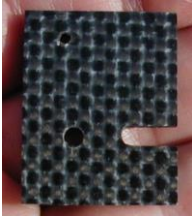


## MAKING YOUR OWN ORCA CAMS & CANOPIES

By Harley LSF 023

This option is always viable if preferred to buying pre-made items that may be available.

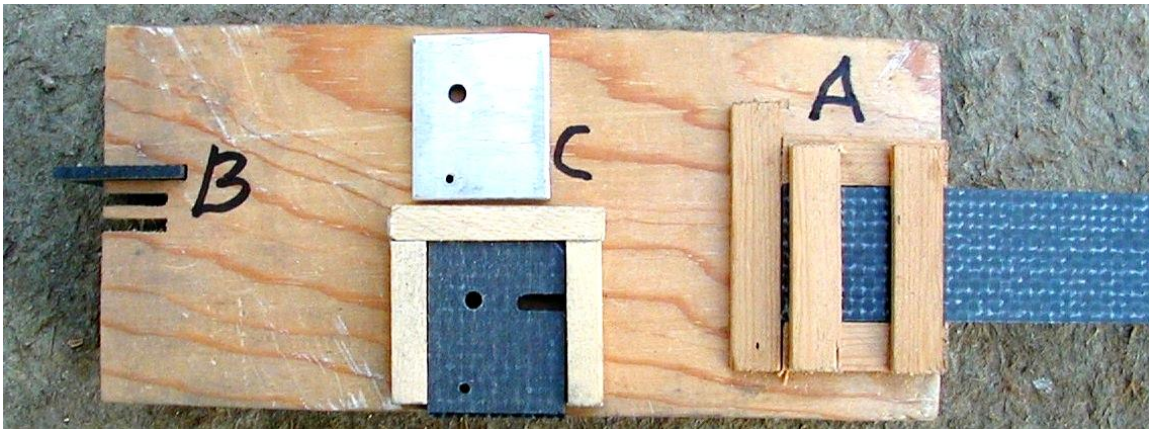


I have some premium .095" thick carbon plate ideal for cams. As long as possible, I'll supply (A) Rectangular 1" x 1-3/8" blanks or (B) pieces shown on left, precisely slotted for 1/8" drive pins, precisely drilled with #30 bit to pivot on 1/8" wire & precisely drilled & tapped for Dubro 2-56 ball links. You shape perimeters. Confirm availability with me at [harleyem@charter.net](mailto:harleyem@charter.net).

Please note: This offer is available only inside CONUS, Hawaii, etc.

PRICES, postpaid: For (A) \$5/pair. For (B) \$10 a pair. Not set up for credit cards, PayPal, etc. Send US paper money, check or M.O. to Harley Michaelis, 26 S. Roosevelt, Walla Walla, WA. 99362.

With the (A) blanks & suitable tools, you can turn them into (B) pieces. To do so, the easily-made A,B,C jig shown is useful. The base is  $\frac{3}{4}$ " ply.



At "A", wood strips are glued down to snugly receive 1-1/4" of a 1" wide strip. Avoid glue inside. Using the Dremel with cutting disk, cut about 1/8" beyond the base edge to get a blank about 1-3/8" long. Sand raw edges up square.

At "B", use a band saw, etc. to size a vertical slot to tightly grip a blank. The actual cam slot (5/16" is deep enough) is cut with a 1/8" thick disk mounted in a drill press. Most disks have a 3/8" hole & will center nicely on a 3/8" bolt. Tighten with a washer & nut. Slip the assembly fully into the chuck. Loosely clamp it. Clamp the drill press table firmly about 1/2" under the disk. Lay a 3/8" drill bit or anything that thick under the disk. Lower the disk to it. Firmly tighten the chuck. Protect yourself from the flying CF dust, preferably with vacuum nozzle where it spews out in this & other steps to follow.

To cut a clean, uniform slot, press the jig & cam blank flush to the table. Note which direction the disk rotates. Angle the jig so the disk smoothly rides on cam edge, rather than gouging into it. Easy does it. Let disk fully stop before removing the work.

At "C", wood strips make a fence around stacked cams & a 1" x 1/8" aluminum guide pre-drilled with 1/16" & #30 bits. Before starting the drill, center the bit in a guide hole. Use thumb to keep stack & guide aligned.

To tap the 1/16" hole, seat the tap in a handle, square it up & continually press hard when turning it to actually make threads. Cover cam with masking tape to mark the perimeter shape on it. Finish with Dremel, hacksaw, disk/belt sander, etc. CF dust will fly.

### CANOPY

Fit a separate "canopy" balsa block between the adjacent thick top blocks. On its underside, glue strips across near front & rear to center & stabilize it on the fuselage. Note the fuselage 1/8" balsa doublers are contoured toward the outer edges of the ply SS's. Simultaneously work all to final shape, ready for glassing-over. Smear a coat of quick epoxy to the horizontal top edges of the canopy opening. Let cure & block sand smooth.

Make a decision to (A) use the balsa block as the "canopy" or (B) as a "plug" over which to make a female fiberglass mold & then a fiberglass canopy in it. For (A) remove the block. Reinforce its open grain ends & adjacent fuselage open grain ends with thin CA glue.

Between the stabilizing strips, lightly glue a block to use as a handle. See pic on page 3. Cut a couple of layers of light fiberglass cloth to drape over the shaped block. Throw-away "acid" or "epoxy" brushes are very practical. Use thin epoxy or a polyester "finishing" resin, such as the Sig, that cures non-tacky. Attach cloth by brushing resin over it along the long center first & then downward to flatten any puckers.

Warmth speeds curing. When fully cured, smooth with progressively finer grits of sand paper. Stroking inwardly at edges, use a sanding block to remove excess cloth. Optionally, apply an additional coat of resin or a coat of the "scratch filler" mentioned in GCF#5, page 4 to further fill weave & smooth the surface. After later painting, break off the handle & hollow out the block to clear hardware.

For (B): Do (A) steps except reinforcing fuselage blocks end grain. Instead, extend each end 1/8" on which to place 1/8" trim tape. See 2<sup>nd</sup> picture below. The plug will not be painted, but needs to be nicely finished to make a mold over it. Brush down a layer of light cloth over it. Let it cure well. Lightly wet sand it glass smooth. If needed, brush on the scratch filler, let cure & wet sand it smooth. When satisfied, coat the plug with paste wax. Buff out with soft cloth. Repeat at least 2 more times.

On a clean surface, roll out two 18" strips of tacky  $\frac{3}{4}$ " plastic tape.  $\frac{1}{32}$ " from top edges, apply tacky  $\frac{1}{8}$ " trim tape. Wax tapes & rub out. Size tape pieces to fully surround fuselage opening,  $\frac{3}{4}$ " tape precisely aligned to its edges. See that all tape is stuck down flat. Optionally, mask further around the opening to avoid slopping resin on the raw balsa fuselage. Position the plug on the fuselage. Study pictures below & then follow instructions under them about applying fiberglass & resin.

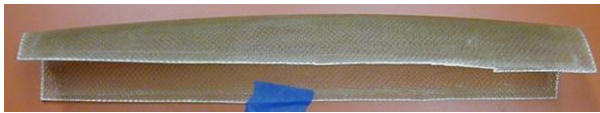


This shows  $\frac{1}{8}$ " tape over  $\frac{3}{4}$ " tape stuck to the balsa fuse side by the canopy opening. Note  $\frac{1}{32}$ " clearance. Ignore the brown background.

The impression the  $\frac{1}{8}$ " tape makes in the mold is transferred to the canopy. The  $\frac{1}{32}$ " setback allows for shrinkage & smoothing along the long canopy edges.



This shows the '89 ORCA plug & mold. After shaping fuse top (with plug), the plug is removed & ends are extended  $\frac{1}{8}$ " for trim tape where black stain is seen. Note trim lines formed inside mold by the  $\frac{1}{8}$ " tape. used. Black stain lines indicate where tape was once affixed.



This is a roughly trimmed canopy out of the mold. Note the molded-in trim lines.

**MAKING THE MOLD:** Coat the plug & tapes with release agent, such as green polyvinyl alcohol. The mold should be rigid so use several glass cloth layers. Precut to drape over plug & tapes. Lay light cloth on the plug first. Brush with resin & then add progressively heavier layers. When thoroughly cured, gently pop off at corners. Trim to  $\frac{1}{2}$ " or so beyond the  $\frac{1}{8}$ " tape impressions.

**CANOPY:** Rinse release agent from mold. Wax & buff it at least 3 times. Apply fresh release agent & let it dry. Precut a layer each, preferably of light, medium & heavy cloth or use more light layers. Working from center toward ends, apply light cloth first, then medium, then heavy, being sure all is wetted out & no puckers. Pick up excess resin with cotton wad. Let fully cure, pop out canopy, rinse off release agent, trim canopy to reference lines & then fine trim/fit to the fuse. As needed, trim to lower to fuselage contours or sand fuse to canopy. When satisfied, mark inside canopy ends on  $\frac{1}{4}$ " balsa to outline the rests the canopy fits over. Cut the rests & glue them to the fuselage blocks.