

1/13th LSH 1980 Atlas Van Lines

Wood parts:

- 2 – 3/32" X 6" X 48" firm balsa (framework and sheeting)
- 1 – 1/16" X 6" X 48" birch plywood (deck doublers and transom)
- ¼" X 48" square firm balsa (deck strips)
- ¼" X ½" X 48" firm balsa (sump standoffs nose blocks)
- ¼" X 24" triangular firm balsa (sponson corner braces)

Cutting Parts

Use a glue stick or spray contact cement to attach the paper templates to the wood. If some of the wood is warped or bowed, it may still be used for the deck and sponson sheeting. Just make sure it curves in the direction needed and you make one right and one left part of each.

When cutting, leave the outlines showing then finish sand to the center of the lines. The paper may not sand completely away with the wood. It may look like you need to sand more, when you have already gone too far. Copy the centerlines and other marked locations from the templates to the parts. This helps with assembly.

Building Board

Find a solid 2 X 8, or 1" piece of plywood or dense particle board. Sand the top smooth and flat. Saw, plane or sand the sides parallel and perpendicular to the top, for a final size of 6.5" X 24". Check this with a scale, square and straight edge. Put the bottom pattern template and a sheet of wax paper over this. Cut out the areas marked for tack gluing.

Tunnel Assembly

The tunnel on this boat is more complex than most hydros. It is built in three curved sections. The reverse tunnel curve adds extra lift towards the rear of the boat. This will reduce drag and add stability in a straight line. The sump section lowers the center of gravity. This will improve cornering stability. It also adds strength, so the center bulkheads can be removed to make room for the electronics.

- 1) Position the straight part of the sump strip on the board and tack glue at the marks.
- 2) Glue the ¼" balsa standoffs to this. These hang half way off the outside edges with the "DN" side on the sheet. The front section will be curved and glued after the tunnel strips. Or add cross grain sections after the deck is on.
- 3) Tack glue the plywood temporary formers on the marks with 3/32" balsa spacers underneath the "DN" side.
- 4) Glue the control plate to the rear of the sump sheet.
- 5) Position the tunnel strips on the curve of the formers and standoffs. The back edges should contact the building board evenly and flat, along with the sump strip and control plate. Glue these to the top of the standoffs and just tack them glue to the temporary formers so the outside edges are 6.5" wide.

- 6) Bend the front of the sump strip up and glue in place. Or wait and add separate cross grain sheets after the boat comes off the building board.
- 7) Glue the ½ X ¼” balsa nose block (or ½” aircraft leading edge) to the front edge of the tunnel. The sump may extend below the bottom edge of the nose block, this may be blended into the nose later.

Frame

- 1) Glue ¼” X 10” triangular balsa strips along the straight bottom sponson edge of each stringer (one right and one left).
- 2) Glue the transom doubler to the transom.
- 3) With the tunnel still on the building board, assemble the stringers, bulkhead C and the transom without glue.
- 4) Check that the stringers are level with each other and that the bulkhead and transom top edges match up with the top of the stringers.
- 5) When this looks good tack glue bulkhead C first, then the transom to the stringers.
- 6) Recheck the alignment then add the rest of the bulkheads.
- 7) Glue all the joints except the base of bulkheads B, C & D (the centers of these will be removed later).
- 8) Bevel the base of the rear non-trip panels to match the stringers and glue between the transom and bulkhead C.
- 9) Glue the 1/16” ply doubler to the back of the right sponson. Also add 1/16” ply scrap to the inside to strengthen the turn fin mount.
- 10) Glue the ¼” balsa deck strips to the cutouts in the tops of the bulkheads from front to back. Keep this curve smooth, it will determine the top profile of the deck.
- 11) Carefully remove the frame from the building board. Do this by slipping a thin knife blade under the bottom to break the tack glue spots loose.
- 12) Check that the boat is straight by laying it on a flat surface. See if the bottom sponson edges of bulkhead C and the corners of the transom all touch at the same time. If there is much more than 1/16” gap counter twist the frame while heating with a hair dryer until it is level. You will want to keep checking this until after the deck is on. When ever a twist appears counter twist to correct.
- 13) Bend the sponson bottom sheets to match the curve of the bulkheads (use steam if needed) then glue in place.
- 14) Bevel the outside edges to follow the bulkhead profile.
- 15) Add the sponson sides using the same process. Work slowly while curving and fitting these parts. The closer they are to the profile of the support structure, the better. This helps keep the hull straight and the profile of the nose smooth.

Decking

Check the top and sides of the open framework for a smooth curving profile. Sand or fill any spot that needs attention. Trim the top of the sponson and rear non-trip sides to a smooth curve when viewed from both the top and the sides. The correct position of the deck is with the inside edges 4” apart. Make sure that all of the deck will meet with support structure before starting to glue.

You will glue the deck, one section at a time alternating one side then the other. Keep the boat on the building board to minimize warps. Do a practice run without glue to make sure you have enough hands and can get to everything without too much trouble (this is the toughest part of building the boat). The first section of deck to be glued is the center, out to the stringer in front and all of the back. The front section over the sponsons is glued after this.

- 1) When you are satisfied with the deck to frame fit, start by laying beads of thick, slow setting CA to the top of the open frame from the deck strip out to (but not including) the stringer in front, and everything from (and including) bulkhead C to the transom.
- 2) Place the deck on quickly and check that it lines up front to back with the center of the deck strip. Hold it until the CA has kicked off. Do the other side.
- 3) Put beads of CA on the bulkhead tops, stringer and sponson sides up front. You will have to hold the deck away from the frame and run little trails of glue along the under side of the deck where it meets with the tops of the bulkheads. Hold this down till the CA sets.
- 4) Trim the deck outside edges flush with the side panels.
- 5) Fill any gaps in the seams of the deck, bulkheads, bottom, and main stringers with thick CA so water won't find it's way past the exposed areas into the sealed off sections.
- 6) Cut the front deck center piece to fit the between the sponsons and glue in place. (The rear center section will go on after the antenna and rudder push rod installation).
- 7) Cut the centers out of bulkheads B, C and D where shown.
- 8) Take the temporary plywood formers off the tunnel bays.
- 9) Plane or sand a 7/32" X 45° bevel on the inside of the sponsons.
- 10) Bevel the sides of the sump as shown.

Sand all over with 220 grit using small sanding blocks. Be careful not to round the edges of the deck. Use 1" or 2" squares of 1/4" balsa with sandpaper glued on one side for this. Apply a thin coating of CA to the sharp corners to harden the edges and sand smooth. The basic hull is done, if you didn't use too much glue, it should weigh 3/4 lb.

Cowling, Cockpit, Engine & Deck Cover

Make a removable hatch cover by either bending 1/16" ply until it fits, or section, plane and sand 1/8" balsa or 1/16" ply sheet to the deck profile. Trim the edges to fit into this area without gaps or binding. Sand the top so the curve matches the deck.

Mark the side and top profiles of the cockpit cowling on a block of foam. Use a band saw to rough cut to shape. Get the final shape by sanding until the piece is round and smooth starting with 180 then 240 and finally 400 grit paper. Foam will gouge easily so be careful towards the end. This will be painted like the rest of the hull but don't use regular CA or resin. Test other materials on a piece of scrap before endangering good parts. Spackling paste, thinned with water makes a good filler for this. Some like to toughen the foam with

glass cloth and thinned epoxy (test with a scrap of foam before trying resin). The tail fins and wing can be made from 1/8" balsa covered with iron on film or painted.

Drive Hardware needed:

- 1 – 1/16" X 1" X 12" brass sheet (strut blade)
- 1 – .015 X 3" X 12" brass sheet (motor belly pan and end cap)
- 1 – 5/32" OD X 12 brass tube (lube fitting and water pickup)
- 1 – 7/32" OD X 12 brass tube (shaft bushings)
- 1 – 1/4" OD X 12 brass tube (stuffing box)
- 1 – 9/32" OD X 12 brass tube (strut tube)
- 1 – 5/16" OD X 12 brass tube (thrust spacers)
- 1 – 1/16" X 1" X 1" X 12" aluminum angle (motor mount)

Drive Tube Assembly

- 1) Cut the strut tube from 9/32" OD brass tubing, 1 1/2" long and smooth the ends.
- 2) Cut the strut blade to a 1 1/4" X 1 1/4" triangle from 1/16" brass sheet as shown.
- 3) Solder these together with a large fillet. Grind or sand the joint smooth.

When soldering, clean the metal surfaces by sanding. Don't touch these. Tin each surface with solder. Be sure both pieces are hot enough to get good solder flow then add the solder. Grind or sand off the extra. I use plain old 40 – 60 electrical solder.

- 4) Cut the stuffing box from 1/4" OD brass tube 6.88" long, smooth the ends.
- 5) For the lube fitting, drill a 1/8" hole through one side, 1 1/4" from the end.
- 6) Solder a 5/32" OD X 1/2" long piece of brass tube over this, being careful not to get solder in the hole.
- 7) Use CA to glue the strut tube over the other end of the stuffing box. Be sure the strut blade and lube fitting are in line.
- 8) Cut two 1" pieces of 7/32" OD brass tube and smooth the ends.
- 9) CA these in each end for bushings. Check that the 3/16" drive shaft fits through both of these without binding and without slop.
- 10) Add short pieces of 5/16" OD tube on each end and. Grind the end faces smooth and square for added thrust bearing area and to blend smooth with the thrust washers and drive dog profile.

When joining metal parts with CA glue, sand the surfaces to be joined with 100 grit and wipe them with a clean paper towel. Don't touch these before gluing. Add the glue and hold the parts together tightly while the CA sets off. Large parts can have little grabber holes drilled for the glue to hook into, or add deep scratches to the surfaces. Don't glue smooth greasy parts covered with fingerprints. Don't let the parts sit around collecting dust corrosion or rust. Glue right after sanding and cleaning.

Drive Line Assembly:

- 1) Cut the 3/16" drive shaft 8.5" long with 10-32 threads on the end.
- 2) Grind small flats on each end for the set screws.

- 3) Assemble the drive dog, thrust washers and propeller.
- 4) The *Dumas* 3/16" "dog bone" type U-joint will hold up to the stress of a 12-cell system very well. Drill out the motor end to 5mm (.19685"), centered on the original hole. A #9 drill is .196" a #8 drill is .199".
- 5) A piece of large silicon fuel tube 1/8" long will act as a cushion between the propeller and a 10-32 lock nut.

The propeller trailing edge centerline should be 1.5" back from the transom and .65" below the bottom. Wait until the motor is in before gluing the drive line.

- 1) Cut a .06" slit in the lower corner of the transom and bottom 9/16" to the right of the centerline for the strut blade.
- 2) Make an opening in the bottom sheet (9/16" to the right) 1/4" wide with beveled ends for the stuffing box to fit through without gaps.
- 3) Line this up with the motor (see below) and apply CA to the inside of the hull to stuffing box and strut joints. Don't use more than is needed to fill the seams. Add a thin bead of CA to seal the outside of the joints.

Motor Mount:

- 1) Cut the motor mount out of .06 or .09" X 1" X 1" aluminum angle using a hack saw or band saw and a file or grind to final shape.
- 2) Cut the motor belly pan from .015" *K&S* brass.
- 3) Wrap it around a 1 1/4" broom handle and let it spring back to the shape of the motor case.
- 4) Cut the end cap from .015" brass sheet.
- 5) Solder the end cap to the belly pan.
- 6) Bolt the motor, end cap – belly pan assembly and motor mount together.
- 7) Position this in a cutout in the tunnel so it lines up with the drive line at a 6.5° angle as shown. The pan will extend through the bottom of the sump by 3/8". When the motor position looks good CA it to the bottom along with the drive line (above).

Don't be tempted to have the u-joint take up much misalignment. This will cause vibration and wear.

Turn Fin & Rudder

The turn fin can be cut from the same aluminum angle as the motor mount, or use one made for a small nitro boat. Anchor this to the back face of the right sponson with a #6 wood screw (or two). If the turn fin is knocked off, it should separate at the mount. It shouldn't rip the back of the sponson off.

Install the rudder 1.75" – 2" to the left of the centerline and the hinge 1 1/2" behind the transom. I use an Octura OC4WRM. As with the turn fin, don't mount it so strongly that hitting something will result in the back of the boat coming off. Drill holes through the

transom and bulkhead F for the push rod sleeve to line up with the rudder and servo arm locations. I seal the push rod to sleeve gap with type A auto lube.

Radio and ESC

Use *Velcro* to hold the receiver to the right side between bulkheads E & F. The antenna can be installed in the right rear corner of the deck. Reinforce the inside of the deck where the base is attached by gluing a 3/32" balsa doubler inside the corner. Run the antenna wire for the receiver connector through a small hole in bulkhead F and sealed with tape. Install the rudder servo with servo tape or glue on the left, opposite the receiver. Once the antenna and rudder pushrod are installed, the open area between bulkhead F and the transom can be covered.

The electronic speed controller can be *Velcroed* to the left side main stringer just behind bulkhead C. This will put it beside the motor and behind the batteries. Check to see that all those heavy wires and power connectors have a place to go, and you can get to them. It is a tight fit for all this equipment. Try all routing options to see what works best.

Battery and Motor

Tack glue foam floatation blocks inside the main stringer between bulkheads B and C. One battery pack will fit snugly between these and anchor to the bottom with *Velcro*. The other will fit crosswise ahead of the motor. Carefully plan the motor lead placement and solder the capacitors, diode, and power connectors. Screw the motor in the mount and plan your wire route and connector placement. Be sure to locate the battery connector so you can get to it easily.

Finish:

Brush nitrate dope (or thinned epoxy) underneath the deck and in the corners inside the hull where the outside paint won't reach. This will water proof the wood without adding too much weight.

There are many ways to cover wood for use in the water. Many people use epoxy mixed 50:50 with alcohol with good success. I have seen a very light weight application of ½ oz. glass cloth and resin used. Prime if needed and sand smooth with 320 grit before painting. I like to spray Midwest Formula-U right on top of bare, smooth sanded wood:

Spray 3 or 4 **light** coats of *Formula-U* on 5 to 10 minutes apart. Do this on a 70° to 90° day (also soak the paint can in warm water) so it will penetrate into the wood just a little before starting to set up. Leave this for a week then sand it down until the wood starts to show through with dry 220 or 320 paper (you will go through lots of it, because it clogs quickly). Then spray 3 or 4 more light coats on as before (don't be tempted to add enough to cover in the first couple of coats). The last coat can be glossy (it will run easily on vertical surfaces). Don't handle this for a couple of weeks. If you don't have dust, orange peel, or runs in the finish, this will be about as fine a painted surface as you could want. If not, you can wet sand with 400 or 600 grit. Then use automotive polishing compound and wax to put a nice gloss on it.

Krylon exterior/interior acrylic is a popular electric model boat paint too. Spray this on top of *Krylon* white sanding sealer, then finish this up with a coat of *Krylon* Crystal Clear after the trim is on. Don't mix paint types without first testing on expendable parts.

The boat logo, U-number, and decorative trim can be painted or "stuck" on, depending on your skill or preference. If you are good with paint and masking fluid or tape try that, or cut *Monokote* trim sheet with a very sharp blade and a steady hand on a glass surface.

Running

This boat handles like most scale pickle-fork hydros. It will start from a standstill with very little slippage on an X series prop. Punch it through it's own wake quickly with full throttle so it won't dig the nose under (a right turn helps). Once on top of the water you can back off and keep it on a very stable plane at quarter throttle. Full power will get the tail off the water within a few feet and you will see a nice rooster tail. As the tunnel fills with air, acceleration will improve and the rooster-tail will thin out. The ride will get smooth and most of the spray will disappear. The boat is now "on the cushion".

The boat will turn very flat without losing much speed. For tight turns reduce power momentarily before starting into the corner. Then add rudder and get back on the throttle. You should be able to hold lane one once you get your skid started. If you are taking a wide line, you can stay at full power through the turn if you don't slam too much rudder to get things started. The boat will turn very quickly if you use a light touch. It will even turn to the left if you don't push too hard.

The Speed-700 type motor is very durable if you don't over prop it. It will take a few runs for the brushes to seat in and come up to full power. The boat should run very well with an X642. By cutting back the leading edge 10 – 20% you can increase run time without reducing top speed. You should be able to swing an X646 with an SS1 to get very impressive speed.

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