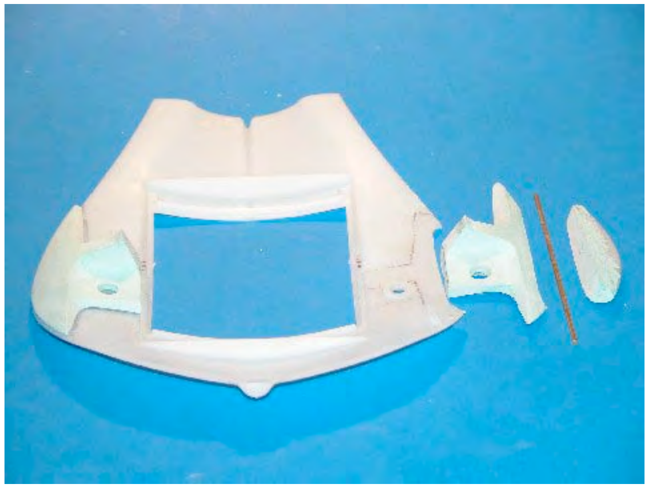
Here you see the inverted SEAVIEW hull after I have built up the port bow plane operating shaft foundation. At this stage I'm test fitting the bow plane operating shaft to the bow plane master. You can see the inboard end of a brass rod, standing in for the eventual bow plane operating shaft -- note how it runs through the bearing formed by the transverse section of bow plane operating shaft foundation.



A number of years ago I converted to r/c one of the old DeBoer Hulls 1/96 scale SEAVIEW kits. I found that using only the stern planes to manage pitch control to be marginal, at best. Back then I resolved, if and when I ever made another r/c model of the SEAVIEW, to incorporate the bow planes in concert with the stern planes to keep and change the boats 'bubble'.

Traditionally bow planes or sail planes are used to push the submarine up or down in the water column as in most designs those control surfaces are reasonably close to the boats center of rotation and contribute little if any appreciable pitching force. Not so, the SEAVIEW: these planes are so far forward as to have the moment arm to act on the boats angular displacement more than to induce a upward or downward force to the vessel proper. The plan is to directly couple the bow planes on the same pushrod system that actuates the stern planes.

Depth control will be handled by the sail planes, worded on a separate channel of the r/c system.



A lot of work had to be done to make the Moebius SEAVIEW kits bow planes a practical item: first I had to make internal foundations through which would be supported individual bow plane operating shafts, then work out a tight fit between the fixed portion of 'manta fin' and the movable bow planes that nests at its tips. Sounds simple enough on paper, but in practice it was a real bear as the two operating shafts are not in line with one another -- this means that the eventual linkage to the planes will involve two separate, but working in unison, pushrods. The good news is that I was able to keep the bell cranks far enough outboard so as to permit inclusion of the full Control Room interior.

The foundations were built up of Evercoat Rage, a two-part, polyester based, heavily filled, automotive filler, available from Caswellplating.com. Creation of the blanks went like this: First, I coated the inside surfaces of the upper and lower bow sections of the hull with wax. I quickly mixed up some filler and slathered it into the tip area of the lower hull piece (building up only one blank at a time, this stuff cures hard very, very quickly). And quickly assembling the two hull pieces, mashing the still pasty filler within, forcing it to conform to the varied compound curves unique to that area of the SEAVIEW. This process repeated until I had a mass of cured filler that completely filled the space at the tip of the manta fin. The process was repeated for the other side.

The two filler derived bow plane operating shaft foundation blanks were then worked on the band saw, mill, and with moto-tools till I had removed the excess material. To index each master perfectly with its location in the hull I extended the mass around a lamp flange. There simply no way, when inserting a foundation within the hull you can get it to fit any way but the right way!

The two foundation pieces would do three things for me: Provide a bearing bore through which the upward angled bow plane operating shaft would rotate. the tip of the foundation piece would be removed to form the core of the assembled bow plane master (once it had been sawed away from the hull proper). And the outboard face of the foundation piece would form the solid flange against which the root of the bow plane rests.

The Seaview Cabal Report #10

The r/c SEAVIEW ain't go'n nowhere without a spinnie thingie in the back to push it along. So goes the theory.

I developed a pump-jet -- two required for the model, one in each propulsion tube -- specifically for the Moebius SEAVIEW. The diameter of the rotor within the pump-jet was driven by one known fact: the surprisingly powerful little Graupnner 280 can motor. That motor in turn selected because its slightly less than 1" diameter would just fit, side-by-side with another motor, within a 2" WTC. That drove the inside diameter of the pump-jet duct. In turn the outside diameter of the duct was driven by the inside diameter of the kits propulsion tube. The resulting wall thickness of the duct was contoured into a venturi tube with the rotor swinging in the plane of the ducts throat.

Funny how things work out for you sometimes.

The German's gave us a pretty good tried-and-true rule-of-thumb means of selecting the motor to swing a particular propeller/rotor diameter (assuming a pitch/diameter ratio of 1). It's simply this: select a brushed motor diameter equal or a bit bigger than the propeller diameter. Yes, this sounds dumber than shit ... but, it works. And it will work for you too if you minimize friction losses in the running gear (the drive train, gears, bearings, couplers and shafts).

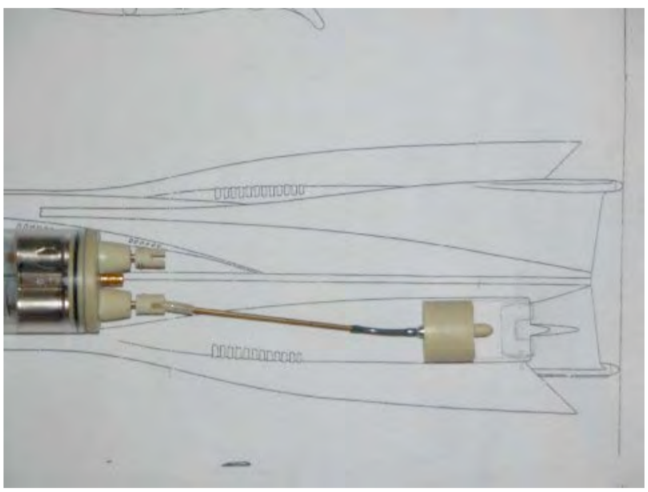
The pump-jet I developed for the Moebius SEAVIEW kit began with information supplied by Frank Winspur, the President of Moebius Models. He kindly responded to my request of information regarding the actual inside diameter of the kits propulsion tubes and hull -- two numbers I needed to get started on pump-jet and Sub-Driver work.

The work above is the evaluation pump-jet tooling and some cast resin parts produced from the tools needed for testing. Specifically, the search to find the most efficient rotor to install; a rotor that moves the most about of water, drawing the lest amount of current from a little 280, direct drive, brushed, electric motor (the largest motor I could use if I was to get two of them, side-by-side, into a 2" outside diameter, 1/16" wall thick Lexan tube).

A feature of the eventual production version of the SEAVIEW pump-jet (two required, one in each propulsion tube, just ahead of the internal stern planes) is the ability to easily disconnect and remove the shaft, rotor, and bearings for service or adjustment -- while the duct and stator unit remains in the propulsion tube. At this time I'm trying out a mounting system that will also permit, if it works, removal of the entire pump-jet unit from the propulsion tube.

Though most of the engineering for the fittings kit is done, there still remains fine tuning of such things as attachment and adjustment strategies.

These are two pre-production pump-jet units. The production castings will incorporate both the duct and the stator as one piece. Also, I've finished rotor evaluation and have settled on the 2-blade rotor as the most efficient for the motor selected (one motor for each pump-jet unit).



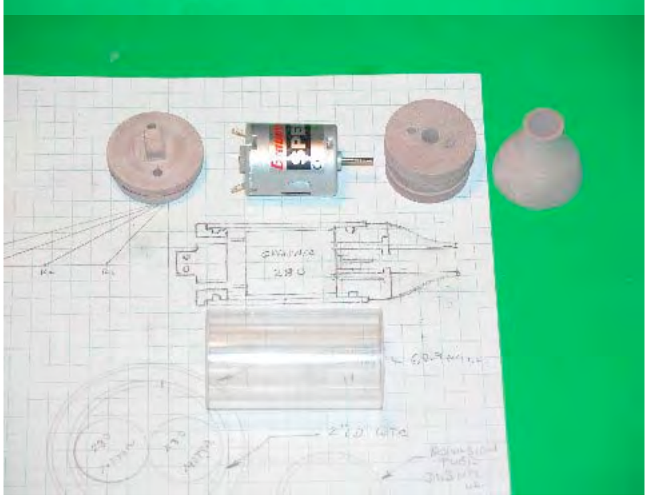
I've already tested 1/8" hose (the same stuff I use in my gas ballast system) as a universal coupler between rigid shaft element and rotor and motor adapter shaft -- works fine on the pump-jet test unit, should not be a problem as applied to that actual installation, seen here mocked up over the Knorowsky drawing. Not too sharp an angular displacement between SubDriver and pump-jet shafts and the intermediate drive shaft. Should work OK without too much mechanical loose between motor (direct drive) and rotor. We'll see.

So far things have gone so well with this project that I fully expect a thorough trick-screwing real soon ... something horrible is going to rear its ugly head, I know it!

I've already performed an empirical study to determine which of the four types of rotors I made (2, 3, 4, and 5-blade) gave the most efficient thrust for a given motor and voltage. I built this test unit -- comprising an identical motor to the ones I'll use on the SEAVIEW SubDriver; a preproduction evaluation pump-jet housing; which is mounted through three brass struts to the motor WTC -- to find which rotor was best for the task.

Testing protocol is just plain stupid: at a given voltage (7.2 volts) I measure current flow as I hold the test unit under water and feel how hard it pushes against my hand. Oh, during these test I felt near zero torque -- the stator is doing its job.

In the above photo you see the completed test unit along with the tools, jigs, and parts I developed to make it.
(I'll mature this arrangement into four identical units, which will be used to propel the little 18" FLYING SUBMARINE model Teskey has been promising to kit, like ... forever! Get to it, Rick, before some big-bad-injection kit outfit beats you to the punch!).



The test unit masters mocked up to test for fit and practicality for the task at hand. Note that I'm using a length of stiff 1/8" hose to act as a drive shaft extension/universal joint between the motor adapter shaft and pump-jet rotor shaft.

The masters I produced for the test unit end-caps were turned from Renshape. This nearly perfect model/Pattern Maker's medium will soon be marketed by Caswelplating.com. This stuff currently is available only in quantities so large as to make the purchase price unreasonable to all but the most aggressive of 'hobbyists'. Caswell will be selling small quantities of the two densities of Renshape I recommend. Look for its availability at his site soon. Use this medium once and you're hooked for life!

"The Russian's don't take a dump without a plan, son!". Neither do I. Test unit masters, motor and short length of acrylic tube over the working drawings I threw together one morning over coffee with Ellie.

A look at the test unit masters and how they go together. The after bulkhead comprises two pieces: the bulkhead that fits the tube makes fast to the motor through two mounting screws, the heads of those screws fit in cavities within the face of the hogner stem fairing piece that butt fits over it. An extension shaft fits to the motor shaft and extends out to the interconnecting rubber hose, that in turn makes up to the front end of the pump-jet rotor. To the extreme right is one of my 1/8" shaft seals. The seal body is RTV'ed into an opening bored into the after end of the hogner stem.

A close-up of the four pump-jets I tested. Note the blade count of each rotor. The hole in the side of each duct (near the leading edge) gives access so I can slip an allen wrench in there to tighten/loosen the rotor retaining set-screw.

Wheeeeeeeeeeee!!

Felt like ten, maybe fifteen ounces of push (thrust). Most thrust was found with the 3-blade rotor, but the current was high. A tad bit less thrust, but significantly less current drain, was achieved with the 2-bladed rotor. The 4 and 5-blade rotors had low thrust and high current draw -- these would be fine with a motor possessing more ass, maybe a speed 400?

Sorry, Andy. Your 3-blader was close, but lost out to the 2-blader.

Working up a fittings kit for the upcoming Moebius SEAVIEW kit, Part-11

I measured the width between the two longitudinal superstructure/deck and hull break lines on the Moebius SEAVIEW kit. And surprise, surprise, I found the distance to be just a tad over 2" -- if I made the access break there I would be able to squeeze in my 2" SubDriver! Excellent! I would be able to make the same access break into this Moebius SEAVIEW kit that the effect miniatures makers did with the larger of the many SEAVIEW miniatures they built for the movie and TV show. Form follows function.

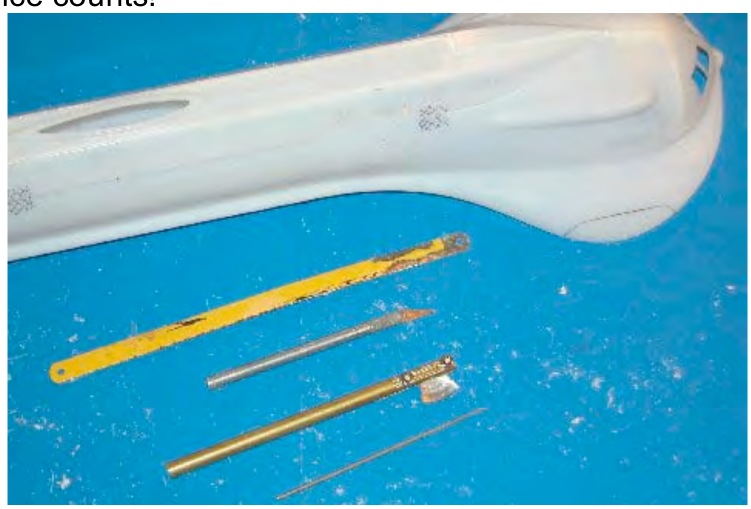
Great, so far. Then icing for the cake: The stern of the superstructure was designed to crutch into the V-slot formed in the integrated vertical stabilizer (Cadillac fins)/upper after hull piece -- this would allow plenty of bonding area for me to glue the removed superstructure to the entire vertical stabilizer/stern hull piece. I have yet to experience a design issue with how the kit is manufactured and broken down that presented anything resembling a problem ... it's like Moebius (and there's a lot of Polar Light in there too) design guys had me in mind when they worked out the parts break-down.

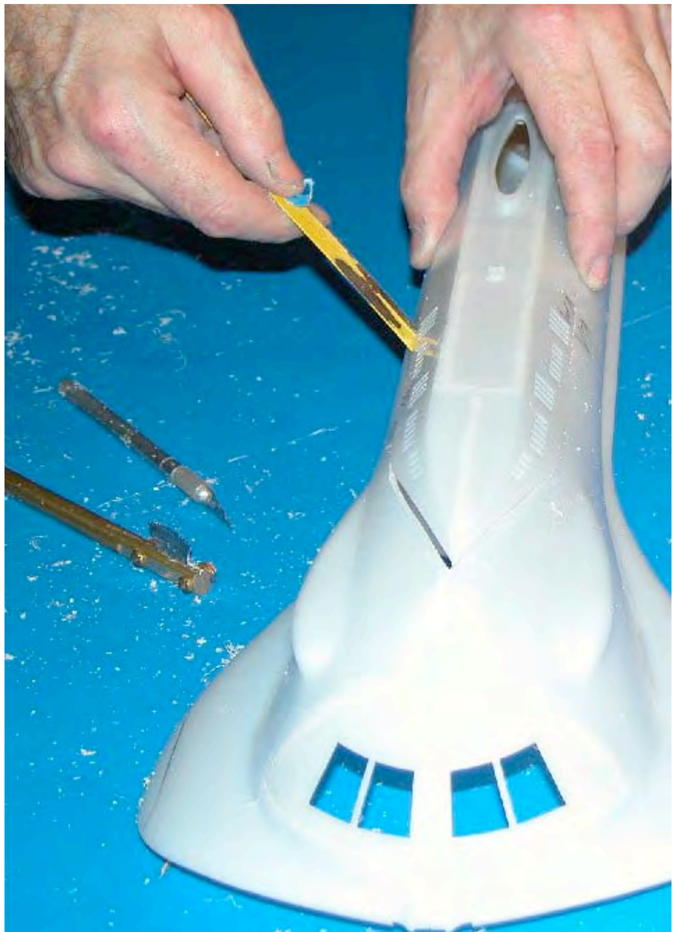
This installment addresses the most difficult aspect of the SEAVIEW kit conversion from static display piece to practical, fully capable r/c model submarine AND while doing so, retaining it's display appeal.

Before cutting the superstructure (in some circles called the 'missile deck') away from the hull I wanted to strengthen it further by bonding the two deck pieces atop it. The forward deck piece has a raised foundation that accepts the sail. The after deck section (two choices provided in the kit, one for the 18 tube version, one for the 20 tube version) has the raised Polaris missile muzzle hatches. I wanted to represent the big 17' effects miniature with this build, so took care to separate that and to make sure I put it on in the right direction. As it turned out, I got the missile tube muzzle hatches pointing in the right direction ... but, somewhere between this shot and assembly, I grabbed the 18 tube deck and glued it in place.

Shown here is the smallest of the three SubDriver's I built for evaluation as the means of control, propulsion, and ballasting for this model. The only difference between them is the size of the ballast tank. The SEAVIEW has a very, very high freeboard (distance between deck and waterline in surface trim), and that demands a lot of reserve buoyancy, and that means a large floodable volume in the ballast tank -- I'll find which of the three SubDriver's can be used to give me a high, yet reasonable freeboard when the model is in surface trim.

The lighter I can make the above waterline structure of the submarine, the less ballast tank I need for a given waterline location. Here I'm cutting out the plastic under-deck from the superstructure, leaving only a horizontal flange -- enough area to get a good glue weld between the superstructure and two deck pieces. I lost an ounce of ugly superstructure weight this way. I know it doesn't sound like much, but every ounce counts!





The four tools I used to separate the superstructure from the hull. I engraved, cut, and sawed the two sections away. At the top is a modified 24-tooth hacksaw blade. Its faces ground to eliminate the 'wave' pattern that's there to keep the tool from jamming in the cut. That wave also produces a wide kerf to the cut, something I wanted to minimize: it's important to keep to a minimum the amount of plastic lost as I cut away the superstructure.

The X-Acto blade was used to make the finishing cuts at the front end of the superstructure, where the side breaks join in a pointed V. It was at the bow section where the saws could not negotiate the tight radius curves. The initial cuts at the forward end of the superstructure break were done with the scribing tool, and finished off with the X-Acto knife.

A submarine, to be statically stable -- that is to say, has the ability to right itself and adopt a desired attitude in its fluid, when not in motion and not disturbed -- has to have its collective mass point very low in the hull, and its collective point of buoyancy high in the hull. Those two points of force -- one force line pushing up, the other force line pushing down -- should be as distanced vertically from one another as is practical. The more distanced the center of gravity is from the center of buoyancy, the longer the righting moment arms available and the greater the righting forces present when the vehicle departs from the desired attitude.

The greater the vertical distance between the c.g. and c.b., the more statically stable the vehicle is. Don't confuse static stability with dynamic stability (as applied to vehicles in motion through a fluid). They are two different things. I'm talking static stability here, and how to maximize it as best we can with the weights and physical configuration of the subject presented to us by Moebius Models.

Anyway ... since building up the three evaluation SubDriver's, Mike Caswell, of Caswell Inc. dug up these neat little Chinese vacuum/pump units of various sizes and forced them on me. Kicking and screaming he got me to try them.

I could not protest too much, as it turned out my conservative habits served us well regarding the use of the little air-compressor aboard the SEAVIEW SubDriver (SD): I had left some unused space within the after dry spaces within the evaluation SEAVIEW SD's. Just enough room to install not only the air pump-motor (http://caswellplating.com/models/ pumps.html), but room left over for a neat little electronic switch, the ES1 (http://caswellplating.com/models/bhm.html), to control the pump.

Even before the test shot of the Moebius SEAVIEW kit got here I went to work building up three evaluation units of the SubDriver. The SD is a removable unit that contains the control, propulsion, and variable ballast sub-systems needed to operate the model submarine. Not knowing how much reserve buoyancy would be needed by this model kit I varied the three SD's ballast tank lengths.

The idea to find which SD would lift the model high enough into the air to get as near a scale waterline as possible. Smaller the better -- I want to leave room up forward for the control room and observation compartment, and Flying-Submarine hangar, as well as space for an on-board real-time video camera-transmitter that will look out the four big windows at the bow.
Two days ago I finally had the opportunity to install and check out two of the candidate SubDrivers aboard the SEAVIEW. I didn't have to test the biggest of the three SD's. The middle one was declared the 'winner'!

The smaller sized SubDriver was tested in the water first. However, the amount of buoyant force its empty ballast tank produced was woefully inadequate to the task. In surface trim the model sat very low in the water. Oh, well. On to candidate #2, the middle sized SD.

Here you see the model sitting in near perfect surface trim with the medium sized ballast tank SubDriver. No need to go to the biggest SubDriver ... my search was over!

A slight up-angle to the hull seen here was corrected by shifting one of the fixed ballast weights forward a bit.
I've done the minimum amount of work to get the model looking 'presentable'. I haven't even come up with a proper superstructure hold-down system yet. That's why the rubber-bands around the hull -- there to hold things together during the SubDriver evaluation tests.

The boat was first set up in submerged trim, by the installation of the appropriate amounts and location of fixed ballast weight and buoyant foam and the SD's ballast tank flooded.

During this phase of the trimming operation, the r/c system was off and the vent valve atop the ballast tank left open, insuring the tank would be completely flooded with water. Lead and foam was adjusted till the boat was in a near neutral state of buoyancy in the water, and stabilized on an 'even keel'.

Once the boat was in proper submerged trim, I dragged it back into the shop, turned on the r/c system, put the submarine back into the pool, and submerged and surfaced it a few times, employing both the gas and low pressure blower (LPB) sub-systems. The gas system having to be used whenever the sail was below the surface -- using the LPB when the sail is above the surface where the internal induction tube within can grab air for the blower to discharge into the ballast tank.

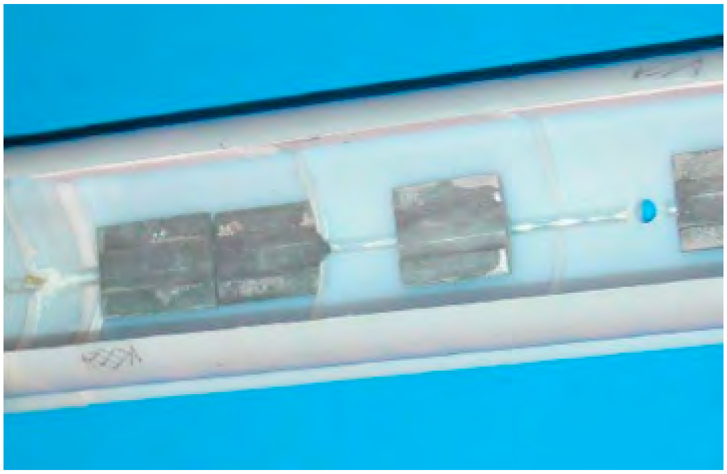
Well, before I could conduct the in-water buoyancy tests I had to outfit the SEAVIEW hull with lead weight low in the hull and compensating buoyant foam high in the hull. Here you see the first step in creation of custom lead weights -- weights that will conform to the geometry of the SEAVIEW hull near the keel.

What I did was to spray on some mold-release within the hull, build up some clay dams, and poured in catalyzed Alumilite casting resin. When cured, the resin plug was pulled out, trimmed, split into two lengths, and these masters used to make a rubber tool suitable for casting molten lead into SEAVIEW specific lead weights.

To the left is a scale drawing I made of the kits hull in cross-section. Needed this to picture how the proposed lead weights would sit in the hull, and what, if any, interference they would present to installation of the SD. This diagram was also used to work out the ideal shape and location of the buoyant that would occupy some of the annular space between the inside of the hull and outside of the SD. The foam is needed to raise the vessels collective point of buoyancy.

The slightly off-center concentric circles of the drawing represent the hull and the SD -- the SD sits below centerline in the submarine. This done to keep the entire ballast tank below the surface waterline of the submarine -- portions of the ballast tank above the surface don't displace water and represent wasted structure.

To the right is a BJB, TC-5040 rubber tool formed over the two resin plugs/ masters/patterns I pulled from the hull. rough and finished cast lead weights below. Only took a few hours to make the custom fitting lead weights, from plugs to installed weights.



Here we see the custom cast (and machined) fixed lead weights installed within the SEAVIEW hull. It was necessary to mill out a shallow channel at the top of the weights -- this to give clearance to the bottom of the installed SD.

In the top of the picture, just under the Velcro securing straps, you can make out the 1/16" rod brass pin fixed into the keel. This fits a hole in the bottom of the SD (the ballast tank section), and acts to 'index' the SD with the hull -- one secured onto the pin, the SD can not shift in roll or longitudinally within the hull. All that is needed to hold the SD in place are the Velcro straps. Neat!

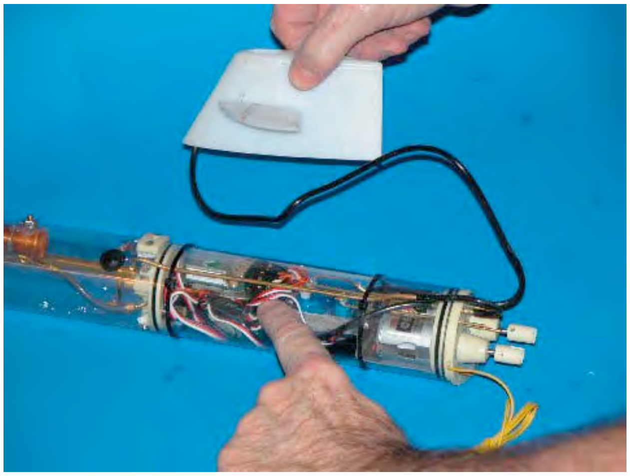
You can appreciate here why I went to all the work to make glove-fit lead weights: Even un-glued, the weights will stay in place, and will shift only longitudinally, and then only with an extreme pitch angle on the boat. Ideal for the initial trimming trials where I had to add/subtract and move weights around till I got the boat of proper weight and of proper weight distribution along the longitudinal axis. The molded in place frames worked for me, keeping the weights in place as well. Later, after SD final selection, and the boat trimmed properly in surfaced and submerged trim, the weights were removed, slathered with RTV adhesive, and bonded within the hull. The RTV bond can be parted with a little force should it be necessary latter to alter the amount and location of fixed ballast weight.

My SEAVIEW SD now features two modes of variable ballast water management system: the primary means of de-watering the ballast tank is with the LPB sub-system, and use of the gas sub-system only in emergencies -- when, for whatever reason, the model can not be maneuvered up to the surface high enough to get the LPB's induction hose intake (high, within the sail) into the atmosphere. The LPB is controlled through channel-5 of my WFLY r/c system (http://caswellplating.com/models/transmitter.html). The Driver controls the LPB through the two-position toggle switch on the right, upper location of the transmitter. A simple on-off switch. What can be easier?!

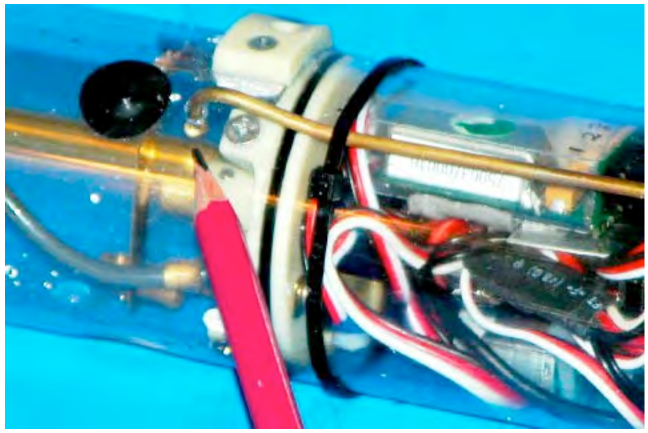
Production SEAVIEW SD's will not have the LPB variable ballast sub-system elements installed. However, space will be there should the customer elect to retro-fit his SD. And the motor bulkhead will be provided with blanked off hose nipples, ready for use should the customer add the LPB to the SEAVIEW SD system.

Here I'm demonstrating how the induction hose, within the sail is positioned in relation to the hull mounted SD. You see the induction hose leading from the sail, down into the motor bulkhead of the SD. It's at the wet side of the motor bulkhead where the internal LPB's intake and discharge hoses make up. A very easy to hook-up arrangement -- suggested to me by Mike Caswell. Credit where credit is due.

As long as I can broach the sail (easy to do, even with a full ballast tank, providing you have some way on), I can blow the ballast tank dry in less than 30 seconds using only the LPB.

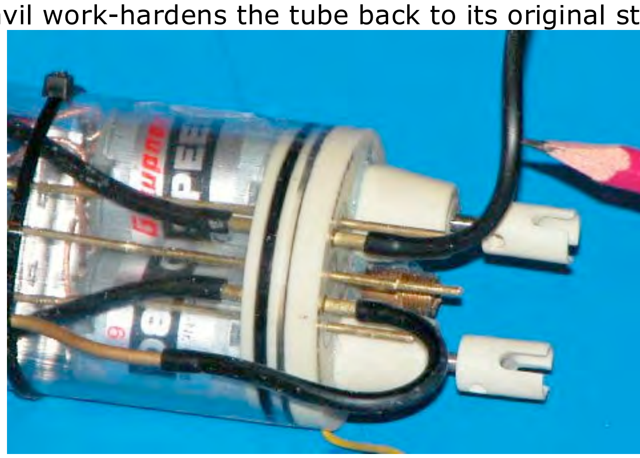


Here I'm pointing to the hard-pipe that routs LPB discharge air into the ballast tank. It's secured to the side of the SD with two tie-tie's, the forward end of the pipe has a right-angle bend and penetrates the ballast tank through a suitably sized hole. The after end of the pipe makes up to the motor bulkhead nipple through a short length of the black, flexible hose. When time comes to pull the motor bulkhead from the cylinder, all I have to do is disconnect the induction and discharge hoses from the bulkhead nipples. Takes but a moment.



Here I'm pointing out where the forward end of the discharge pipe penetrates the ballast tank. By placing the discharge pipe entry point high on the ballast tank I minimize the pressure head the LPB has to work against; the less the pressure differential, the quicker I can move air into the ballast tank. A little dab of RTV sealant around the pipe/cylinder interface point insures a watertight seal.

Oh ... before you bend cartridge alloy brass tube (most of the K&S brass is cartridge alloy) you have to anneal it first: take the tube to a red heat, let it cool slowly, and that will soften the metal enough so you can bend it without fracture or crimping. An acquired skill, I can assure you! After bending the tube, slight banging of the work on an anvil work-hardens the tube back to its original state.



I'm pointing to the 'induction' hose. The lower hose is the interface piece between the motor bulkhead and the standing length of brass pipe that forms the 'discharge' pipe leading to the forward located ballast tank.

You clearly see how brass tube 'nipples' are used as hard points through which the flexible hoses inside and outside the SD are interfaced. These nipples are permanently CA'ed in place.

To remove the motor bulkhead all I have to do is slip the two hoses off their respective nipples. Simple!

Subject: (no subject)
Date: Saturday, July 19, 2008 8:41 AM
From: DMeriman@aol.com
To: <mike@caswellplating.com>
Conversation: (no subject)

Working up a fittings kit for the Moebius SEAVIEW kit, Part-13

A Report to the Cabal:

Wow! ... stop the presses. The Moebius SEAVIEW kit is finally in town and the usual Internet fan-boys are all a-twitter about the quality of the kit parts and the horror of the instructions. Blah, blah, ... blah! You read one of these self-appointed experts posts and you've read them all -- it's like these idiots are all working from the same set of cum stained Cliff Notes.

So! The Moebius SEAVIEW kit is now out there and in the hands of all those who have been screaming for its release all these months. Now what?

Wanna bet how many of these boxes of well engineered, very well produced kit parts remain un-assembled, still in the box, shoved into a dusty, dark bedroom closet, soon forgotten by the same fan-boy who only recently posted of how he was going to outfit his Moebius SEAVIEW with lights, sound chips, after-market decals, and the power of life and death?

The almost orgasmic flurry of Internet chatter about the kits contents has come and gone. Keyboard-pounding get-a-life kit assemblers telling us how well the kit parts fit ... how they wished it was released in 1/144 scale ... their angst at finding the kits instructions too hard to understand by the typical public school educated burger-flipper forty-year-old who still lives in a room above the garage.

Glad that's over with! And now the WAIT.

When will the first article appear by someone who actually builds the kit and does it justice at the same time? Lot's of talk out there -- very little to show for it.

Most of the lamo's who bought a Moebius SEAVIEW kit won't finish it -- they'll drop that project the instant the next new kit hits the street: they'll fall over each other trying to be the smartest guy in the thread talking up the positive and negative features of the NEW kit. Again.

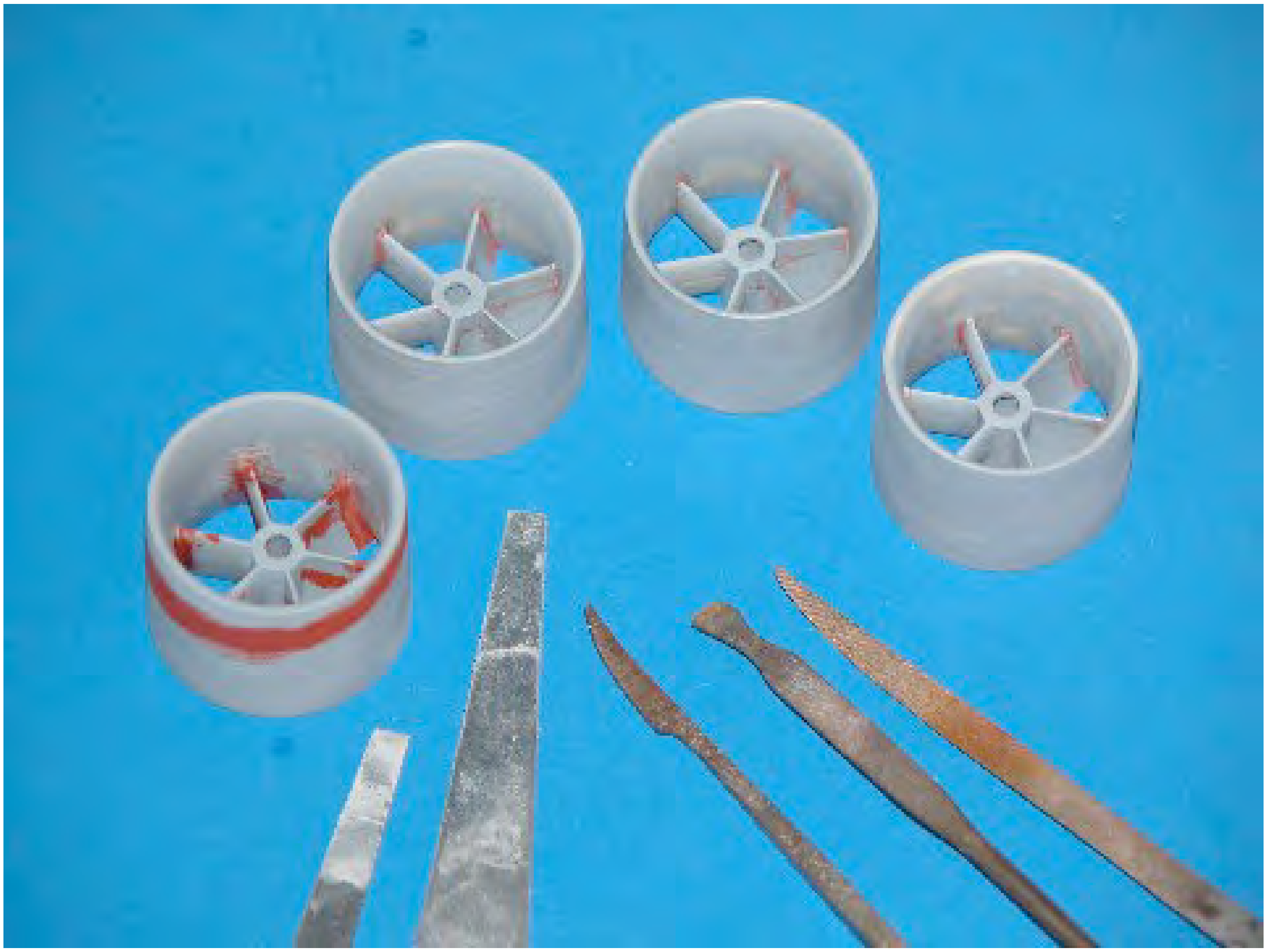
Kit assembleitus-interuptus

Morons.

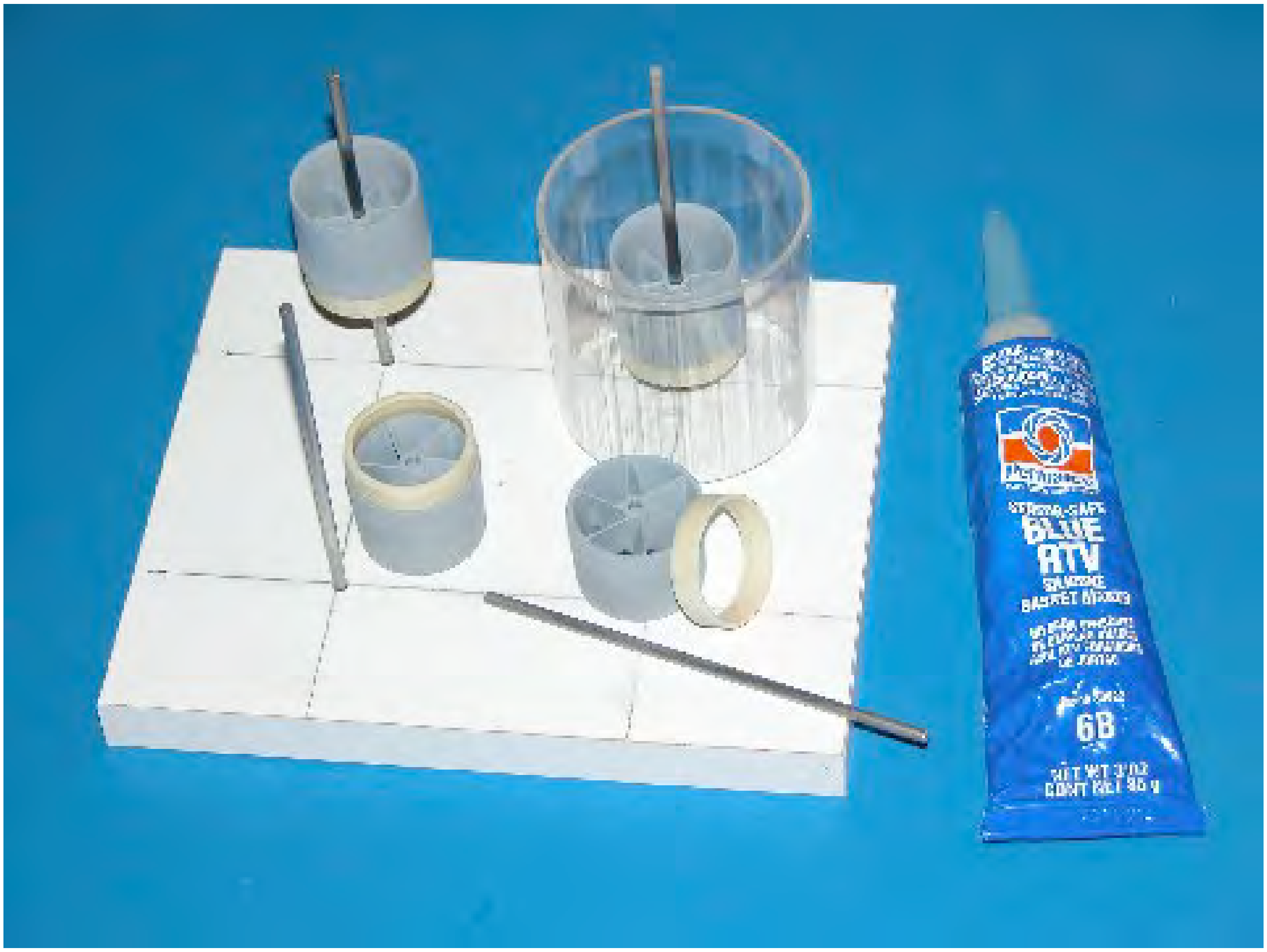
OK, Ass-Holes! Time to put up or shut up.

finish your SEAVIEW kit and post the pretty pictures on the same sites you vomit out your unsolicited, insipid opinions, rumors, and stupid witticisms; let's see some assembled and well painted SEAVIEWS out there. I double-dog dare ya!

And that's all the time I have to address the peanut-gallery today: I'm much too busy at the moment finishing the tooling for the Moebius SEAVIEW conversion kit and SubDriver products we're producing to outfit the SEAVIEW kit for r/c operation.



Final clean-up of the four production pump-jet duct-stator masters consisted of finding and filling any remaining gaps between stator assembly and duct with air-dry touch up putty (Nitro-Stan 9001) -- thinned with lacquer thinner and applied with a brush -- followed by a careful filing with custom shaped riffler files and modified Flexi-File sanding sticks. A final coat of primer to even things out, and these masters were ready to produce production tools.



The four production pump-jet masters being mounted, ready to receive the first half of the RTV rubber. Note the resin rings: these are 'bubble-catchers'. They serve as a plenum at the top of the mold cavity where back-fill resin resides and air-bubbles within the introduced resin can rise and escape. During resin part clean-up the resin bubble-catcher piece is cut off and discarded.

Note that a center rod is used to support the masters over the mold-board (this rod is the same diameter as the outside diameter of the eventual press-fit Oilite bearings in which the rotor shaft is held). This rod permits a two-piece tool to be created by simply pouring the first half of the tool to the half-way point up the master -- when that cures, the containment (dam) cylinder is slipped off, the master removed from the rubber, indexing pits cut into the face of the rubber, mold-release sprayed over the flange face and into the cavity of the rubber, the master re-installed, the containment cylinder slipped back on, and the second half of the rubber tool poured in place.

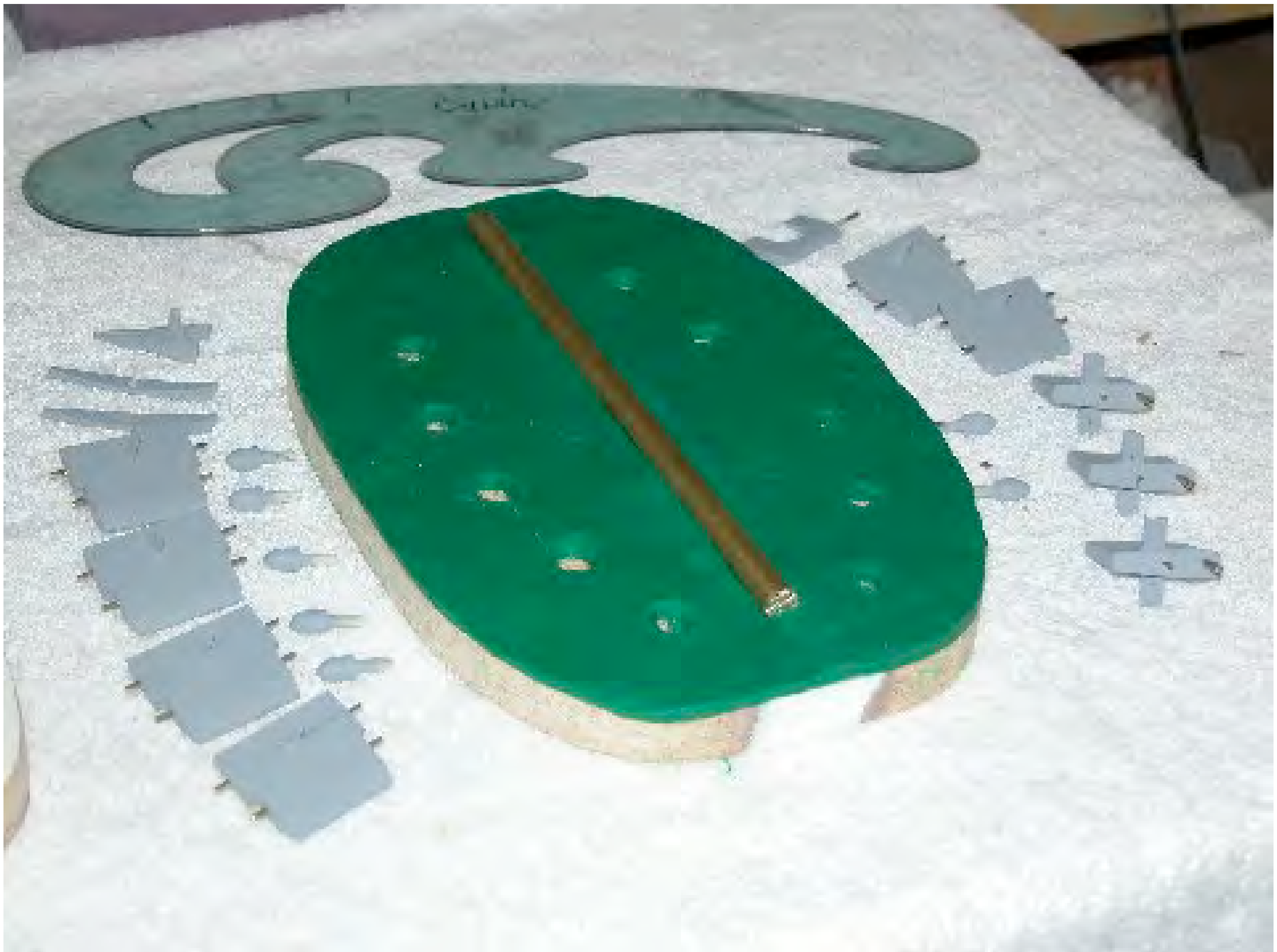
The bubble-catcher rings are tack-glued to the upper end of the pump-jet master -- the glue fails during master extraction from the formed tool, permitting separate removal of pump-jet master and its associated bubble-catcher. These items are put away in safe storage after tool making for future use.

Production masters test fit to custom cut mold-boards -- investigating the best possible arrangement that would insure minimal use of expensive tool making rubber, and most efficient means of getting resin into the cavities while at the same time, getting displaced air out of the cavities.

More 'art' than science here. Decades of tool making has taught me how to get it right the first time!

Backing clay is used to impress half of the master, shielding it from total encapsulation within the eventual RTV rubber tool (slit molds are an exemption -- in that tool the master is totally entombed in the rubber and a single slit is cut into the rubber to extract the master ... but that's another story).

Here I've rolled out some oil based clay and have placed the sheet of clay onto a mold board, nominal clay thickness for this work is about 1/4". I've already impressed into the clay a 3/8" solid brass rod to form the main sprue channel for this tool.



This particular clay covered mold board had holes drilled into it to provide clearance for the projecting stubs on the rudder masters -- those studs to form square channels in the tool that will, during the part casting operation, accept core pieces that in turn will provide rudder interconnect void.

I press the masters into the clay -- note that I've arrayed the masters on the table in the desired arrangement around the mold board. You have masters of the outboard rudder, skeg rudder, pump-jet shaft bullet fairing, sail plane fairing, and stern plane going into this particular tool.

I swear! ... I haven't touched a drop in 35 years!! Besides, I wasn't what you would call a 'happy' drunk. Camera playing tricks at 3 AM in the morning.

This is the completed mounting of masters in their backing clay. Note the central sprue and how the masters are arrayed around it -- the object is to provide the shortest, least convoluted path of resin from the sprue into the tool cavities.

Rose pushing clay up tight against the rotor masters set into this disc shaped mold board. This work is done with a custom shaped piece of wood, the idea is to push the clay around without moving or scaring the masters.

This particular tool will be used for spin-casting low temperature metal. The masters are set in concentric circles around the discs center (the axis of rotation). The rotors will be the heaviest items cast and to prevent vibration of the quickly spinning tool I took care to place the six rotor masters diametrically opposed about the diameter of the disc -- that was a hard and painful lesson to learn (ain't that right, Ellie?).

"Faster, damit! ... faster!!!!"

Once the clay has been pushed up tight against the masters, a water soaked stiff brush is used, employing a sharp stippling action, to even out the clay about the masters -- this produces a uniform and sharp edged demarcation between master and backing clay.

A better shot of rose stippling down the clay around the rotor masters on the spin-casting tools mold board. Once all the masters are in place, the indexing depressions pushed in, and the sprue channeling indicated, masking tape is wrapped around the mold board and the first half of the two part RTV rubber tool is poured.

Rose indicating in the clay, by light passes of this scratch-awl, the locations of the eventual sprue channels -- everything radiates from the center of a spin-casting disc type tool. This is how you teach a kid basic physics.

Mold boards, with mounted masters, ready for the first tool half pour. Above are some tools, ready for the second half pour. Each tool will produce parts for at least three Moebius SEAVIEW fittings kits -- items needed to convert the static display model kit into a practical r/c submarine.

3:30 AM. You're looking at about $300 worth of rubber here!

I got your child labor laws ... right here!

(insert whip cracking sound effect here).

Working up a fittings kit for the Moebius SEAVIEW kit, Part-14

The purple looking rubber, all used for resin casting tasks, is the PolyTek 71-20 RTV silicon rubber. The Blue stuff is the BJB Inc., TC-5050 high-temperature RTV silicon rubber used for low temperature metal casting.

The first half of a two-part RTV tool has been made, pulled off of the clay embedded masters, and ready to receiver the masters as that half if prepared to form the second half of the tool.

Preparing to pour the second half of the two-part disc type tool that will be used for spin-casting of the SEAVIEW fitting kit metal parts.

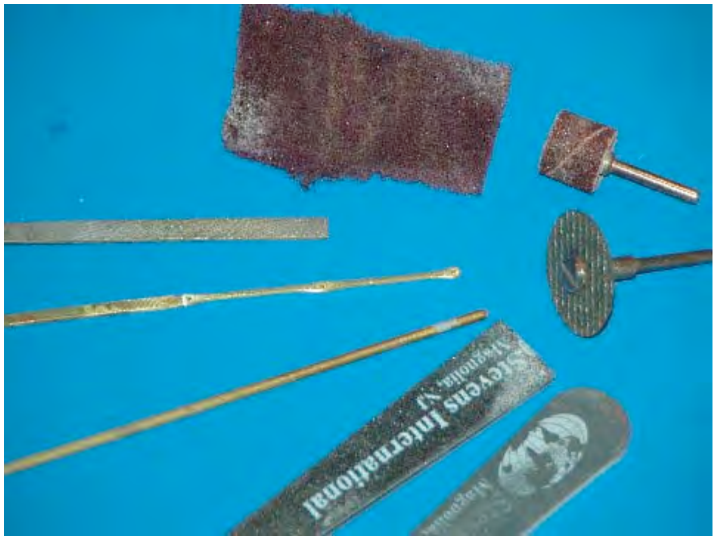
The completed disc type metal casting tool opened up to show off a freshly shot set of cast metal SEAVIEW fittings kit parts. In foreground are some of the same pieces cut away from their sprue runners. To the right, in foreground are some of the 4-40 RTV screw core insets used to form the set-screw threads into the three types of specialized bell cranks used aboard the r/c converted Moebius SEAVIEW kit.

I've streamlined metal and resin casting design to the point where in those parts that require a threaded bore (such as the bell crank set-screw cavities within these cast metal parts) the thread is captured during the casting process. What I do is insert 4-40 rubber core pieces within a cavity, and when the metal is introduced into the cavity and freezes, the core imparts a positive shape -- the desired threaded bore. Since the RTV rubber 4-40 core pieces are elastic, I don't even have to 'unscrew' them from the metal that surrounds them, I just pull, and the rubber elongates and the threaded core just pops out without complaint or damage. Neat!

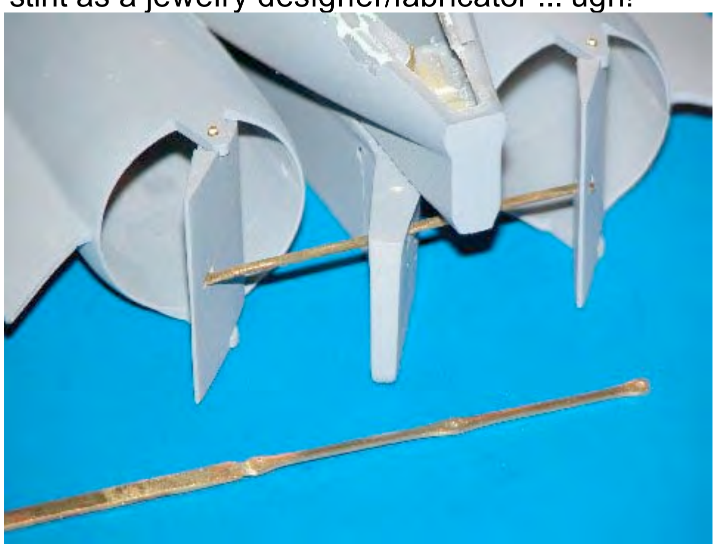
Production metal and resin castings, ready for clean up, sorting and bagging. Little goes to waste, the round sectioned resin sprue pieces will be later cut up and used as 1/8" and 3/16" shaft seal bodies.

The cast resin pump-jet duct-stator cast pieces are further worked on the lathe where the 'bubble catcher' ring piece is spun off. A little clean up to remove flash and the unit is ready to receive two press-fit Oilite rotor shaft bearings.

Ellie using the hand-press to set the Oilite bearings into the bore of the cast resin pump-jet duct-stator castings.

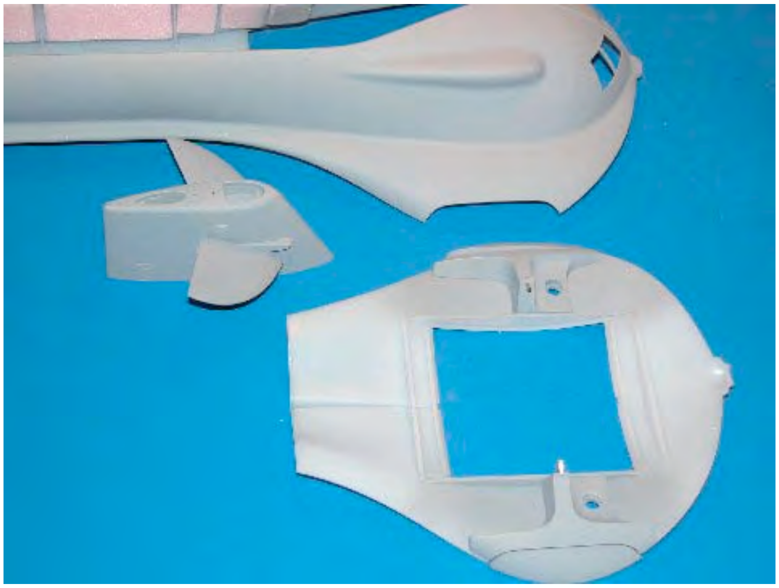


The interconnecting rudder bar was an item that has come late to the SEAVIEW fittings kit I'm producing for Caswell, Inc. I had originally planned on the customers working a length of brass rod to make this item, but after making one myself I deemed the task too difficult for the common, mouth-breathing type customer, so elected to produce the item as a cast metal piece and add it to the other items of the fittings kit. Here is the finished brass master and some of the tools used to get it this way. Reminded me of my brief stint as a jewelry designer/fabricator ... ugh!



The prototype rudder bar installed in the Moebius SEAVIEW kit -- it was that exercise that convinced me that our customers would be much better served by a unit supplied by us, ready for use. The rudder bar master is in foreground.

As you can see, only the central skeg rudder is driven by the servo -- the two outboard rudders are ganged to it through the rudder bar. This arrangement can clearly be seen in the eight-foot filming miniatures. This linkage was not employed on the big effects miniature.



I've taken a fitting kit and started working up the parts for use aboard the test-shot SEAVIEW I got from Moebius about a month ago. I've since secured two kits and will use those to generate a written and video 'how to' dealing with the integration of the fittings kit and how to trim the SEAVIEW model for submerged and surfaced operation via radio control.

The test-shot SEAVIEW coming together. Note that access to the SubDriver is through the now removable superstructure..

Getting the Moebius SEAVIEW Into the Water, Part-1

The Moebius SEAVIEW I converted to r/c was finished and put through its paces at the recent SubRegatta held earlier this month at the Reflecting Pool, Carmel, Indiana. The Attached movie is one of three attachments I'm providing of the footage shot there by Kerry Addington and Rick Galinson.

The below stills are some frame grabs from Rick and Kerry's video and will give you a quick appreciation of the ideal conditions there at the Carmel Reflecting Pool. We had perfect weather for the three day event and had a ball running this and the other boats we brought along.

Kerry Addington got some great movie shots of the SEAVIEW transitioning from surfaced to submerged trim. Here my SEAVIEW is ducking under as the ballast tank fills with water. The Observation Lounge/Compartment -- as with most of the models interior -- is free-flooding. Just behind the Observation Lounge, in place of the Control Room, is a standard Up-Periscope real-time video camera-transmitter. As long as I keep the SEAVIEW at periscope depth, where the camera-transmitter antenna projects, I can see what the camera sees (the scene bracketed by the four window frames -- just like being aboard the boat!) through a pair of virtual goggles. Neat!

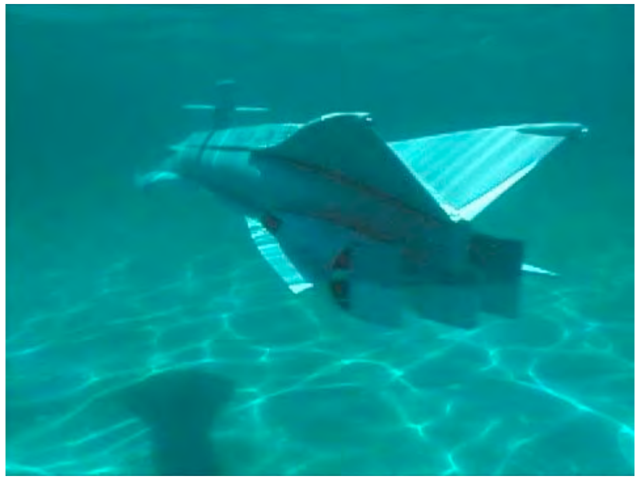
The size of the Reflecting pond is apparent here -- the depth is a consistent three feet and the bottom is concrete. There was very little chemistry in the water so r/c cross-range was excellent. The r/c Moebius SEAVIEW ran great and responded to rudder surprisingly well. Depth control was assured by the inclusion of a set of fixed vanes in the nozzles of the two propulsion tubes -- the vanes produce a constant 'pitch up' force needed to counter the 'pitch-down' force created by the shovel shaped bow. David Welsh (the only other guy there at the event with an r/c version of the Moebius SEAVIEW) did not incorporate the vanes on his SEAVIEW and as a consequence his boat kept diving to the bottom at an extreme down-angle each time he attempted to change from surfaced to submerged trim. Lesson learned.

Cruising along, decks awash.

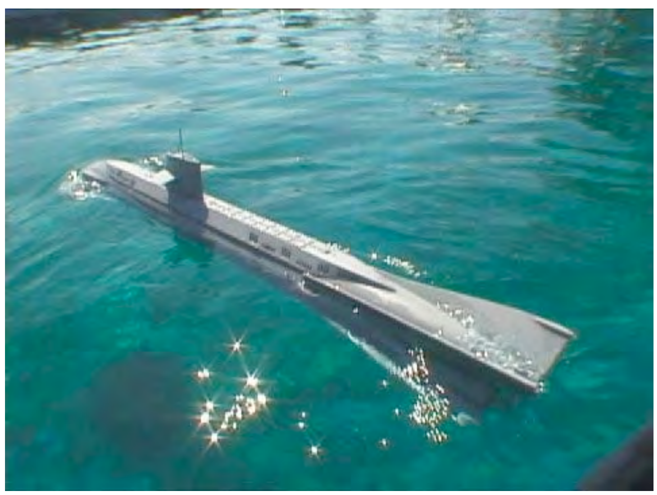
Taking off the angle as the boat nears Patrol Depth. Note that the bow planes on the r/ c Moebius SEAVIEW are practical control surfaces -- they are linked directly to the stern planes; they work in concert to effect angle changes on the boat. The practical set of sail planes are used for depth control -- note that those are at 'hard rise' at the moment, working to arrest the boats descent.

Bow planes on 'full rise'. An on-board angle sensing device controls the bow and stern planes -- it commands the planes to counter any unwanted pitch angle the boat gets into. I overdrive the angle keeper from the transmitter when I want to make quick depth changes on the model. Normally I leave the bow and stern planes alone and only drive the sail planes to seek or maintain a specific depth. Just like on the real boats.

No doubt some idiot will take this shot and show it off as 'proof' that the SEAVIEW is painted blue.



At the desired depth and the bow and stern planes are returning to neutral. Note in the nozzle of the port propulsion tube you can just make out one of the fixed vanes under the movable stern plane. The fixed vane gives a constant up-thrust vector, needed to counter the down-pitch force created by the bow and manta-fins -- a design problem, overcome by the fixed vanes.



Roll Closing-Credits!